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Power and Trust: Analysis of the Effects of Deglobalisation and Financial Technology in the United Kingdom, United States and European Union

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Abstract

This thesis researched the effects deglobalisation and financial technology are having on the United Kingdom, United States and European Union since the 2008 Global Financial Crisis (GFC). Particular attention is paid to financial services, as it is the industry most closely related to the GFC and is central to the concept of financial technology.

It begins by examining the development and dynamics of the globalised economy, defines what deglobalisation is, reviews financial crises predating the GFC and introduces the concept and history of financial technology. Analysis then focuses on the current financial regulatory landscape of the EU, UK and US. It then reviews technological developments that have occurred in the aftermath of the GFC to determine which have the greatest likelihood for adoption by the financial services industry within the next five to ten years and how they are most likely to be implemented. Particular attention is given to blockchain and smart contracts and their potential for business integration.

It then assesses financial legislation passed during Trump's tenure to determine its ramifications. The thesis concludes with analysis of the state of deglobalisation and socioeconomic conditions, especially within the UK as of 2021, the outcome of the finalised Brexit agreement for financial services and how they have affected the UK economy. This is to determine what the consequences of the period of deglobalisation from 2016 to early 2021 have ultimately meant for the US, UK and EU.

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Chapter 1 Introduction

The 2008 Global Financial Crisis (GFC) did not just crash the world economy, it destroyed faith in the economic system. The Brexit Referendum and the election of Donald Trump were two major reactionary political events with impending economic consequences that occurred in the aftermath. They indicated an upheaval in the long-term trend towards greater global integration and a change of course towards protectionism known as deglobalisation. Regarding financial services, deglobalisation has the potential to result in differing regulatory priorities, regulatory divergence and increase the cost of cross-border financial transactions. More research was required to better assess what this trend really means.

The initial aim was to research what was transpiring regarding deglobalisation and how it was affecting the financial services industry. During the course of the literature review and as more in-depth research was performed the focus broadened. It was apparent aspects of deglobalisation were transpiring, but also that technology was another area of disruptive change affecting financial services. Recent technological innovations in financial services are known collectively as fintech, a portmanteau of financial technology. The industry's regulatory and technological landscape is quickly changing in response to deglobalisation and fintech. This thesis has researched the effects these simultaneous developments have had for the UK, US and EU and how they are altering the dynamics of their relationships. The question this thesis attempts to answer is:

What effects are deglobalisation and fintech having in the US, UK and EU regarding their interrelations and financial services?

The deglobalisation movement is a reaction to and rejection of the state of the globalised economy in the 21st century. Advents in fintech being integrated into the infrastructure of the financial services industry are truly revolutionary. This means the rise of fintech in this period of deglobalisation is a very broad, multi-faceted area of research that needs to be comprehensively viewed from the political, economic, sociological, technological and legal viewpoints so assessment of these two factors can be made. Research of these subjects in tandem is very relevant; as Stephen D. King, Senior Economic Adviser for HSBC stated, "Technology can both enable globalisation and destroy it" (King, 2017:6).

The analytical theme of this thesis is based on the concept of *caveat emptor, cui prodest*, meaning buyer beware, who benefits? What was observed with deglobalisation in the form of Brexit and Trump and financial technology alike were grand promises with unforeseen results. The research timespan made it possible to see what was purported as the benefits of these issues when they

were new and then retrospectively assess what transpired to determine what the impact of deglobalisation and fintech have been and who gained the most from the changes they brought.

Chapter 2 Literature Review

The literature review has four sections. It provides an introduction to the historical background wherein deglobalisation and fintech have emerged. It covers:

- Development of the Global Economy
- What is Deglobalisation?
- Modern Failures Prior to the GFC
- The History of Financial Technology

2.1 Development of the Global Economy

2.1.1 **Classical Liberalism**

The purpose of this first section is to provide the reader with a basic understanding of the dynamics of the global economy. To comprehend development of the modern global economy and what deglobalisation opposes, analysis begins at a shared theoretical point of origin for both sides of the political and economic spectrum of market economies - classical liberalism.

> Classical liberalism's psychological creed was based on four assumptions about human nature. People were believed to be egoistic, coldly calculating, essentially inert and atomistic (Hunt, 1995:38).

It is the philosophical basis for both conservativism and social liberalism because of its focus on the protection of civil liberties. For conservatives, its appeal is the protection of economic liberties, whereas liberals value the protection of social liberties. Neither ideology favours pure classical liberalism, which purports government's role is to protect both types of liberty (Butler, 2015; Hudelson, 2015). Classical liberalism has as its central theme the notion that, "the 'higher ranks' of individuals are motivated by ambition" (Hunt, 1995:39). The four assumptions of human behaviour could also be summed up as, 'greed is good', the mantra of Gordon Gekko in the Reagan era film *Wall Street* (Weiser & Stone, 1987). That was from a work of fiction, but its sentiment is not.

The foundations for this school of thought were developed two centuries prior by Scottish economist and philosopher Adam Smith with the theory of the 'invisible hand'; it states free exchange leads to natural equilibriums in price and production (Hunt, 1995; Hunt & Lautzenheiser, 2011).

> In 1776, with the publication of Adam Smith's *The Wealth of Nations*, a new individualistic philosophy – classical liberalism – had definitely gained the ascendancy in England … In condemning greed, acquisitive behavior, and the desire to accumulate wealth, the medieval Christian paternalist ethic condemned what had become the

> capitalist order's dominant motive force. The capitalist market economy, which had been extended by the late eighteenth century to almost every phase of production, demanded self-seeking, acquisitive behaviour to function successfully. In this context new theories about human behaviour began to emerge. Writers began to assert that selfish, egoistic motives were the primary if not the only ones that moved people to action (Hunt, 1995:29-30).

Smith's theory formed the basis of discourse on the virtues of capitalism and marked a distinct break from the feudal paternalism that had dominated Europe since the middle ages. He postulated in his earlier work, *The Theory of Moral Sentiments* (1759), the invisible hand theory can only properly function when social justice prevails (Maczynska & Pysz, 2010). Also revolutionary was Adam Smith's opinion on international trade:

> If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage (Smith, 1776:993).

2.1.2 The Law of Comparative Advantage

Smith's viewpoint on international trade was expanded by British economist David Ricardo, who in the early 19th century developed the law of comparative advantage. Smith focused only on absolute advantages, like the production of different goods in individual countries and viewed it in the context of one country producing a good more efficiently than another country and each producing what they can at an advantage and importing the other good (Hayes, 2019; Ricardo, 1817). The mathematical basis of the law of comparative advantage is a country should not produce goods it is able to produce in greater quantities, but rather those with a lower opportunity cost. Table 2.1 illustrates this:

Table 2.1 Absolute Versus Comparative Advantage and Opportunity Cost

Country	Units		Opportunity Cost of Wine (Wine/Cheese)	Opportunity Cost of Cheese (Cheese/Wine)
	Wine	Cheese		
France	20	10	0.5	2
Italy	30	22	0.73	1.36

Italy has an absolute advantage in the production of both wine and cheese. Most important is that France has a lower opportunity cost for the production of wine. This means France has a comparative advantage for wine, whereas Italy has both a comparative and absolute advantage for cheese due to its lower opportunity cost (Dean et al., 2020). The law of comparative advantage

states implicitly, “trade between two nations normally raises the real incomes of both” (Krugman, 1996:1) and has been the primary argument in favour of international trade. It means a nation less efficient at producing everything can still benefit from product specialisation and is the impetus for globalisation.

The major periods of globalisation were between 1850-1914 and 1945-1990. The period from 1990-2008 could be considered one of ‘hyperglobalisation’ brought on by deregulation, privatisation, the fall of the Soviet Union and developments in communications and information technology (Frankel, 2000). The situation now is as King states:

> What went so right in the years after the Second World War – a period during which economies became both richer and increasingly integrated with each other – and why did it all seem to be going so wrong at just the point when lasting success was, for many observers, guaranteed? (King, 2017:8)

2.1.3 **Economic Versus Political and Social Systems**

Regarding deglobalisation, it is necessary to first be aware of the differences between economic, political and social systems. Capitalism and communism are opposite ends of the economic spectrum and receive the most criticism and attention in debate of which is superior or how society should function. This viewpoint is too simplistic - all economies are some form of a mixed economy. Examples would be how the UK provides primary healthcare to everyone and secondary healthcare to ordinary residents free of charge via the National Health Service (Public Health England, 2019) or how the US has social security and public education systems. These examples are the opposite of capitalism, yet exist within two very capitalistic nations.

Capitalism is both an economic and political system; its main trait being industry and trade are controlled by privately owned businesses to generate profit (Downes & Goodman, 2003). With communism and socialism, the state owns the means of production and they do not have purely economic and political aims. Their shared goal is also social, as both envision the creation of a new type of society (OED, 2018). Like them, deglobalisation wants to reform how the economy and society function and takes exception with capitalism, albeit in a more nuanced manner.

Economic debate is further complicated because many choose to willingly conflate socialism with the past failures of communism. This first began with the anti-communist movement instigated by former FBI Director J. Edgar Hoover and Wisconsin Senator Joseph McCarthy in the 1946 US Congressional elections when they intentionally labelled communism and socialism as one in the same (Hall, 2019b). The fact is they are two separate schools of economic thought. This same behaviour is characteristic of Donald Trump. As reported by the *New Republic*:

> Trump has attempted to turn the 2020 primary into a binary choice between his (corrupt) presidency and Venezuela-style socialism. Many in the media have followed his lead, pressing Democrats on whether or not they are socialists, despite the fact that none describe themselves as such. This pseudo-story not only has rendered the term 'socialism' meaningless—conflating national health insurance and graduated tax systems with a government takeover of the entire economy - but it is erasing important distinctions in Democratic candidates' policies that ought to be the focus of debate (Shephard, 2019).

The fundamental difference is with communism the government provides and compensates individuals based on what the government sees as being adequate to meet an individual's needs; a true communist system renders money obsolete. With socialism, an individual's contribution is the basis for their remuneration, meaning someone working harder or producing more output should be compensated accordingly. Because of the communist system's inherent inability to accurately quantify the value of labour or goods it has repeatedly failed due to a lack of personal motivation, as it was not focused on satisfying anyone's immediate self-interests (Caplan, 2022; Heilbroner, 2005).

What socialism and communism have in common is a highly centralised form of government and state ownership of industry. In modern social democracies such ownership is typically only in key sectors, such as healthcare or infrastructure. Even in the US, natural monopolies, like hydroelectric power stations, are sometimes owned by the municipality they serve (Idaho Falls Power, 2020).

The definitions of socialism and communism have been conflated for so long they are now synonymous with loss of liberty and freedom of choice in the mind of the average American. Any cooperation is considered a sign of weakness and is associated with authoritarianism and communism's westward expansion from Russia at the end of World War II (Hall, 2019b). This was due to intentional fear mongering then and has happened again. It is a tactic of divide and rule combined with a long-term promulgation of the idea anything that does not enable privatisation and profiteering in every sector of the economy is a communist endeavour. When campaigning for the Democrats in 1952, former President Harry Truman stated:

> Socialism is a scare word they have hurled at every advance the people have made in the last 20 years. Socialism is what they called public power, social security, farm price supports, bank deposit insurance, the growth of free and independent labor organizations. Socialism is their name for almost anything that helps all the people. When the Republican candidate inscribes the slogan 'Down With Socialism' on the banner of his 'great crusade,' that is really not what he means at all. What he really means is, 'Down with Progress – down with Franklin Roosevelt's New Deal,' and 'down with Harry Truman's fair Deal.' That is what he means (Mikkelson, 2019).

Prior research has found that collectivist systems have two inherent problems. The first is the lack of quantitative indicators of relative value of commodities because no one knows the shadow prices which reflect the values of goods in relation to one another and is why pure communism renders money obsolete. In the USSR, because no one knew the exchangeable value of anything, the entire bureaucracy tended to be conservative (Ehrbar, 1998).

> The failure of the economies of the former socialist countries of Czechoslovakia, Hungary and Poland, was due to national accounting aggregates being distorted by unrealistic producer prices, incorrect weighting (in as much as industry was assigned higher than actual shares in net material product), and by inappropriate index-number methods (Vonyó & Klein, 2017)

Eastern European socialist economies were effective when in a phase of extensive growth, but slowed down when investment reached a point of diminishing returns and eventually collapsed in the 1980s because both national accounts and investment statistics were untrustworthy under centralised collectivist governments (Vonyó & Klein, 2017). Without reliable means of accounting and comparison of the value of goods like market economies, they cannot quantify values such as marginal rates of substitution, price elasticity, breakeven points or many other measures used for determining relative values.

This flaw with collectivism is due to the Marxist theory of surplus value which believes value is only produced by human effort. It meant their accounting systems could not accommodate price fluctuations up or down, as is possible with the utility theory of value (Ehrbar & Glick, 1987; Hall, 2019b; Hunt, 1995). The quantification of value is something at which market economies excel, because within them many jobs are focused on accurate price determination.

The other reason for the downfall of former collectivist economies is what behavioural economics has shown: “People are impatient - they like to experience rewards soon and to delay costs until later” (O'Donoghue & Rabin, 1999:103). It is the same belief formulated by Jeremy Bentham that people are inert and only motivated by pleasure or avoidance of pain. If effort will not yield immediate rewards, people generally choose to be lazy (Hunt, 1995). In capitalist economies there are ramifications for this behaviour, like failing to save for retirement.

Collectivist economies have converted to market economies for two fundamental reasons – they are inferior at accurately quantifying the value of labour and goods and do not foster willing participation and innovation from individuals. People want relatively immediate and accurate compensation for their efforts, especially when living at a level of bare subsistence. An example of this is Vietnam. In the late 1980s it moved from being a socialist state to a position of being socially

oriented but with a market economy by first allowing individuals to sell surplus produce and now has a capitalist economy (Vanham, 2018).

A difference also exists between socialism and social programs. Having a market economy and allocating adequate funding to social programs is not the same thing as socialism. Examples of what is considered socialism are extremely varied, such as Myanmar (Burma) and Norway. They are as different in history, population (55,590,071 versus 5,467,439) and per capita GDP ($6,300 versus $91,781) as they are in geography (CIA, 2020). They possess fundamental differences and resources that no form of government or economy can change, yet both are broadly labelled as being socialist.

Market economies encourage continuous improvement by providing individuals the right of refusal and the freedom to choose whether to purchase a product or service or seek it elsewhere. Having an economic structure that enables this, yet also realises that governments themselves are not profit seeking enterprises, but rather an entity with a mission - which is the management of their resources in a way that positively affects the wellbeing of all of their people - is paramount to understanding the core issues underlying the deglobalisation movement.

What all this means is that greed may or may not be good, but any economic system that does not permit individuals to work for their own self-interest and cannot accurately quantify and compensate effort will not foster willing participation. This correlates with the fourth tenet of classical liberalism – atomism – which holds that, "the individual is a more fundamental reality than the group or society" (Hunt, 1995:39). Thus any society is no more than a sum of its individual members and is what Margaret Thatcher meant when she said:

> You know, there's no such thing as society. There are individual men and women and there are families. And no government can do anything except through people, and people must look after themselves first. It is our duty to look after ourselves and then, also, to look after our neighbours (Thatcher, 1987).

2.1.4 The Social Contract

The social contract is a core aspect of human relations collectivist economies embrace and capitalist economies generally ignore. It is synonymous with English philosopher Thomas Hobbes' (1588-1679) most famous book, *Leviathan*, in which he wrote:

> And because the condition of man ... is a condition of war of every one against every one, in which case everyone is governed by his own reason, and there is nothing he can make use of that may not be a help unto him in preserving his life against his enemies; it followeth that in such a condition every man has a right to everything, even to one another's body. And therefore, as long as this natural right of every man to everything endureth, there can be no security to any man, how strong or wise soever he be, of

> living out the time which nature ordinarily alloweth men to live. And consequently it is a precept, or general rule of reason: that every man ought to endeavour peace, as far as he has hope of obtaining it; and when he cannot obtain it, that he may seek and use all helps and advantages of war. The first branch of which rule containeth the first and fundamental law of nature, which is: to seek peace and follow it. The second, the sum of the right of nature, which is: by all means we can to defend ourselves (Hobbes, 1651).

Until people work together and relinquish some autonomy for the safety of living in peace with one another, there is no rule of law. This requires some to be in positions of authority and others who are inferior. By establishing a hierarchy, cooperation with one another and a functioning society is borne. This is the social contract that enables individuals to live well and thrive. Without it, people are forced to live in a constant state of fear of predation. Classical liberalism also believes government exists to minimize conflict and protect people from one another and the existence of society also has economic benefits as it enables the division of labour (Hunt, 1995; IEP, 2019).

The first formal legal establishment of the social hierarchy and the rights and responsibilities of everyone, rulers included, was arguably the Magna Carta in 1215. It was essentially a peace treaty between the King and rebelling barons and was considered a failure at the time. Despite this, its core principles were the foundation for the US Bill of Rights in 1791, the Universal Declaration of Human Rights in 1948 and the European Convention on Human Rights in 1950 (Breay & Harrison, 2014).

Times have changed. American historian Rich Hall provided this viewpoint on how hierarchy exists in today's society:

> When you go to work in the morning, if your name is on the front of the building, you're rich; if your name is on your desk, you're middle class; and if your name is on your shirt, you're (expletive) poor (Hall, 2018).

The result of social hierarchy and division of labour is supposed to be more leisure time and enough security for individuals to focus on achieving self-actualisation, as seen in American psychologist Abraham Maslow's Hierarchy of Needs in Figure 2.1.

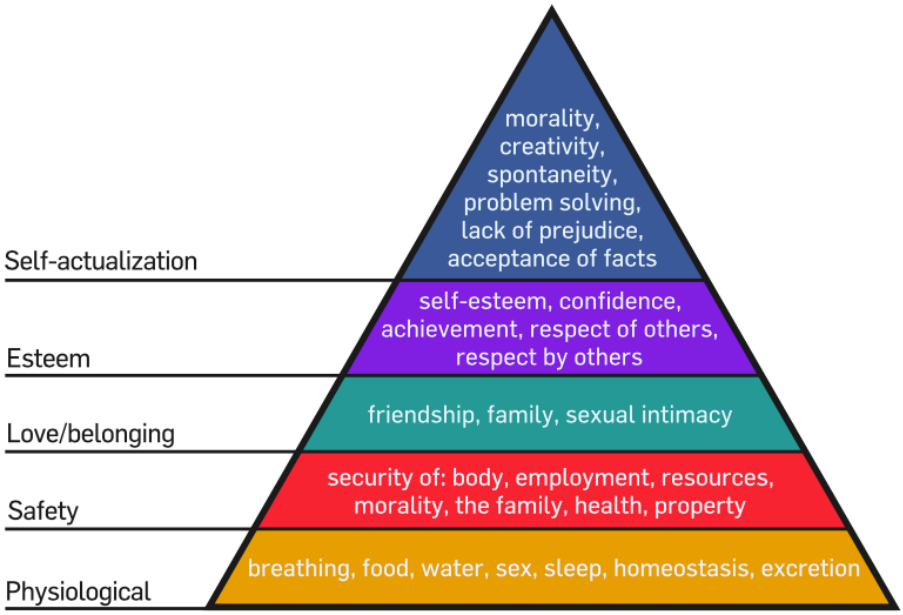


Figure 2.1 Maslow's Hierarchy of Needs

(Wikimedia, 2020)

Fulfilment of these needs was also motivation for the American Revolution, as stated in the American Declaration of Independence:

> We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed. That whenever any form of government becomes destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its foundation on such principles and organizing its powers in such form, as to them shall seem most likely to affect their Safety and Happiness (US Congress, 1776).

People require a socioeconomic system with adequate balance between those with strict central control that uniformly prioritise the needs of all individuals and ignore their atomistic desires versus others that prioritise private ownership and self-interest and are plagued by strife and class divisions. It also is not necessarily the type of political or economic system per se, but rather how power is used, as any government can use its authority for its own benefit foremost. The ongoing debate is how much and what type of economic involvement a government should provide.

Sometimes the private sector requires government support, like with the GFC bailouts, other times it shuns its intervention, like with regulations designed to prevent financial crises or that benefit society at large – something known as socialising risk and privatising profit. Socioeconomic hierarchies exist; everyone is somewhere in the pecking order. The persistent conflict is maintaining

cooperation in the form of the rule of law between everyone involved. It is a struggle old as humankind that now has manifested itself in the form of deglobalisation. Those who voted for Brexit and Trump felt that the globalised economy had been destructive to their life, liberty and pursuit of happiness because the way the global economy had developed to work was not working for them.

2.1.5 Institutions of the Global Economy

Assessment of deglobalisation requires familiarity with the major institutions and concepts of the globalised economy. This begins with where the modern world economy began – the end of World War II.

> For globalization to work, nation states need to accept reductions in sovereignty for the greater good. But who decides what is the greater good? (King, 2017:8)

The role supranational institutions fulfil in the globalised economy has been one of deciding what the greater good is. Deglobalisation opposes them and the power they hold and considers them instrumental in the continued privatisation of property and promulgation of corporate interests.

Examination of how four of the global economy's major components were created, their objectives and the ways in which they operate follows. These are: the World Bank, the International Monetary Fund (IMF), the World Trade Organization (WTO) and the European Central Bank (ECB). Analysis of the main underlying schools of modern economic thought in the US, UK and EU is also provided.

2.1.5.1 Bretton Woods

A new international monetary system, commonly known as Bretton Woods, was negotiated in July 1944 in Bretton Woods, New Hampshire at the United Nations Monetary and Financial Conference. The agreement fixed the price of gold to the US dollar and then valued other currencies against it. This system lasted until the 15th of August, 1971, when US President Nixon stated that it would no longer be possible to exchange US currency for gold (Ghizoni, 2013).

One of the main causes of World War II had been the punitive measures of the Treaty of Versailles at the end of World War I. Having seen its outcomes, the architects of the Bretton Woods had multiple goals. Foremost, they sought to create a stable system for international commerce that prevented 'economic aggression' by means of currency devaluation and expanding of the money supply via printing of money, as happened in the Weimar Republic (Steil, 2013).

Bretton Woods became fully functional in 1958. Currencies became convertible at a rate of 35 US dollars per ounce of gold; other countries settled their balances against one another in dollars.

The US had authority for adjusting the supply of dollars and keeping the price of gold against dollars fixed. The agreement was fully operational from only 1958 to 1971 and from that point moved to having currencies backed by faith in the economic system alone; what it did was get the international economy functioning. The world economy is still overseen by the two major developments of Bretton Woods, the International Monetary Fund (IMF) and the World Bank Group (Chen, 2019).

2.1.5.2 The World Trade Organization

Bretton Woods also created the General Agreement on Tariffs and Trade, a precursor to the WTO, whose mission is the promotion of international commerce and the reduction of tariffs (Boushey, 2017). Bello believes WTO trade agreements promote monopolization of high-technology innovations by US companies through the Trade-Related Intellectual Property Rights Agreement and that the Agreement on Agriculture enables EU and US companies to engage in monopolistic competition in third-world countries (Bello, 2004).

2.1.5.3 The World Bank

Because of the massive devastation that occurred in the European and Asian theatres of war, Bretton Woods also established the International Bank for Reconstruction and Development (IBRD) to assist with financing reconstruction. Thereafter the IBRD, better known as the World Bank, refocused on helping developing nations finance major infrastructure projects. A loan taken out with the World Bank is backed by the government of the borrowing nation (Downes & Goodman, 2003).

It has 189 member countries, known as shareholders. It is compulsory to first join the IMF. The largest shareholder in the World Bank is the US; this gives it the authority to appoint its president. A board of governors represents the other members. The US, Japan, Germany, France, Germany and the UK are five of the six largest shareholders and have individual Executive Directors (ED). There are 24 in total; the other 16 EDs represent other members as individual groups; due to the size of their economies, China, Saudi Arabia and Russia each have their own dedicated ED (Hall, 2019a).

2.1.5.4 The International Monetary Fund

Until abolishment of the gold standard in 1971, the IMF's role was supervising daily operations and adherence to the Bretton Woods exchange rate system. This involved short-term lending of reserve currency to nations for settling debts and supporting their own currencies. Now it assists developing countries and attempts to reduce poverty (Ghizoni, 2013). The financial obligation to join the IMF is the purchase of 195 World Bank shares at $120,635 each, plus a subscription fee of 88.29% of the quota due. This determines a member's maximum financial commitment and voting power. The US has the largest quota of $118 billion, the smallest is Tuvalu at $3.5 million (Hall, 2019a; IMF, 2017).

The 13 IMF members hold 58.73% of the total voting power. The US has more than three times the share power of any other country at 16.51%, which is a reduction from the 30% it held prior to the 1970s (Bello, 2004). Although the US' implicit control over the IMF has waned, it is still substantial and unique because it can veto major decisions (CRS, 2021).

Table 2.2 Thirteen Largest IMF Shareholders - 2020

Country	Percentage of Total
United States	16.51
Japan	6.15
China	6.08
Germany	5.32
France	4.03
United Kingdom	4.03
Italy	3.02
India	2.63
Russian Federation	2.59
Brazil	2.22
Canada	2.22
Saudi Arabia	2.01
Spain	1.92

(IMF, 2020a)

The IMF and World Bank were set up as two different institutions to provide a division of labour. They define their roles as being distinct from one another in that:

> The bank is primarily a development institution; the IMF is a cooperative institution that seeks to maintain an orderly system of payments and receipts between nations (Driscoll, 2020).

The US is accused of using pressure at the end of the Vietnam war to influence both the IMF and the World Bank to deny Vietnam aid in support of a US trade embargo that lasted until 1994 (Davies, 2015). Criticism of the IMF comes from many angles; free-market supporters consider it too interventionist, whereas others believe its power is used coercively for the benefit of wealthy, free-market countries (Head, 2003). Bello contends it is submissive to the US Treasury, some examples being the Mexican bailout in 1994-95 and the crisis in Southeast Asia in 1997. It that instance, it was

thought US Secretary of the Treasury Robert Rubin was micromanaging the IMF Managing Director (Bello, 2004).

Other critics think the IMF creates moral hazard and allows member nations, like Greece and Italy, to pursue unsustainable budgets (Eichengreen, 2012). In Kenya in the 1990s, the IMF required the central bank to remove capital controls; this allowed corrupt politicians to transfer funds out of the country. In 1997 the IMF required Indonesia, Malaysia and Thailand to raise their interest rates and implement tight fiscal policies for the purpose of strengthening exchange rates (Bordo & James, 2000). This turned a minor problem into a full-blown financial crisis. Argentina also suffered economic damage in 2001 due to similar policies that were used in those Asian countries (Jun, 2009). Vietnam rejected offers of loans valued at hundreds of millions of dollars from the World Bank on three separate occasions in the late 1990s which were contingent on it selling its state-owned companies, which it finally agreed to in the 2000s (Davies, 2015).

According to Joseph Stiglitz, former chief economist at the World Bank and critic of the World Bank and the IMF:

> The IMF has facilitated the nationalization of private debts in many countries. Nationalization of private debts undermines prudential lender behavior and is a government intervention in the market. But that is not the view you'd take if you were chairing the creditors. These policies protect foreign creditors (Komisar, 2011:2).

In its defence, the IMF states it is concerned with the long-term health of the world economy and that much criticism is focused on short-term problems. IMF intervention is only needed in times of crisis. This means a government whose policies likely caused the problem has someone else to blame. Also, no one is forcing the countries to take a loan from the IMF (Edwards, 1989).

2.1.5.5 The European Central Bank

Creation of the European Central Bank (ECB) began in 1988 with the decision to build an, “Economic and Monetary Union”(ECB, 2020c). The union’s goals were a single monetary policy across the Euro area countries, a common monetary authority and free capital movements within Europe (ECB, 2020c). The ECB defines its primary objective to be price stability, with the additional objectives of, “a high level of employment and sustainable non-inflationary growth” (ECB, 2008).

The ECB’s primary tasks are:

- Monetary policy for the euro area, its definition and implementation.
- Foreign exchange operations.
- Management of the official foreign reserves.

- Promotion of financial network payment systems.

The ECB has the following ancillary tasks:

- Issuance of banknotes.
- Creation of statistical information (in conjunction with the national central banks).
- Financial stability and supervision.
- International and European cooperation.
  (ECB, 2008)

From its onset, the role of the ECB has been more comprehensive than those of the World Bank or the IMF. Of particular interest to fintech is the ECB's task of promotion of payment systems and to deglobalisation is its focus on financial stability. Due to Brexit, the UK left the European System of Central Banks; its subscribed capital of 14.3% was reallocated to national central banks in both the euro and non-euro area (ECB, 2020b).

Unlike the World Bank, IMF and WTO, the ECB is only under EU control and not the implicit authority of the US. It is a burgeoning rival to American influence because of the different approach the two have on how best to manage their economies. An area where the two differ most is their level of public debt.

2.1.6 Fiscal Versus Monetary Policy

Governments and their central banks have limited options for managing the health of their economies against the irrational whims of aggregate consumer demand and fluctuations in the business cycle. Much of what any government does is agree a budget and the allocation of funding. The primary tools used are fiscal and monetary policy. Fiscal policy is another name for the theories of John Maynard Keynes. It is focused on achieving sustained economic growth and price stability with a primary emphasis of achieving full employment. This is accomplished by means of taxation and spending policies enacted by the central government (Abel et al., 2016).

Monetary policy involves decisions made by national banks on the level of their country's money supply. This is done through open market operations or changes in the reserve requirements with the goal being to keep the economy from growing too quickly and spurring inflation. If a government runs a budget deficit it has the ability to borrow, this is done by issuing bonds on which they must then pay interest. It means they are spending future tax revenue as interest and principal on the debt issued must be paid in subsequent years (Abel et al., 2016; Downes & Goodman, 2003). Central banks, such as the US Federal Reserve Bank and the Bank of England, are independent entities. This

means although they are delegated specific economic goals by their respective governments, the exact way in which those goals are achieved is at the bank's discretion (Abel et al., 2016; BoE, 2020b).

2.1.7 Neoliberalism, Keynesianism and Ordoliberalism

The three most influential schools of economic thought within the economies of the UK, US and EU are neoliberalism, Keynesianism and ordoliberalism. They base their origins on classical liberalism and the writings of John Stuart Mill, Jean-Baptiste Say and Adam Smith and differ in their views on freedoms of the individual (Maczynska & Pysz, 2010). Ordoliberalism originated in Germany; due to its position within the EU as the largest net contributor (€12.9 billion in 2016), as seen in Figure 2.2, it has been influential in EU monetary policy (Deutsche-Presse Agenteur, 2018). Also evident in Figure 2.2 was Britain's financial role in the EU of being third largest net contributor (€5.6 billion in 2016); this led to the belief it was not benefitting financially from EU membership and was one of the major reasons for Brexit.

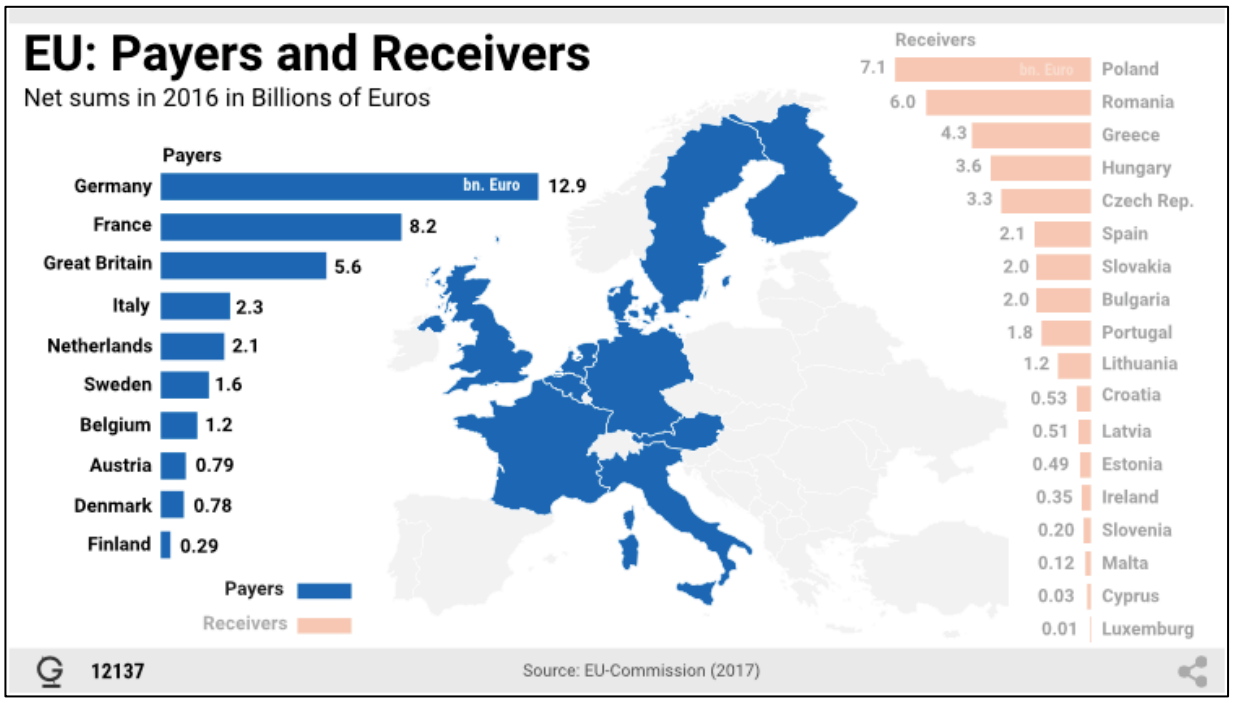


Figure 2.2 Net Benefactors and Recipients of EU Funding - 2016

(Deutsche-Presse Agenteur, 2018)

Neoliberalism's primary traits are market fundamentalism and a marginalized role of government in the development of economic order; its focus is the economic processes of the market. The role of the state is to fine-tune aggregate supply and use fiscal policy and taxation for ensuring price stability. It is based upon Smith's theory of the market acting as an invisible hand that shapes

economic order so well as to relegate government to the role of 'night watchman'; it relies on the triad of deregulation, privatization and stabilisation as the means for achieving economic growth. Neoliberal doctrine was considered to be one of the underlying causes of the GFC (Hunt, 1995; Maczynska & Pysz, 2010).

Keynesian economic theory believes excessive demand leads to inflation and insufficient demand leads to unemployment; it is the cornerstone of modern economic policy in use today. Keynes' original theories also focused on the irrational nature of human behaviour, which he called 'animal spirits'; this core aspect of Keynesianism has gradually been omitted and forgotten (Maczynska & Pysz, 2010). Keynesian economic policy aims to dampen the excesses of the business cycle through the use of tax cuts and increased government purchases in periods of decline and doing the opposite during periods of overexpansion so to control the amount of disposable income available to consumers (Downes & Goodman, 2003; Steil, 2013). Keynesian policy is beneficial for short-term stimulus. In the long-run, it is considered to be detrimental, as it encourages expansionist monetary and fiscal policy and leads to inflation. Countries that adhere to Keynesian doctrine are at risk of increased public debt and eventual rises in taxation (Popa, 2018). What neoliberalism and Keynesianism have in common is both have ignored teaching individuals how to use their economic freedom in a responsible manner (Maczynska & Pysz, 2010).

Ordoliberalism was founded in the 1930s and 1940s by the Freiburg School in Germany as a response to the economic and political turmoil of the Weimar Republic (Popa, 2018) and the hyperinflation it experienced from 1921-24 (King, 2017). Creation of order in the economic system is its utmost priority. It is a conservative-liberal program that promotes a strong role for the state. Ordoliberals hold that markets are not self-regulating and only work efficiently if there is competition. Without state intervention, competition will succumb to imbalances, such as oligopolies and monopolies. They focus on regulating the economy without directly influencing the economic process or dissolving economic power groups. Due to fear of hyperinflation, ordoliberals are heavily focused on the role of the state in maintaining stable prices and avoiding expansionary monetary and fiscal policies (Maczynska & Pysz, 2010; Popa, 2018).

Ordoliberalism believes free markets provide immense advantages, but also has fairness, stability and social justice as its goals. In this aspect it is both an economic and social philosophy, whereas Keynesianism is purely economic in nature. Keynesianism centres on stimulating aggregate demand; ordoliberalism is considered supply side economics (Popa, 2018). It was first applied in West Germany in 1948 and by 1966 had proved to be very successful at stimulating economic development. In Germany, the prevalence of the ordoliberalism was overtaken by the move to a

Keynesian approach, which also was eventually overtaken in the early 1980s by the influence of neoliberal ideas based on the Chicago School's advocation of a 'lean state' though the use of the neoliberal triad (Maczynska & Pysz, 2010).

Ordoliberalism takes a more direct approach to shaping of the economic order and microeconomic aspects of the economy than either Keynesianism or neoliberalism, see Table 2.3. This is the difference between coordinated and liberal market economies, which is a difference in, "the structure and institutions used to resolve contractual dilemmas between economic groups" (Meunier, 2007). Industrial relations in Germany happen at the sector level and are based on the concept of collective bargaining; in the US such negotiations happen at the company level (Hancké, 2009). An example of this is how industrial relations for biotechnology in Germany are conducted through the association of German Biotech Companies (VBU) and the German Industry Association for Biotechnology (DIB); in the US no comparable infrastructure exists (Dudofskiy, 2020).

Table 2.3 Comparative Analysis of Neoliberalism, Keynesianism and Ordoliberalism

Economic Policy Doctrines	Economic Order	Economic Processes		
	Shaping of Economic Order	Macroeconomic Dimension	Microeconomic Dimension	Individuals and Their Emotions
Neoliberalism	No	Yes	Yes/No	No
Keynesianism	No	Yes	No	Yes/No
Ordoliberalism	Yes	Yes	Yes	Yes

(Maczynska & Pysz, 2010)

2.1.8 The Role of Debt in the Global Economy

The global economy is structured around the use of debt as a means for facilitating trade. According to the IMF, as of 2018, the total world debt level was $188 trillion dollars; $130 trillion was privately held and $68 trillion was government issued (IMF, 2020b). All debt is two-sided, meaning any debt owed is also a debt owned. Interest and payments made on debt are a source of income and generally a low-risk investment for the debt's holder, dependant on its rating. Debt as a vehicle for commerce is susceptible to misuse. There are many advantages to the use of debt versus equity ownership:

Advantages of debt versus equity:

- Issuance of debt does not dilute an owner's equity.
- Interest on debt can be deducted on company tax returns.
- Municipal debt is oftentimes free from any taxation.
- Raising capital by issuing debt is less complicated and more expedient than the requirements for issuance of equity shares in a company.
- Debt requires no reporting to shareholders.
- In many instances a government or organization does not have the ability to issue equity shares.

Disadvantages of debt versus equity:

- The principal value of a debt must eventually be repaid.
- Interest due on debt restricts current cash flows.
- Servicing debt restricts one's ability to grow an organisation.
- Should default occur, assets that are pledged as collateral on debt can be seized.
- Interest is a fixed cost and raises the break-even point.
- Issuance of debt can be laden with provisos on future financing.

(Findlaw, 2018)

Since 1965, the US has had a budget surplus only five times – in 1969 ($3.2 billion) and then from 1998-2001 ($69.2, $125.5, $236.2 and $128.2 billion). The surpluses for period from '98-'01 were attributed to defense sector expenditure cuts and a thriving economy due to the advent of the internet (Inc., 2020). Since 2007, the US debt to GDP ratio has gone from 35% to 79% in 2019 – before the Covid-19 pandemic. As of April, 2020, the US federal budget deficit was expected to quadruple to $4 trillion. As seen in Figure 2.3, by 2023 it is expected to surpass the debt level post-World War II as a percentage of GDP (Condon & Merrill, 2020). As of November 2020, the US national debt was over $27 trillion dollars, which is $82,366 per US person (Peter G. Peterson Foundation, 2020). The US economy has consistently relied on debt, but since the GFC the amount of its total debt has rapidly grown.

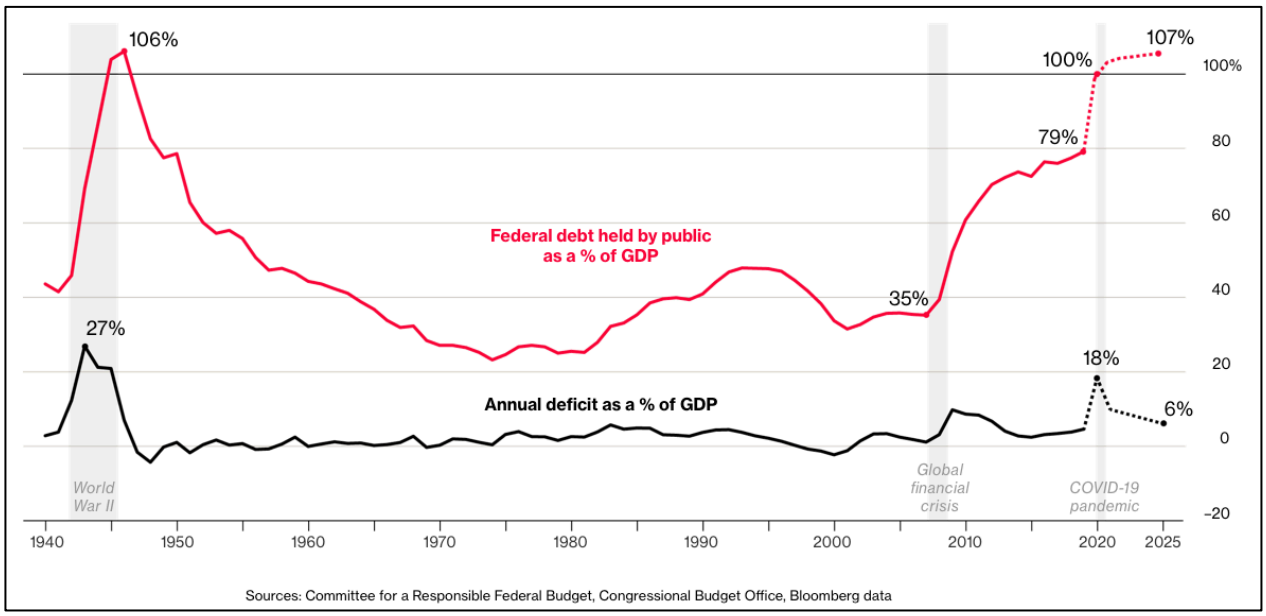


Figure 2.3 US Federal Debt Projection - April 2020

(Condon & Merrill, 2020)

A disconcerting issue regarding debt on the national level is what is known as 'stock-flow reconciliation'. Basic accounting holds that debt accumulation over a certain period should be calculated by the following equation:

$$\text{DEBT}t - \text{DEBT}t - 1 = \text{DEFICIT}t$$

This means is the total stock of debt is equal to the sum of all past budget deficits. In actuality, there tends to be more debt than expected due to the stock-flow reconciliation:

$$\text{DEBT}t - \text{DEBT}t - 1 = \text{DEFICIT}t + \text{SF}t$$

In their research for Yale University and the Inter-American Development Bank, Campos, Jaimovich and Panizza found that even with outliers excluded, for the period from 1972-2003 of the 117 countries researched, "in the average country-year, debt grows three percentage points of GDP faster than what is implied by the budget deficit" (Campos et al., 2012). The problem is once a country begins relying on debt, there is a likelihood it will end up with even more debt than expected. If a major crisis, such as a natural catastrophe or pandemic should arise where deficit spending is required, they are already leveraged and run the risk of default.

Contrary to this, debt adverse countries are not only not using today's revenue to service previously issued debt, their governments are also not devoting effort to devising means for managing their

debt, such as selling off of state owned assets or relying on quantitative easing; they can instead concentrate their efforts on proactive governance. It is thought that the foundations of ordoliberal conservatism that are the basis of German socioeconomic policy were a buffer against the negative effects brought about by the GFC and the effects it had on Germany's economy (Maczynska & Pysz, 2010).

> Four of the five economists (on the German Council of Economic Experts) have ordoliberal visions and strongly endorse the compliance of the Maastricht stipulations and especially the no-bail-out clause, which 'strengthens market discipline' by ensuring that private lenders – not the other member countries – bear the consequences of unsustainable fiscal policies (Popa, 2018)

Ordoliberal theory holds that markets do require some level of state intervention to prevent concentrations of power from forming, which is what happens when oligopolies are allowed to develop (Popa, 2018). This ensures competition exists and prevents the emergence of entities, such as banks that are 'too big to fail'. In the case of the Greek financial crisis in the wake of the GFC, bailout funding by the EU and the IMF in three different packages totalling €289 billion was approved by Germany due to its self-interest, because as of 2009 a 'large part' of Greece's debt was held by German banks (BBC, 2018; Popa, 2018).

Institutions that pose systemic risk by being too big to fail can adversely affect the economy due to governments needing to intervene with emergency funding, which puts a nation deeper in debt. This is what happened with the GFC. The result was multiple governments were forced to cover the costs of moral hazard on the part of the banks which had been able to act unscrupulously due to regulatory capture in the form of the US Financial Services Modernization Act and US Commodities and Futures Modernization Act (Amadeo, 2019).

Research by Deborah J. Lucas, Professor of Finance and Director of the MIT Golub Center for Finance and Policy found the total direct cost of the bailout to the US taxpayer was $498 billion, which was 3.5% of 2009 US GDP. The primary beneficiaries were the, "large, unsecured creditors of large financial institutions" (Harbert, 2019). Because of their role in the GFC, 47 bankers were sentenced to jail – 25 in Iceland, 11 in Spain, 7 in Ireland and one each in Cyprus, Germany, Italy and the US (Noonan et al., 2018). In the US – epicentre of the crisis – only one banker, Kareem Serageldin, plead guilty to falsifying books and records used for inflating the prices of bonds that had been securitized in the form of residential and commercial backed securities at Credit Suisse. He was forced to return over $25 million in compensation to his employer, paid $1 million to the US Securities and Exchange Commission and served 30 months in prison (US DOJ, 2013a).

2.1.9 **The Global Economy in the 21st Century**

The dynamics, institutions and concepts of the global economy central to globalisation have been reviewed. The ability to manage the economy requires cooperation between governments and central banks, as neither has complete control. In trying to react to the business cycle and the aggregate effect of irrational human behaviour to improve the economic well-being of their populations, these actions are macroeconomic in scale, can be slow in nature and may not be obvious to the average person.

The recent period of deglobalisation was defined as a situation of 'us against them' – 'us' being the Trump administration and its sycophants and 'them' being everyone else who did not succumb to their demands. Just as individuals are atomistic at heart and put a premium on the present at the expense of the future, so too are nations. We are in a late-stage of everyone acting in their own short-term self-interest at the expense of others and their own future selves.

The efforts of governments using demand-side economic policy to try to improve the disposable income of consumers to keep the economy stimulated ignores a key aspect of globalisation. Decades of offshoring skilled, high-paying jobs to places with lower labour costs for the sake of quarterly earnings also has had long-term detrimental effects on the health of that nation's economy. The damage inflicted is the countries where production has been relocated have more leverage in potential trade wars while domestically fewer people are earning a substantial wage that is recirculated in the economy. Unless good relations or control over one's trading partners are maintained, they are able to use their productive capacity against the very nations that provided it.

The massive levels of quantitative easing that occurred as a response to the GFC have resulted in certain countries, the US and UK in particular, still being deep in debt. This is something future generations will inherit. Policies aimed at stimulating consumption do not work for people restricted by stagnant wages and continual shrinkage of their real earnings if the money never gets to them. The motive of Keynesian economics is supposed to be to put disposable income in the hands of consumers; such actions are to be short and sharp.

Giving access to cheap credit is also not a workable solution for people who cannot afford it and was an underlying cause of the GFC (Amadeo, 2019). Expansion of the money supply is futile if the funds are never received by people who put the money back into the economy by means of immediate consumption. It instead ends up in the possession of those who use the funds for investment purposes because they can already consume as much as desired. Likewise, supply-side economic

policies of tax cuts do not work if those tax cuts are aimed only at higher earners, who - again - are already at full consumption.

According to Saez and Zucman of the University of California, Berkeley:

> Between 1978 and 2018, the share of pre-tax income earned by the top 1 percent rose from 10 percent to about 19 percent, and the share of wealth owned by the top 0.1 percent rose from 7 percent to about 18 percent. In 2018, the tax system was regressive at the top-end; the top 400 wealthiest Americans paid a lower average tax rate than the macroeconomic tax rate of 29 percent (Saez & Zucman, 2020).

The solution is one major corporations and captive governments choose to ignore – they need to pay higher wages to their workers and not their executives. According to Piketty, Saez and Zucman, in the US, from 1980 to 2014, there was a 61% growth in pre-tax income per adult, but the reality of disparity is hidden in the average (Piketty et al., 2016). The outliers in this change are that the top 1% saw a 205% income growth, whereas the bottom 50% had only a 1% growth (Boushey, 2017). As seen in Figure 2.4, according to the Economic Policy Institute, from 1979 to 2017 the wage gap in the US has widened. Those in the 90th percentile saw a cumulative increase of 46.9%; for low-wage workers in the 10th percentile this was 8.9%, meaning during this time span top-earners saw their earnings increase from a ratio of 3.5 to 4.7 versus low-wage workers (Schmitt et al., 2018).

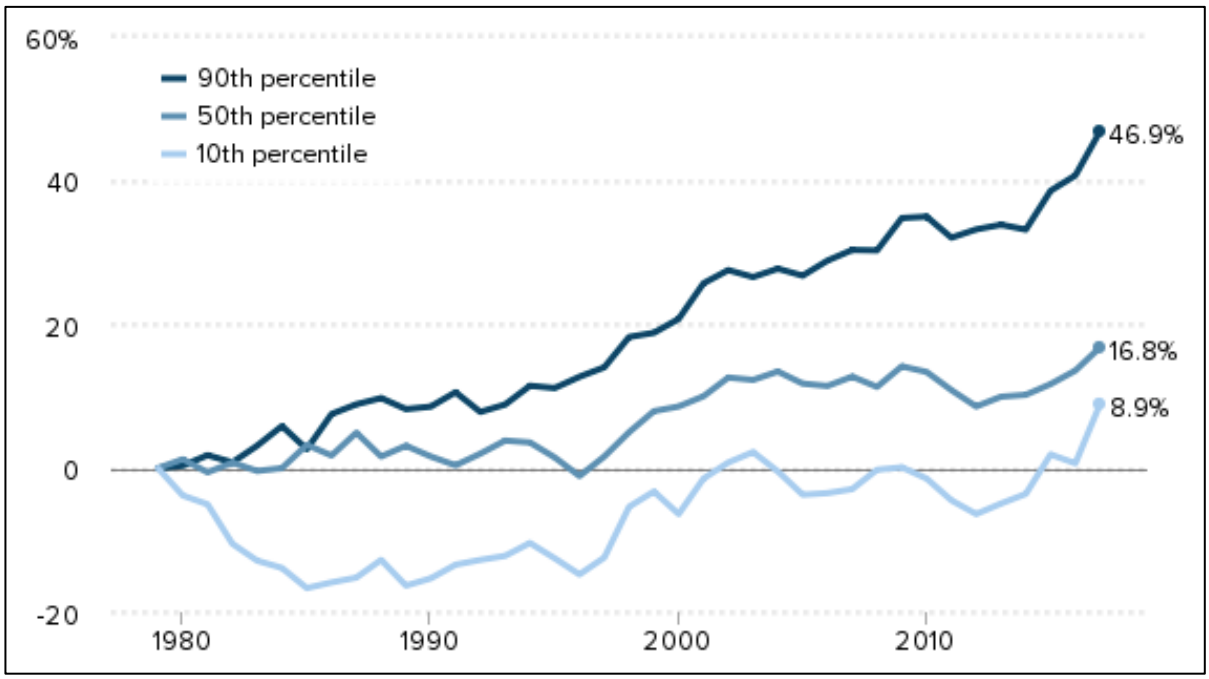


Figure 2.4 Cumulative Percent Change in Inflation-Adjusted Hourly Wages for all US Workers at the 10th, 50th and 90th Percentiles, 1979-2017

(Schmitt et al., 2018)

Neither supply nor demand-side macroeconomic policies are of benefit to working people already living below full consumption, who time and again have seen the economic system exclude them while apparently benefiting others who are already better off. The Covid-19 pandemic of 2020 only exacerbated the problem. The number of billionaires rose by 31 from 2,158 in to 2017 to 2,189 in 2020; their cumulative wealth escalated 27.5% (US$10.2 trillion, £7.9 trillion) over just four months from April to July of 2020 (Gadney et al., 2020). This deepens entrenched social class divisions and creates a sense of resentment in people the socioeconomic system is not benefitting.

As shown in Figure 2.5, in 1991 UK median non-retired household disposable income was £22,426; in 2018 it was £31,319, an increase of 39.65% (ONS, 2020b). The average price of a property in the UK in January 1991 was £57,086; in January 2018 it was £224,544 - an increase of 293% (UK Land Registry, 2020).

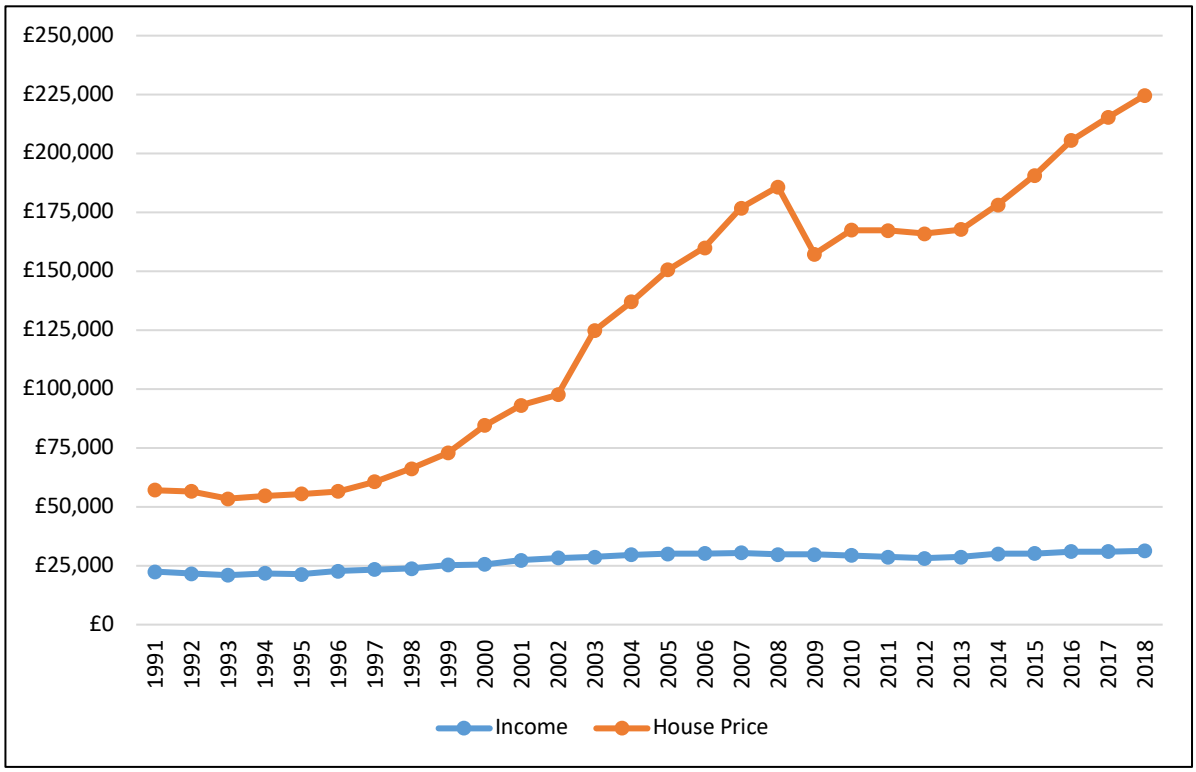


Figure 2.5 UK Non-Retired Disposable Income Versus Average House Price 1991-2018

(ONS, 2020b; UK Land Registry, 2020)

The US and UK now have service-oriented economies providing less opportunity for greater income than was available to previous generations. As of 2018, the service sector accounted for 67% of US GDP (Citi, 2018); in the UK it was 71% (Plecher, 2020). As of 2019, in the US manufacturing was 11%

of GDP, its lowest value since 1947 (US BEA, 2019); in the UK industry constituted 17.41% (Plecher, 2020).

Home ownership was a given in the era of the baby boom; it has been replaced by generation rent. Zero-hours contracts and escalating retirement ages are the new normal. Younger generations now have less disposable income, saving for retirement is a looming, yet unattainable priority and everyone is looking for someone to blame. Like a pandemic, the GFC started in the US and spread throughout the world economy and only one US banker was held liable. The neoliberal market economy does not educate its participants on how to use their economic freedom responsibly and does not provide the social justice Adam Smith stated was necessary for economic justice to exist. Because of this the average person lost faith in globalisation as it does not provide them security from predation – the social contract has been broken. This is the reason for the rise of deglobalisation.

2.2 What is Deglobalisation?

This section will introduce the reader to the concept of deglobalisation. Globalisation is the trend toward greater interconnectedness of economies. It is a natural outcome of the law of comparative advantage. Globalisation is not new, but the concept of deglobalisation is. The term can first be attributed to Walden Bello, author of *Deglobalization – Ideas for a New World Economy*, published in 2002 (Bello, 2004). In it he asks:

> How to manage the world economy – and, more fundamentally, whether humanity wishes it to go in an ever more market-oriented, transnational corporation-dominated and capital-footloose direction – is the most important international question of our time (Bello, 2004:iii).

Bello opposes globalisation because he sees it as a corrupt system enriching developed economies through extraction of natural resources from developing nations and exploitation of their people in the form of cheap labour. He envisions deglobalisation as a path towards a more perfect society. The name he has given it is new, but such thought is not. Perhaps Plato's *Republic* was the origin of such thought, for he too attempted to define what constitutes a just state:

> The society we have described can never grow into a reality or see the light of day, and there will be no end to the troubles of states, or indeed ... of humanity itself, till philosophers become rulers in this world, or till those we now call kings and rulers really and truly become philosophers, and political power and philosophy thus come into the same hands (Plato, 375 B.C.).

In *Utopia*, Sir Thomas More satirically described an ideal society:

> He coined the word ‘utopia’ from the Greek word ou-topos meaning ‘no place’ or ‘nowhere’, but this was a pun – the almost identical word eu-topos means ‘a good place’ (British Library, 2019).

He also stated the responsibility of having authority in the social hierarchy:

> For if you suffer your people to be ill-educated, and their manners to be corrupted from their infancy, and then punish them for those crimes to which their first education disposed them, what else is to be concluded from this, but that you first make thieves and then punish them (More, 1516:21).

Regarding what utopia means, Dr. Heather Alberro of Nottingham Trent University wrote:

> Utopianism is the lifeblood of social change, and has already inspired countless individuals and movements to change the world for the better. [It] is in fact a philosophy that encompasses a variety of ways of thinking about or attempting to create a better society. It begins with the seemingly simple yet powerful declaration that the present is inadequate and that things can be otherwise (Alberro, 2019).

In the *11 Pillars of the Alternative* Bello described how he envisions deglobalisation should function:

> 1. Production for the domestic market must again become the centre of gravity of the economy rather than production for export markets.
>
> 2. The principle of subsidiarity should be enshrined in economic life by encouraging production of goods at the level of the community and at the national level if this can be done at reasonable cost in order to preserve community.
>
> 3.Trade policy — that is, quotas and tariffs — should be used to protect the local economy from destruction by corporate-subsidized commodities with artificially low prices.
>
> 4.Industrial policy — including subsidies, tariffs, and trade — should be used to revitalize and strengthen the manufacturing sector.
>
> 5.Long-postponed measures of equitable income redistribution and land redistribution (including urban land reform) can create a vibrant internal market that would serve as the anchor of the economy and produce local financial resources for investment.
>
> 6.Deemphasizing growth, emphasizing upgrading the quality of life, and maximizing equity will reduce environmental disequilibrium.
>
> 7. The development and diffusion of environmentally congenial technology in both agriculture and industry should be encouraged.
>
> 8. Strategic economic decisions cannot be left to the market or to technocrats. Instead, the scope of democratic decision-making in the economy should be expanded so that all

> vital questions — such as which industries to develop or phase out, what proportion of the government budget to devote to agriculture, etc. — become subject to democratic discussion and choice.
>
> 9. Civil society must constantly monitor and supervise the private sector and the state, a process that should be institutionalized.
>
> 10. The property complex should be transformed into a 'mixed economy' that includes community cooperatives, private enterprises, and state enterprises, and excludes transnational corporations.
>
> 11. Centralized global institutions like the IMF and the World Bank should be replaced with regional institutions built not on free trade and capital mobility but on principles of cooperation that, to use the words of Hugo Chavez in describing the Bolivarian Alternative for the Americas (ALBA), 'transcend the logic of capitalism.'
>
> (Bello, 2009)

Juxtaposition of Bello's ideals with Dr. Alberro's opinion shows how deglobalisation's original goals are a utopian desire. As the name utopia implies, it does not exist anywhere. As this thesis will research, it may not be possible in the already globalised world economy. In less than two decades since the term deglobalisation was coined, it metamorphosed into something opposite of what Bello envisioned. Professor Tony Payne of the University of Sheffield, summed it best:

> Remarkably and in an act of brazen but effective political theft, that core critique – which in effect alleged that the purported universal benefits of globalisation had not 'trickled down' inclusively enough and that the process was instead fostering growing and increasingly outrageous inequalities – has been purloined over the course of the past couple of years by the populist right … Donald Trump and his followers look forward to initiating a process of what is being called 'de-globalisation' whereby companies are hauled back to their national bases, rust-belts are made good again and trade wars seen as valid tools of national diplomacy (Payne, 2017).

Dr. Mervyn Martin of the University of Teesside, sees deglobalisation as myth, for it is just a slowdown and not a reversal of globalisation:

> Integration, which is used to approach globalization, is not a one-way process seeking greater levels of integration, but rather a tool to address global challenges, which will involve making choices on the degree of integration that is thought necessary at a particular time. In other words, based on what is perceived as necessary at a given time, selective interconnectivity is used to reflect the level of integration desired … Delocalization does not exist. The Brexit vote and President Trump's Presidential bid success are all part of the globalization process, where from time to time, the levels of integration will slow down. This does not suggest backtracking on globalization (Martin, 2018).

2.2.1 Evidence of Deglobalisation

Deglobalisation exists both as a social movement and also as a measure of global interconnectedness. Four metrics for gauging the level of globalisation or deglobalisation occurring are: world trade growth, migration, capital flows and trade tariffs. Regarding post-GFC deglobalisation, according to the WTO, world merchandise trade volume was negative 1.1% for the first half of 2016 and flat compared to the same period in 2015. Trade growth projections were revised downward for the second half of 2016 as well as 2017 (WTO, 2016a).

According to the WTO:

> These figures underline the lower responsiveness of trade growth to GDP growth that has been observed in recent years. Over the long term, world merchandise trade volume has typically grown around 1.5 times faster than world real GDP at market exchange rates, although in the 1990s trade grew about twice as fast as output. However, since 2012 the ratio of trade growth to GDP growth has fallen to roughly 1:1. If the latest WTO forecasts for trade and output in 2016 are realized, the ratio of trade growth to GDP growth will fall to 0.8, its lowest level in 15 years (WTO, 2016a:8).

The UN reported annual migration fell to 1.9% from 2010-2015 from 2% from 2000-2005 (UN, 2015); McKinsey stated international capital flows had reduced by 66% (Lund et al., 2017); and according to the WTO, non-tariff barriers, which are another form of protectionism, in the G20 grew from 300 in 2010 to 1,200 plus as of 2016 (WTO, 2016b).

However deglobalisation is defined, this populistic drive towards greater isolationism has the potential to affect the financial services industry not only in the form of regulatory fragmentation, but also through reduced employment due to a lack of economic activity and international relocation of employment opportunities. As of 2019, whether or not Donald Trump's and the UK's versions of deglobalisation would be viewed in retrospect as satire, like Thomas More's, or as works of tragedy remained to be seen.

2.2.2 Objectivism and the Philosophies of Ayn Rand

Trump and Brexit are both outcomes of political conservatism purportedly acting in the interests of the vox populi. To understand modern conservatism one must first be acquainted with the concept of Objectivism. Extreme neoliberalism, often referred to as neoconservatism, which has dominated the US conservative movement over the last 40 years is largely based on the 'Objectivist' writings of Ayn Rand, née Alisa Rosenbaum. She considered selfishness to be a virtue, the rights of the individual to be superior to absolutely everything and full and complete laissez-faire capitalism to be the only just form of government (Ha, 2017).

Ayn Rand was born in St. Petersburg, Russia in 1905 to a successful pharmacist who lost his property in the Bolshevik revolution and his liberty to anti-Semitic legislation. This motivated Ayn to flee to the US, where she began a career as a screenwriter and author. Despite insistence to the contrary, her early experiences obviously formed the basis of her staunch hatred towards government interference and reverence of the 'productive businessman' as a hero (Anderson, 2009). Just as the Bolshevik revolution was the result of one group taking Marxist doctrine to the extreme, so too are her viewpoints, albeit in the opposite direction.

The Objectivist philosophy is based on four tenets:

1. Metaphysics – Facts exist, reality is objective. Opinions do not change facts.
2. Epistemology – Reason is the only way to perceive reality and your place within it. Think, do not feel.
3. Ethics – Do not sacrifice yourself for the benefit of others or expect them to make sacrifices for you. Ego should be your reason for living.
4. Capitalism – Property rights are synonymous with human rights. Taxation is tantamount to dispossessing people of deserved rewards (Meirson, 2020).

Many of Rand's acolytes are persons of distinction. These include former US Federal Reserve Chairman (1987-2006) Alan Greenspan, founder of the conservative magazine *National Review* the late William F. Buckley, Jr., American libertarian Ron Paul, former Speaker of the US House of Representatives Paul Ryan, right-wing media figure Glenn Beck, as well as Donald Trump and various members of his ever revolving cabinet (Anderson, 2009).

The hypocrisy of Rand's adherents is she was opposed to two of the other cornerstones of the US conservative movement – religion (protestant Christian) and the complete illegalisation of abortion. She was an avowed atheist and vehemently pro-choice, so much so that she considered abortion to be a moral right (Rand & Binswanger, 1988). She was also quite clear that her philosophies were not open to interpretation – one either followed her teachings absolutely or was a heretic; she saw no middle ground (Meirson, 2020). Dogmatic rules such as these are the making of a cult. Hers was a cult of personality based on being humourless and unable to express affection.

Ayn Rand took exception with anyone whose opinion was not ultimately hers coming out of their mouths so much so that she labelled the economist and Nobel Laureate Milton Friedman, one of the main neoliberal theorists and the founder of monetarism, to be a "miserable eclectic" and "an enemy of Objectivism" (Meirson, 2020). He was one of the main progenitors of the conservative Chicago school of economics, which is known for its strong views against Keynesianism, socialism

and the state having a centralised control over the economy (Maczynska & Pysz, 2010), all of which she too opposed. This vitriol was because he viewed economics as a science detached from philosophy (Meirson, 2020). With such negative opinions of those with whom she most likely should have been sympathetic, unsurprisingly in the 1950's she fell out of favour with - and repeatedly campaigned against - the conservative movement in the US due to its strong association with God. She, "warned explicitly that religious conservatism was the most dangerous thing of all" (Ha, 2017).

The Oxford English Dictionary defines demagogue as:

> A political leader who seeks support by appealing to the desires and prejudices of ordinary people rather than by using rational argument (OED, 2018).

Ayn Rand's approach to demagoguery was unique in that she used rational arguments to appeal to people's main prejudice – selfishness borne from self-preservation. If she were still alive, it could be presumed she'd take exception with her proponents and their piecemeal adoption of her philosophies. Her enthusiasts do something she adamantly forbade – pick out the parts of Objectivism that suit them and ignore the rest. Hers is a dogma not meant to be open to interpretation.

With the election of Trump and vote for Brexit, this is what deglobalisation has become – an aberration of utopian desire being implemented by neoconservative governments sympathetic to Rand's philosophies. Objectivists do not believe in altruism. Consider what Boris Johnson said in March 2021 about the UK's quick development of a Covid-19 vaccine by publicly funded universities, "The reason we have vaccine success is because of capitalism, because of greed" (Catterall, 2021).

2.2.3 **Deglobalisation – Trump Style**

Donald Trump described himself in 2016 as a fan of Rand and said of her novel, *The Fountainhead*, "It relates to business, beauty, life and inner emotions. That book relates to … everything" (Powers, 2016). Like its protagonist, Howard Roark, an architect battling against the establishment, he portrays himself as a victim and leveraged this position to appeal to his base. The basis of his presidential campaign and actions after assuming power were a deviant version of deglobalisation labelled by Professor Lisa Duggan of New York University as, "Zombie Neoliberalism" and the, "Neoliberal Theater of Cruelty" (Duggan, 2019).

Ha thinks Trump envisions himself in the role of Rand's, "capitalist entrepreneur individualist and the true leader of society and change agent of society" (Ha, 2017), yet the actions he took while in office were a rejection of Randian economics. Ha sees Trump's perspective as being:

> The free market is broken, you guys have been getting screwed by elites, and I'm going to get on the phone with Business and tell them what is what … I am going to help you. The American worker needs the help of the government to get better trade deals, to bring back jobs; I'm going to do that (Ha, 2017).

This is Trump's paradoxical version of deglobalisation – a capitalist promising to use their power to rescue workers by means of protectionism.

As of mid-2019, what could be supposed was Trump would continue his tariff war undeterred by what experts told him, even those from the far right of the political spectrum. According to the Cato Institute, the Koch brothers funded right-wing think tank, they calculated the 25% tariff on Chinese imports (as of June, 2019) was a cost of about $400 for every person in the US (Ikenson, 2019).

Trump claimed the tariffs were a tax paid by China:

> So our country can take in $120 billion a year in tariffs, paid for mostly by China, by the way, not by us. A lot of people try and steer it in a different direction. It is really paid — ultimately, it is paid for by — largely, by China. And businesses will pour back into our country (Trump, 2019a).

But this isn't so, as noted in the *Quarterly Journal of Economics*:

> Annual consumer and producer losses from higher costs of imports were $68.8 billion(0.37% of GDP). After accounting for higher tariff revenue and gains to domestic producers from higher prices, the aggregate welfare loss was $7.8 billion (0.04% of GDP). U.S. tariffs favored sectors located in politically competitive counties, but retaliatory tariffs offset the benefits to these counties. We find that tradeable-sector workers in heavily Republican counties were the most negatively affected by the trade war (Fajgelbaum et al., 2020).

In addition to the tariff war, Trump enacted a $16-billion farm bailout on top of $12 billion in emergency farm aid announced in 2018 aimed mainly at soybean farmers. Due to the trade war, soybean exports to China had fallen to zero (Hiltzik, 2019). Trump's apparent intent was to copy Reagan's strategy of outspending the USSR on defence during the cold war in the 1980s with the Strategic Defense Initiative. That resulted in the destabilisation of their economy and those of their satellite states and the fall of the Soviet Empire (Hall, 2019b). Trump wanted to use the might of the US economy against China as a weapon in a protracted trade war. As stated by former Deputy Governor of the Central Bank of Mexico Manuel Sánchez, "Trump clearly does not grasp the concept of comparative advantage" (Sánchez, 2019).

The Peterson Institute for International Economics described the impact of the steel tariffs as:

> Trump's tariffs raise the price of steel products by nearly 9 percent. Higher steel prices will raise the pre-tax earnings of steel firms by $2.4 billion in 2018. But they will also push up costs for steel users by $5.6 billion. Yes, these actions create 8,700 jobs in the US steel industry. Yet for each new job, steel firms will earn $270,000 of additional pre-tax profits. And steel users will pay an extra $650,000 for each job created (Hufbauer & Jung, 2019).

Another indicator of his plan to create jobs for political points with his voter base regardless of costs was an aspect of the US-Mexico-Canada Trade Agreement (USMCA) trade deal stipulating the percentage of a vehicle that must be produced in the US versus Mexico was to increase to about 40%. American labour costs around three times what it does in Mexico, which results in the manufacture of a more expensive car, costs of which are passed on to the consumer. In turn, this makes autos manufactured under these terms less competitive against foreign counterparts (Sánchez, 2019).

The US tried the use tariffs before with the Smoot-Hawley Tariff Act in 1930. The result was reciprocal behaviour on the part of the its trading partners. That was at the time of the Great Depression and exacerbated the contraction occurring in the economy (Black et al., 2017). A major flaw existed in Trump's nationalist strategy of divide and rule.

From his previous business dealings and trade negotiations as of June 2019, it appeared he viewed things in binary terms of 'us' and 'them'. For this reason he apparently looked forward to seeing Britain leave the EU, as it is easier to manipulate lone states than a block of 27 nations. He did not seem to grasp that corporations have the ability to relocate their operations to a country not subject to tariffs. As reported in May 2019, "One of the biggest winners is Vietnam, which has seen its trade with the United States increase dramatically" (Fernholz, 2019).

Brad Setser, of the US think tank, Council on Foreign Relations, stated:

> The Vietnamese can argue that their growing trade surplus was, in some sense, made in America. The recent jump in its surplus (and the surplus of many other East Asian economies) is almost certainly the consequence of Trump's tariffs on China (Setser, 2019).

As of 2021, Trump's trade war was ongoing and hadn't increased production in the US; it just changed the location from where the US sourced its imports.

More certain was the USMCA agreement being about using market share and economies of scale, which are heavily in the US' favour, to exert control on its trading partners. It is through this control he wished to wage economic war with China. Specifically, the USMCA allows a party to withdraw

from the agreement if another party enters into a free trade agreement with a country it deems to be a non-market economy (e.g., China) (CRS, 2019). In March 2017, Boushey stated much of what Trump is doing - such as coercing HVAC systems manufacturer Carrier into not relocating jobs to Mexico - was largely for show to appeal to his base. Behind the scenes she predicted his intent would be to deregulate the financial sector, remove consumer and environmental protections, foster privatisation, reduce social provision of health care and provide massive tax cuts for the wealthy (Boushey, 2017).

2.2.4 Brexit and US-UK Relations

The proposed trade agreement between the US and the UK is similar in nature to the USMCA. According to David Henig, Director of the UK Trade Policy Project and a former UK trade official, "This is an uncompromising document from the US point of view, with no mention of mutual benefit" (Kottasova, 2019). Like the USMCA, the proposed US-UK trade agreement uses the US' might to exert control over any trade deals the UK would negotiate with China, as it states that the US, "will take 'appropriate action' if the country negotiates a trade deal with a 'non-market country' — which experts said is a reference to China." (Kottasova, 2019; Office of the US Trade Representative, 2019b:15).

In his inaugural address Donald Trump said:

> At the bedrock of our politics will be a total allegiance to the United States of America, and through our loyalty to our country, we will rediscover our loyalty to each other (Trump, 2017).

It appears 'the art of the deal' was to negotiate a trade agreement beneficial only to the US. It was not beyond comprehension to view a future US-UK bilateral trade agreement as a situation wherein Pareto optimality with both parties being better off was not the motive of the Trump administration (Downes & Goodman, 2003; Hunt, 1995). It was always Trump's intent to benefit only the US and thereby himself.

As was the case repeatedly during the 20th century and due to deglobalisation in the form of Brexit, the UK again aligned itself with the US. John Major left the office of Prime Minister in November 1990 and became European Chairman of the Carlyle Group, the US multinational private equity corporation in 2001 (The Carlyle Group, 2001). Annual remuneration for this part-time position was £500,000 (Hosking, 2002). As of May 2019, David Cameron – the PM who brought deglobalisation to Britain - was in the employ of a US artificial intelligence firm (Marsh, 2019). This is not a reciprocal relationship; American Presidents do not leave office to then work for British companies. It appears

there is greater income and opportunity working for the US than there is for Britain and the Prime Minister's Office has become a stepping stone to a well-placed position supporting the interests of American free enterprise.

As of 2019, whatever one thought of Trump's presidency, it was certain that his version of deglobalisation involved using trade as a weapon, ignored the economic costs of those actions and instead focused on the long-term leverage and political appeal the trade deals would offer. Whether or not this would be beneficial for the US remained to be seen. For the UK, deglobalisation thus far appeared to have no economic benefits for Britain.

Anyone who believed it to be a return to autonomy from being under the control of the EU ignored the fact the US is an uncompromising trading partner that will exert its strength in order to control Britain's ability to trade with other countries. As historian Max Hastings stated in 2018 to Theresa May before she became PM, "Please do not join the long line of British leaders who delude themselves that the Americans will do us favours" (Hastings, 2018).

Times have changed; the cold war ended some 30 plus years ago. Germany is no longer divided and bordered by the Iron Curtain. The continuing need for a special relationship between the UK and US, which was fostered through comradery in two world wars, has been on the wane for some time.

This can be viewed as:

> In the modern era, the relationship between the US and the UK was shaped by two mutually reinforcing trends; the steady expansion of US global power and the decline and fall of the British empire (Tisdal, 2019).

In the 1990s, there were approximately 100 US military bases in the UK; there are now 13 (CND, 2020). Brexit also means one could argue:

> Europe is no longer a viable strategic alternative to the US alliance, while the US is ceasing to regard Britain as an important European or global player (Tisdal, 2019).

This is because the UK can no longer act as emissary between the US and the EU. As the only English speaking country in the EU, that is a role that could go to Ireland. As will be researched further, this is important in regard to the future for the financial services industry post-Brexit, for Ireland also has a special relationship with the US.

As shown in Figure 2.6, from December 2015 and as of November 2020, the pound had depreciated by 18% against the Euro; since December 1999 it was down by 21%. From December 2015 to

November 2020 it was down by 16.34% relative to the US dollar; since December 2007 - prior to the financial crisis - it was down by 36%. This is the financial reality of what the GFC and Brexit brought thus far to the British – more public debt and a weakened currency (OFX, 2020).

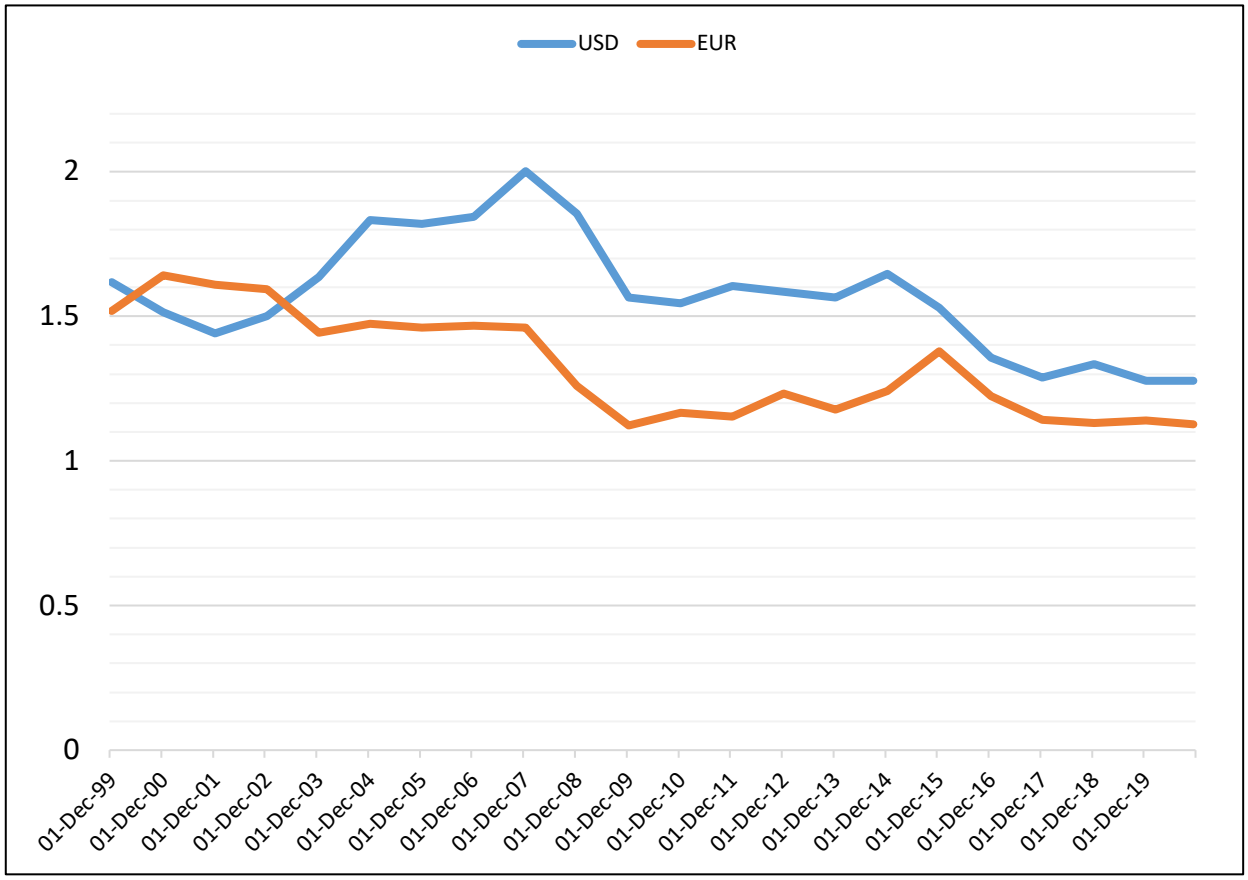


Figure 2.6 GBP Versus USD & EUR

(OFX, 2020)

Considering future trade agreements with the US, one should remember what happened in 1956 with the Suez Canal when US President Eisenhower told Britain to remove its troops or America would damage Britain's financial system by selling US holdings in sterling bonds; Britain conceded to America's demands (King, 2017). That was a part of Britain's past, it was repeated with the UK's participation in the Gulf War in the quest for non-existent weapons of mass destruction and at the point this review was performed it also looked like it could be the path of Britain's future.

US President Abraham Lincoln is thought to have said:

> You can fool all the people part of the time, or you can fool some people all the time, but you cannot fool all people all the time.

He never said this. The quote likely originated in the 1684 work *Traité de la Vérité de la Religion Chrétienne* by Jacques Abbadie (O'Toole & Sullivan, 2013). Regardless of its origin, as far as Trump's behaviour concerned, its logic is sound. Be it by chance or not, Donald Trump is apparently aware of two things: facts do not appeal to certain people and you can fool some of the people all of the time. His method of communication relies not on logos, but rather pathos, and enables him to manipulate others to his own advantage.

Determining what this means for future relations between the US, UK and EU, particularly in regard to financial services will be researched further. Brexit and Trump both were a major change of course for the UK and the US. As will be explored, these deglobalistic movements are in many ways a conflict between the neoliberal governing style of the US versus the more ordoliberal style of the EU, which likely will have ramifications for financial services.

Winston Churchill is quoted as saying, "You can always count on the Americans to do the right thing, after they have exhausted all other possibilities", but this is also false. It was actually Israeli politician Abba Eban who said in 1967, "Men and nations behave wisely once they have exhausted all other resources" (O'Toole, 2021). Regarding deglobalisation, exactly what constitutes the 'right thing' and 'wise behaviour' is open to interpretation. This thesis will examine what happened with Brexit and Trump up to early 2021 and the deglobalising effects they had so conclusions can be made in a manner that enables the reader to form their own opinions as well.

2.3 Modern Failures Prior to the GFC

2.3.1 **Introduction**

Deregulation and securitization of subprime mortgages in the US were the underlying reasons for the GFC. Systemic weaknesses became apparent when interest rates began to rise and set the crisis in motion (Amadeo, 2019). Since the 1980s, periodic financial crises have become de rigueur and are a prime reason for populism in the form of deglobalisation. It is no longer a question of if, but rather when, will there be another problem with the financial system that by design seems not to affect those in control. One result of the GFC was no longer needing to consult a history book to see what a failure of the system looks like. The bank run in 2008 on Northern Rock in Figure 2.7 appears no different than the US bank runs during the Great Depression like in Figure 2.8.

Figure 2.7 Northern Rock Bank Run in 2007

(Skuce, 2011)

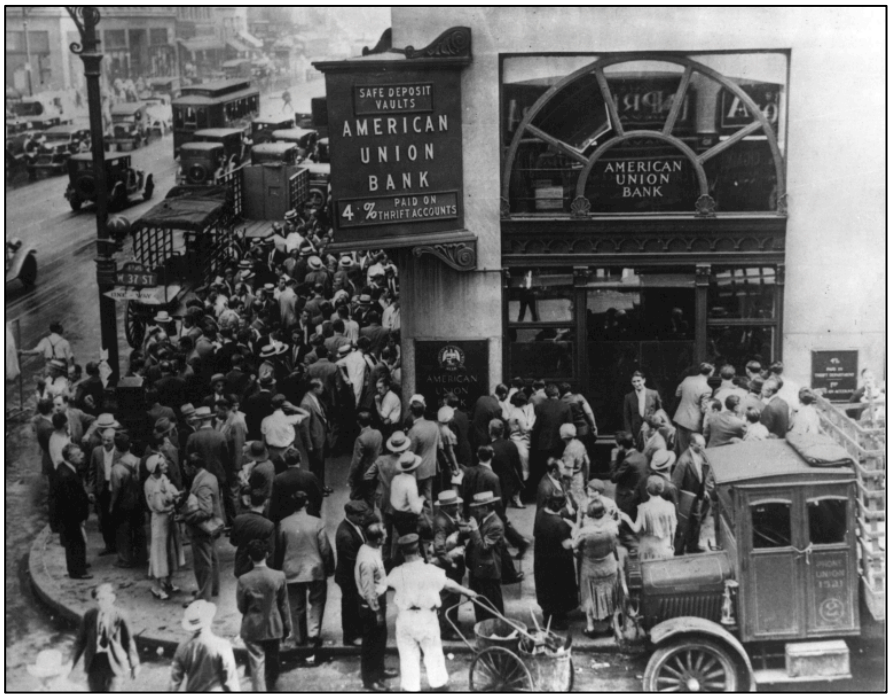


Figure 2.8 Great Depression Bank Run in 1929

(Unknown, 1929)

The Great Depression was the most catastrophic modern failure prior to the GFC. It began with the collapse of the US capital markets on the 29th of October 1929 and lasted for the next decade plus.

The banking sector saw over 4,300 lending institutions fail at a cost of over $360 billion to the US federal government (Grossman, 2010). Exactly when the depression ended or whether it can be attributed to the massive expenditure related to the beginning of World War II in 1939, or rather by the post-war reduction in military spending and the end of price controls, is an issue of debate (Ferrara, 2013). Regardless, the pre-war regulatory actions that were taken, specifically the Securities Act of 1933 and the Banking Act of 1933 (Glass-Steagall), in the wake of the Great Depression fostered a financial system that was largely free of crisis by 21st century standards - that is, until deregulation of the financial markets in the 1980s (Macey, 2000; Upton, 2018).

The laws put in place to prevent another Great Depression were largely very successful. This was also due to the post-World War II reinvigoration of the global economy under Bretton Woods, disruptive changes brought about by major technological advancements like the semiconductor, transistor, jet powered aircraft, television, satellite communication and more, and the drastic effects they had on how society functions, along with a return to normalcy (Geiger, 2019).

The combination of rapid innovation, orderly, functioning global markets and a willingness for countries to cooperate in rebuilding themselves after two world wars created a disruptive environment ripe for economic development where one did not need to rely on speculative banking products for personal enrichment. It was similar to what was reviewed in how many socialist economies were also successful during their growth phase. One could surmise all economic systems at some point in the medium to long-run face a point of reconciliation on whether resources and labour have been adequately utilised and distributed - which is in essence the study of economics itself.

Reviews of four major systemic failures that occurred between the Great Depression and the GFC follows to provide insight of their causes and the extent of their economic effects. They are: the US Savings & Loan scandal in the 1980s, the Bank of Credit and Commerce in 1991, the Asian Financial Crisis of 1997 and Enron in 2001. There have been others, but these four were large and are varied enough to give insight into what pre-existing conditions enabled them to happen.

There are fundamentally two different kinds failure – those that occur due to macroeconomic issues, such as excessive borrowing or price shocks, like the energy crises of the 1970s in the US. These can be considered an outcome of the imperfections of governments or agencies trying to manage the money supply to be synchronised with unpredictable business cycles and geopolitics. Of greater concern are those attributed either to regulatory capture or deregulatory measures. Those situations should have been avoided, but were not due to lack of regulatory oversight and the

opportunistic illegal actions of dishonest parties. Such crimes are initially successful when capital markets are in a period of stable growth; it is possible to justify illicit behaviour when asset prices are rising and there is a plausible reason for profit. When markets begin to correct, which is an inherent part of the growth cycle, acts of fraud are no longer so easy to obfuscate.

The following analyses show deregulation and lack of regulatory oversight repeatedly led to huge financial losses that were ultimately paid for by taxpayers and private investors. With the spectre of deregulation having again risen in the US - albeit this time in the guise of deglobalisation - in a time when the technological infrastructure of the financial industry is being redeveloped to function in ways no one can quite foresee, the issue at hand is whether we are seeing the foundations be laid for the emergence of another crisis or type of regulatory arbitrage.

2.3.2 **The Savings & Loan Crisis**

The Savings and Loan (S&L) Crisis of the 1980s in the US is synonymous with deregulation and fraud. Prior to the GFC, it was the second most costly failure of the US banking industry, inferior only to the Great Depression (Kress & Turk, 2019). The 1932 Federal Home Loan Bank Act established the Federal Home Loan Bank system to supplement state level chartered savings and loan institutions. It was a reaction to the crisis in homebuilding and banking caused by the 1929 stock market crash and subsequent Great Depression. In 1933, a system for federal chartering of S&Ls was created by the Home Owners' Loan Act and was implemented under the supervision of the Federal Home Loan Bank Board (FHLBB). The creation of the Federal Savings and Loan Insurance Corporation in 1934 provided means for federal insurance within the S&L network (Downes & Goodman, 2003).

The S&L network was restricted to providing fixed-rate home loans and branch offices and had capped interest rates payable to depositors or charged to lenders. In return, the federal government gave its implicit backing to deposit insurance. The US economy entered a period of high interest rates in the 1970s (13.3% in 1979) and low economic growth. Prior to this, the S&L network generated consistent profits and averaged lending rates at 6% and savings rates of 3%. At this same time, instruments like money market accounts, which offered superior interest rates, became available. Because S&L associations were prevented from offering interest rates above 5.5% on deposits, they could not compete as their assets were already invested in long-term, low-interest fixed rate mortgages. By 1980, 85% of S&Ls were operating at a loss (Calavita & Pontell, 1990; Will et al., 2010).

Reagan was elected president in 1980 and ushered in a wave of deregulation. Laws phasing out limits on interest rates permitting S&Ls to engage in unsecured commercial lending were passed in

1980 and 1982. They could now issue credit cards and consumer loans, invest in high-risk ventures and invest directly in their own property. Deposits were still backed by the federal government; insurance was increased to $100,000 per account from $40,000. The underlying problem was the majority of S&L assets were invested in fixed rate mortgages. Deregulation meant they were able to offer high interest rates and created an environment of intense competition for deposits. This exacerbated the problem and the spread between interest payable and interest paid increased (Will et al., 2010).

Federal backing of these institutions via the FSLIC meant that taxpayers were liable for the failures, which cost between $150 to $170 billion dollars and made it the largest financial crime in history (Calavita & Pontell, 1990). Other sources place the total cost as high as $360 billion (Grossman, 2010). As interest was due on the 30 year treasury bills issued to cover the cost of the fallout, inclusion of this expense drives the total cost of the crisis towards $500 billion (Will et al., 2010).

The FHLBB referred over 6,000 cases to the Justice Department for prosecution in 1987 and another 5,000 in 1988. More than 2,900 lending institutions required either government assistance or failed (Pontell et al., 1994). It tainted the reputations of several US Senators, who became known as the Keating Five – John Glenn, Donald Riegle, Alan Cranston, Dennis DeConcini and John McCain. They received campaign contributions from Chares Keating in return for intervening with regulators on his behalf. Mr. Keating was convicted on many counts of fraud, conspiracy and racketeering in relation to the S&L crisis (Will et al., 2010).

From the onset of the deregulatory measures that fomented the S&L crisis, namely the Depository Institutions Deregulation and Monetary Control Act of 1980 (Robinson, 2013), through to the failures, convictions and government bailouts that resulted, this crisis typifies the damaging potential of deregulation. A stable lending system is loosened in the spirit of reducing the size and reach of government, only for it to later result in massive costs to the government and its taxpayers. The opportunity to seek massive profits though lack of oversight and greed can motivate firms to take undue risks due to moral hazard.

2.3.3 **BCCI**

In 1972, Aga Hassan Abedi founded the Bank of Credit and Commerce International (BCCI) in London. Its market was to be South Asian immigrants and purported intent was as a bank for developing nations. It was backed by Abu Dhabi's ruling family; Bank of America held a 25% stake. By 1982, it was in 57 countries with 280 branches, 45 of which were in the UK (The Economist, 2004). From its inception, BCCI used the its operations in many countries with multiple layers of

subsidiaries, holding companies, nominees, shell companies and any other means of opacity available through the use of a complex corporate structure to evade regulation. Central to this plan was using the secrecy provided by operating in the Cayman Islands and Luxembourg (Royan & Cagan, 2001). No one regulator could question their affairs because of their limited legal jurisdiction, which was BCCI's founders' intent. This corporate structure enabled BCCI to provide banking and money laundering services and manage the receipts of many types of illicit business including: arms trafficking, illegal immigration, prostitution, sale of nuclear technologies, terrorism funding, smuggling and illegal real estate transactions. This took place on a global scale in Europe, Africa, Asia and the Americas (Kerry & Brown, 1992).

The coordination of regulators from seven different countries was required to bring down BCCI in July of 1991. The bank failed due to massive fraud, as it had also used its opaque structure and lack of oversight to engage in risky lending practices. The web of deceit created made record keeping of their true operations and hiding the bank's massive losses due to poor investments unmanageable and led to its downfall (Royan & Cagan, 2001). When regulators seized control, BCCI ranked as the seventh largest private bank in the world with $20 billion in assets and was the largest bank in Luxembourg and the Cayman Islands. BCCI intentionally had different accountancy firms auditing it in each of these countries so neither would have full oversight of what was transpiring (Kanas, 2005). Initial losses were estimated to be between $10-17 billion, although much was recovered by its liquidators (Royan & Cagan, 2001).

Determining the total cost of the BCCI scandal is impossible. Due to ancillary expenses, lost opportunities and social fallouts, a final value will never be known. BCCI illustrates how fragmented international regulatory oversight, inverted corporate structures and complicit auditors are used to circumvent the rule of law. What happened with BCCI occurred again with Enron. One could even surmise BCCI was used as a template for Enron to commit similar crimes just one decade later.

2.3.4 **The Asian Financial Crisis**

The Asian Financial Crisis in 1997 started as a real estate bubble due to overvalued assets. When contraction of the banking system in Japan occurred, it manifested as credit restrictions in Thailand and the bubble burst. Capital inflows stopped and the Thai baht was devalued. The Thai government tried to support its currency and used up its cash reserves. The IMF was brought in to manage the situation through high interest rates and fiscal austerity. That resulted in bankruptcies, unemployment and a drop in real wages of up to 30 percent. Due to the interconnectedness of the local economies, the crisis spread to the Philippines, Malaysia, Indonesia and Korea. Banks failed and the equity markets saw 40 to 80 percent of their values erode (Komisar, 2011).

An alternative view proposed by Ramon Moreno of the Federal Reserve Bank of San Francisco is the Asian financial systems were the root of the crisis due to their inherent weakness. Moral hazard due to governments either implicitly or explicitly providing guarantees against failure was the cause; there was no incentive for risk management. Pegged exchange rates attracted large capital inflows and rapid growth and rising markets concealed the underlying issues (Moreno, 1998).

The structural problems in several east Asian economies were as follows: business criteria were not used in allocating credit; certain borrowers could not be refused due to political connections. Government policy objectives were prioritized and loans were given to poorly managed firms. There was an underlying belief someone other than the financial intermediaries would incur the costs of failed loans (Moreno, 1998). Moral hazard led to a lack of adequate risk avoidance. Many contend the actions taken by the IMF to contain the crisis actually exacerbated the problem. Its remedies, enacted with the backing of the world's major economies, were the same as what it did in similar situations in Latin and Central America (Katz, 1999). The key difference was with the Asian crisis, it was not the government, but rather the private sector, whose excesses had triggered the problem.

Also was different with this crisis was the government budgets were in surplus, there were high savings rates, positive current account balances and modest inflation. It was at the IMF's insistence the economies had liberalised their capital accounts in the mid-1990s in the first place. That was so capital exporting countries, like the US and Japan, who in 2020 were the top two shareholders in the IMF, and their speculating traders could have access to the markets (IMF, 2020a). There was also a lack of infrastructure for monitoring how much banks, individuals and businesses were borrowing from overseas. Low quality short-term loans were used to fund long-term investments; when confidence faded and lenders refused to renew the loans the problems began (Katz, 1999). The main critique of the IMF was that liberalising access to capital accounts created the real estate bubble in the first place and that their timing and actions were too late and too extreme. The IMF instructing that spending be cut caused the economic slowdown to deepen and created a recession (Essential Action, 2019).

From what happened in Asia, it appears the IMF's primary motivation is exposing developing economies to outside investment for the benefit of first-world economies looking for greater access to new markets in the pursuit of double digit profit margins. Prior to the crisis, an Asian investor could borrow Japanese yen almost interest free, invest the funds in Thai real estate and see annual returns upwards of 20 percent (Katz, 1999). These investment opportunities would not have been possible were there adequate capital controls in place and is why Bello believes the IMF was complicit in causing the crisis (Bello, 2004).

2.3.5 **Enron**

In December, 2001, the Enron Corporation of Houston, Texas filed for bankruptcy. Prior to the bankruptcy filing, Enron had a market capitalisation of $63 billion. It fraudulently inflated nearly $600 million of earnings by using an elaborate network of shell companies and an inverted corporate structure (Stimson, 2011).

Enron was able to do this by means of the Commodity Futures Modernization Act (CFMA), which was passed in 2000 by means of an unnoticed rider on a large appropriations bill during the end of the 106th Congress. It overruled previous laws preventing unregulated trading of credit default swaps and trading in energy derivatives and exempted Enron from any regulation on the energy commodity market. The main provision rendered moot by the CFMA was the Shad-Johnson Accord, which was an agreement between the Commodity Futures Trading Commission and the Securities and Exchange Commission that prohibited such trading (Amadeo, 2019; Stimson, 2011).

The CFMA was central not only to the Enron scandal, but also to the GFC as credit default swaps were the financial instruments central the GFC (Stimson, 2011). Enron was able to perpetrate fraud through the use of off-balance sheet special purpose entities so debts were not recorded on its own balance sheet (Schwarcz, 2006). Deregulation again created a means for dishonest businesses to capitalise on the lack of oversight. Prior to going bankrupt, Enron also used its market share to manipulate energy prices and create artificial shortages in the western US, resulting in rolling blackouts in California in 2000 and 2001 (FERC, 2007). These illegal actions were made possible through partial deregulation on the state level in California (FERC, 2003).

Enron founder, Kenneth Lay, was well connected to former US President George W. Bush. Bush had appointed him to be on the U.S. Energy Department Transition Team. As Governor of Texas, Bush passed deregulatory legislation in 1999 in Enron's favour. In return, Mr. Lay and his company provided Bush with nearly $2 million in campaign contributions (Nichols, 2006). Without cronyism and deregulation perpetrated at the state and federal level over many years, the Enron scandal might never have happened. Kenneth Lay, former CEO Jeffrey Skilling and CFO Andrew Fastow were found guilty of fraud and conspiracy. Mr. Lay died before sentencing, Mr. Fastow served six years in federal prison. Mr. Skilling was released from prison in February of 2019 on the condition that he surrender $42 million to Enron's victims (Stevens & Haag, 2019).

Arguably the biggest loser in the Enron scandal was their accounting firm, Arthur Andersen. It was their duty to provide due diligence and verify Enron's accounts were an accurate representation of their financial status. Because of loss of faith in their company, it saw its clients, employees and

investors abandon it en masse. Arthur Andersen - the only American company within the 'big five' largest accounting firms in the world - was soon insolvent. Its name is now synonymous with the scandal that destroyed it.

2.3.6 **Modern Failures Prior to the GFC - Summary**

We have reviewed four major financial crises and scandals that occurred prior to 2008. The information provided indicates that were adequate regulatory oversight in place, they could have been either mitigated or avoided. In the 21st century there have been others, like Parmalat in Italy in 2003, Bernie Madoff in 2008 or Allen Stanford in 2009, but those were relatively minor and due to an individual or cartel. The overarching theme of those reviewed is deregulation, lack of regulatory oversight and a drive to give as much access to capital markets as possible results in opportunistic risk taking. This in turn leads to abuse of the freedom provided by lack of regulation and failures, which end up being paid for by governments and their citizenry.

It should not be the responsibility of the taxpayer or those who invest in good faith to assume liability for market abuse. As with ordoliberalism, it is the role of government to proactively regulate so as to reap the rewards free markets have to offer, while ensuring rogue players do not use moral hazard to their advantage. The Keynesian response of government spending in times of crisis has become a crutch governments have come to depend on without consideration for the long-term effects debts cause.

How this pertains to the financial services industry post-GFC is as was defined by Professor Christopher Bovis when he assessed financial market integration in the EU. In this instance it applies to the global financial markets as a whole:

> The financial markets ... have integrated enough to create an interconnected and cross-border financial crisis, but not enough to justify a collective response to it (Bovis, 2010).

Governments unwilling to take a prudent, long-term approach to financial regulation that promotes stability and confidence in the markets can find themselves weakened by levels of debt which have risen from them having to repeatedly cover the cost of failures to a point where they no longer possess the ability to lead regulatorily, as they are too busy attending to the problems caused by their economic mismanagement; this results in regulatory fragmentation. Their citizenry, who have repeatedly seen their taxes used to pay for market failures due to moral hazard and regulatory capture have lost faith both in the financial system and globalisation as a whole.

Failures keep recurring, major change and retribution are minimal. Laypeople are dissatisfied and have chosen to place faith in retreating from the global economy. The irony of voting for Trump and Brexit it is the neoconservative philosophies and actors - the very ones who have time and again abused the system - in which they have placed their faith. This could mean the votes cast for these two were made as a general act of frustration with the status quo.

2.4 The History of Financial Technology

> Every technological improvement has always been a part of FinTech, beginning with the invention of the Abacus - Ruth Milligan, Head of Financial Services & Payments, Tech UK, May 2019 (Fintech North Conference, 2019).

The term fintech was coined in the early 1990s by the Financial Service Technology Consortium, a project initiated by Citigroup to facilitate technological cooperation (Arner et al., 2015). Like deglobalisation, the term may be new, but the relationship between finance and technology is not. More than any other industry, finance seeks to exploit technological advancements to minimise costs and increase efficiency. Improvements in the financial sector have positive effects on the economy due to it facilitating practically all production and most consumption activity (Frame et al., 2018).

The history of fintech has been broadly categorised into three distinct periods by Professor Douglas Arner. He defines the first of these, fintech 1.0, as beginning in 1866 with the laying of the first transatlantic telegraph cable and includes innovations such as the advent of Telex systems in the 1930s as well as the Diner's Club card in 1950 (Arner, 2016). Prior to this, Samuel F. Morse sent the first telegraph on May 24th, 1844. In actuality he did not invent the telegraph, rather he applied the use of a relay, developed by Professor Leonard Gale, which remedied the problem of signal degradation over long distances. This, along with the code he developed with Alfred Vail, known as Morse code, made his telegraph a practical means for communication.

In 1894, Guglielmo Marconi invented the wireless radio transmitter, which was substantially improved in 1907 by Lee de Forest's invention of the audion, better known as the vacuum tube. This enabled signals to be amplified on the end of the receiver (Geiger, 2019). These developments provided the ability for information to be communicated globally in minutes and hours instead of days and weeks. It represented a massive acceleration of response time, thereby enabling capital and commodity markets to price assets more quickly and accurately than ever before.

In December, 1947 the transistor was invented at Bell Laboratories in the US by William Shockley, John Bardeen and Walter Brattain, for which they won the Nobel Prize in physics in 1956. This was

further improved by Dawon Kahng and Mohamed Atalia, also at Bell Labs, with their invention of the metal-oxide-semiconductor field-effect-transistor (MOSFET); it was superior because it was scalable and could be easily manufactured. The MOSFET transistor is considered by historians to be the most important invention in the 20th century. From 1960 to 2018, over 13 sextillion (13×10^{21}) were produced. It is the most widely manufactured device in all of human history and is the core component in electronic devices that have shaped modern life (Gaudin, 2007; Geiger, 2019).

The first commercially available mainframe computers in 1951 were the UNIVAC I in the US and the Ferranti Mark 1 in the UK; they were based on vacuum tube technology and were instrumental in the design that would be central to the infrastructure developments which mark the second era of fintech (Crosley, 2018). By 1958, the industry had transitioned to the manufacture of mainframe computers based on transistor technology, as well as the development of medium-sized, business-oriented systems, like the IBM 7070 and 1400 series (Campbell-Kelly & Garcia-Swartz, 2015).

The period of FinTech 2.0 was defined by a move from analogue to digital technology. The invention of items like the personal calculator and the automated teller machine in 1967, as well as development of the BACS (Bankers' Automated Clearing Services), CHIPS (Clearing House Automated Payment System), SWIFT (Society for Worldwide Interbank Financial Telecommunication) and NASDAQ (National Association of Securities Dealers Automated Quotations) infrastructures in the late 1960s and early 1970s laid the foundation for the high degree of interconnectedness that exists today (Arner, 2016).

This period also saw major changes in the way the bond and equity markets operated, most notably with what became to be known as 'May Day' - May 1st, 1975 - when the New York Stock Exchange abolished fixed price commissions by order of the US Securities and Exchange Commission. The reluctance on the part of the exchange was obvious, as by year end 35 brokerage firms, no longer able to compete in an environment of 40-50% discounts compared to before, had gone out of business. Although commission income generated per trade dropped considerably, the number of shares and capital trading soon reached levels 500% greater than what they were before abolishment; the loss in commissions was more than made up for by the increase in volume (The Washington Post, 1985).

A similar event, known as the 'Big Bang', occurred on the London Stock Exchange on the 27th of October, 1986 when it was deregulated. This abolished minimum fixed commissions, ended the separation of trading and advice and allowed foreign ownership of UK brokers. It also involved a

move away from direct, face-to-face to electronic trading. The daily amount of capital traded increased from $US 4.5 billion to $7.4 billion within in a week (Robertson, 2016).

Neither of these deregulatory measures on the exchanges would have been possible without adequate technological infrastructure in place that could cope with the increased trade volumes. A key bit of financial technology that facilitated electronic trading was the 1982 debut of the Bloomberg Terminal (McCracken, 2019). It was revolutionary then and is still the premier system for financial information. That was at a time when most financial information was delivered via newspapers, which now are just as obsolete in their ability to transmit financial information as was the open outcry system.

Possibly the largest advancement in financial technology generally overlooked was the invention of the spreadsheet. In 1979 VisiCalc (visible calculator) was the first ever spreadsheet program available for personal use. It was originally made for the Apple II computer and was one of the core functions that made Apple computers a success (Grad, 2007). This type of program, where data is stored in cells and formulae are used to link the cells together, with the modification of data in one cell causing data in other linked cells to be automatically modified, was beyond disruptive in the efficiencies it brought to the world of finance. It was a sea change in regard to the speed and ease provided for updating financial information.

The development of open standards that are widely available and free from licensing also occurred in the 1980s. They include the UNIX operating system developed by AT&T (formerly known as Bell Labs) back in 1969. UNIX is a machine independent system that was the first used in client-server configurations and was also the base system for the Mac OS X operating system released in March, 2001 (Moreau, 2018). Open standards systems were more popular in Europe than in the US due to their potential for creating an environment of cooperation between suppliers (Campbell-Kelly & Garcia-Swartz, 2015).

The rise of the personal computer was the most obvious development in the era of fintech 2.0. Apple was one of the first companies to release a personal computer, the others being Commodore and Tandy. Adoption of the PC escalated in the 1980s with the release of the IBM PC in 1981 (Campbell-Kelly & Garcia-Swartz, 2015), mainly because Apple computers were expensive, whereas the PC was much less so. Interconnectivity between personal computers existed in the 1980s, but was a complicated process. November 1994 saw the release of the first beta version of the Netscape web browser. In August 1995, Microsoft unveiled its Windows ’95 operating system, which included

Internet Explorer 1.0. At this point the internet became a mainstream technology (Greenstein, 2015).

The third wave of development, fintech 3.0, was up to 2008. It includes such developments as the iPhone, automated investing via companies like Wealthfront, launch of the first cryptocurrency, Bitcoin, in 2009 and the creation of the peer-to-peer money transfer services like Transferwise (Arner, 2016). The current era of fintech, fintech 3.5, will be evaluated later.

The prior major technological advancements have been reviewed as reference for understanding later examination of the most recent fintech developments. Much as the cells of a spreadsheet link together and update accordingly, what is now happening involves a level of interconnectivity between disparate sources of information being applied to financial information that make it not unfathomable to see practically all data somehow having some value as financial information.

2.5 Literature Review - Summary

The feud between capitalist and collectivist economies was won long ago due to collectivism's inability to reward individual effort and accurately quantify value. The globalised market economy is the most reliable and efficient system of commerce available which is why it dominates. The social contract is not one of its priorities and is the reason the original deglobalisation movement opposes it. The globalised market's weakness is it can be susceptible to fraud and crises which require nations to cover the costs of such failures. The most recent and severe of these, the GFC, was the impetus for a new variant of deglobalisation in the form of Brexit and Trump and created a market gap that spurred additional developments in fintech.

Deglobalisation is another name for utopian desire. Inward looking policies of tariff wars and isolationism have historically resulted in greater costs which are passed on to the consumer. Achieving the goals of any version of deglobalisation is improbable, as multi-national corporations are more adept than the governments that seek to control them. Corporate feudalism is the new seat of power. A solution would be for governments to work collaboratively with one another in unison and use their coordinated power to negotiate with companies and each other if they are to make real progress on issues such as global financial regulation.

This would not only ensure orderly, functioning markets and successful national economies, but also prevent multinational corporations from pitting individual jurisdictions against one another in a race to the bottom on issues like financial regulation and taxation. The examples reviewed found previous episodes of deregulation or lack of oversight led to opportunistic and illegal risk taking. The

costs of the actions of rogue actors end up being absorbed by taxpayers and increase national debts. This is a loss of opportunity for tax receipts to be invested in something more beneficial to society and exacerbates the reasons for distrust in the globalised economy.

The infrastructure of the financial services industry is undergoing disruptive technological change. Without consensus, divergent regulatory goals and new technologies could find unprepared governments trying to use outdated macroeconomic tools, regulations and technology to manage economies that are becoming interconnected in novel ways.

This literature review has found a gap exists. There is much academic literature available on trade, finance and regulations, but no one has yet researched the effect fintech will have on the financial services industry in this period when deglobalisation has simultaneously occurred and the potential for greater regulatory fragmentation is likely. Further research is needed on current regulations and technological developments to determine whether they are a solution to, or further exacerbation of, the root causes for deglobalisation.

Chapter 3 Research Methodology

3.1 Research Introduction

The motive of this thesis is to explore globalisation trends of the financial services sector in the US, UK and the EU and examine the effects regulatory divergence and technology are having on the sector from an operational perspective. The findings have the potential to inform policy, equip businesses to respond to change and increase the understanding of the impact of deglobalisation and technology on the financial services sector and beyond.

The key aims of this study are to provide a PESTEL (Political, Economic, Social, Technological, Environmental, Legal) analysis and compendium of information. Its contribution to knowledge is relevant for use in bolstering the resilience of global financial systems to changes in regulations, which are often driven by the level of openness or protectionism, and gauging how novel technologies are most likely to be integrated into the financial system.

A major analytical theme is the relative levels of national debt. This is because the regulatory failures that led to the GFC resulted in multiple governments having to bail out their economies and private lenders deemed 'too big to fail' by issuing debt. It led to public mistrust in the financial system that manifested in the form of deglobalisation. National debt is also a quantifiable metric for assessing the financial impact of Brexit and Trump.

3.2 Research Question

Saunders, Lewis and Thornhill state:

> The importance of defining clear research questions at the beginning of the research process ... cannot be overemphasised. One of the key criteria of your research success will be whether you have a set of clear conclusions drawn from the data you have collected (Saunders et al., 2009: 32).

For the research undertaken, one unifying question was asked:

What effects are deglobalisation and fintech having in the US, UK and EU regarding their interrelations and financial services?

The basis for this was initial data collection for the literature review found financial services post-GFC were being affected most by developments in both deglobalisation and fintech. It is a broad research subject. Simpler questions could have been posed, but these two issues were concluded to be the most pressing matters affecting the financial services industry, as is the wider theme of the

geopolitical financial relations they encompass. Just as one task inevitably leads to another, so too does a comprehensive question expose more granular areas for future research. As this thesis is the foundation of research on this combined topic, it behoved a wide-ranging question be asked first. This led to the discovery of information sources, further areas for exploration and the development of conclusions that would not have been possible had a more specific topic been investigated.

The rationale for the specific selection of the major themes on which this thesis is based were as follows:

1. Choice of the United Kingdom, United States and European Union as territories of research:

The UK, US and the EU have been embroiled in two of the 21st century's most prominent deglobalisation events - Brexit and the election of Trump. These three territories also represent key financial markets which are affected by the political changes, enabling an exploration of the impacts of divergent regulatory priorities over recent years and how these interplay with, and influence technological developments. Research by Professor Arner in 2017 found the GFC resulted in, "public distrust in the financial services industry, particularly in the US and EU" (Arner et al., 2017:13). By using these three areas as a basis for investigation, what the thesis exposed was the larger theme of Britain moving away from the ordoliberal ideology of the EU. This appears to be based on a desire to adopt a more neoliberal approach to regulation and debt, like that of the US.

2. Selection of technologies:

During the initial data collection period it became apparent the combination of blockchain and smart contracts was a major issue for detailed research. Each is reviewed in a standalone chapter. Also evident was how other technologies, such as machine learning and the internet of things, have the potential to be integrated with blockchain and smart contracts to provide additional synergy. Research of fintech found any one new technology is limited in its application, however the use of multiple new technologies in concert has the greatest potential to affect financial services.

3. Foundational theories and the origins of deglobalisation research:

Bello's writing was used as the viewpoint from which deglobalisation was explored based on the fact he coined the term and wrote the first substantive book on the subject. Others have researched the topic of 21st century globalisation, such as Sabino Cassese (Cassese, 2015) or Jean-Bernard Auby (Auby, 2017). What those authors have in common is a continuation of the theoretical discussion of globalisation.

One could assert globalisation and deglobalisation are opposing sides of the same argument. What differentiates Bello is he views the subject of globalisation from a contrarian point of view that at some point globalisation will need to regress. The motive of his writing in *Deglobalization – Ideas for a New World Economy* was to approach the subject primarily by documenting the harm globalisation has done. Later detailed in his *11 Pillars of the Alternative*, Bello proposed solutions to the ills of globalisation from a largely theoretical point of view (Bello, 2009). In order to gauge the course deglobalisation took due to Trump and Brexit, a more quantitative approach was used, as was introduced in the literature review.

3.3 Research Theory, Methodology and Techniques

Academic research is based on the use of theory, methodology and techniques. In qualitative research, the researcher is the prime instrument of data collection; this can be a benefit or detriment to the quality of the research (Likupe, 2021). The other means of research, quantitative research, is more specific and focused on discovering causation and the existence of a relationship between a defined set of variables, normally through the use of statistics (Bazarbash, 2019). This definition also prescribes what qualitative research is, as it encompasses the methods quantitative research does not. This is a wide gamut; a qualitative researcher has great control on the outcomes of their research at all stages.

One of the most important things a qualitative researcher does is discriminate against which sources of information to include. The power this task holds is the reader is never even made aware of information that may have been of relevance, meaning any qualitative research is first focused on the inclusion and exclusion of data; it is thus biased from the onset.

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations (Alvesson & Sköldberg, 2000).

This research has relied on the use of multiple methodologies and qualitative and quantitative methods. The latter has been employed only so far as in the analysis of numerical data. When viewed as a contiguous work, it is evidently qualitative in nature.

Morgan delineates the use of quantitative and qualitative methods as respectively being inductive versus deductive methodology (Morgan, 2013). The methodologies and conclusions of this thesis are primarily inductive, subjective and contextual. It was determined only after the collection and analysis of information what deglobalisation and fintech collectively represent is an ideological shift

in the power dynamics of the relationships between the US, UK and EU. An explanation of the different methodologies used in this research follows in Table 3.1 .

Table 3.1 Qualitative Versus Quantitative Research

Qualitative Research	Quantitative Research
Induction **Purposes** o Generates theory from observations o Oriented to discovery, exploration **Procedures** o Emergent design o Merges data collection and analysis	**Deduction** **Purposes** Tests theory through observations Oriented to cause and effect **Procedures** o Predetermined design o Separates data collection and analysis
Subjectivity **Purposes** o Emphasises meanings, interpretation o Tries to understand others' perspectives **Procedures** o Researcher is involved, close to the data o Researcher is the 'research instrument'	**Objectivity** **Purposes** o Emphasises things that can be measured o Results do not depend on beliefs **Procedures** o Researcher is detached, distant from the data o Relies on standardised protocols
Context **Purposes** o Emphasises specific depth and detail o Analyses holistic systems **Procedures** o Uses a naturalistic approach o Relies on a few purposively chosen cases	**Generality** **Purposes** o Emphasises generalisation and replication o Analyses variables **Procedures** o Uses experimental and statistical controls o Works across a larger number of cases

(Morgan, 2013)

Research in the initial stages was largely interpretivist. Analysis of the financial regulations across the chosen territories was performed first. During that phase, research of the financial regulatory ecosystem focused on how the different territories regulate financial services and lending. This was followed by an evaluation of the various technologies developed since the GFC and how they might most be of benefit to the financial services industry, followed by a review of the financial regulatory changes in the US. Research was concluded via analysis of the state of deglobalisation as of late 2020 and early 2021.

3.4 Epistemology of Qualitative Research

There are two main epistemological means by which a qualitative researcher approaches their task. The first is positivism and the use of objective methodology where the researcher is a neutral element in the research process and is congruent with the ontology of realism. The other epistemological school of thought, social constructionism, asserts, like the philosophical school of existentialism to which authors such as Camus, Sartre and Kafka belong, it is the individual themself that gives reality meaning. This type of research would be most in line with the ontology of relativism (Likupe, 2021).

Realism is correct; facts do exist – Trump was elected, Brexit was voted for by a majority, and so on. Regarding the qualitative research conducted, it is not the presentation of basic facts, but rather the relative context in which they are viewed that matters most. Differing points of view are what give life and the human experience its rich contextuality and are what this research has attempted to capture through the use of social constructionism.

To gain an understanding of what social constructionism is, consider Plato's allegory of the cave. In it he highlights the limitation of social constructionism and how the beliefs of any observer are biased by the limitations of their own knowledge (Bedard, 2020). Plato's parable is about a group of prisoners chained together in a cave. Between them and the entrance is a fire. Outside the cave people are using puppets and other objects that give the prisoners the impression of various events occurring, but this is just false imagery.

Should a prisoner escape and learn the truth of what is actually happening, they would discover their previous beliefs were incorrect by having acquired new knowledge. Were they to venture back into the cave to share their experiences with the others, upon returning they would find their eyes unaccustomed to the dark, be unable to see and appear to act as if they would been blinded. From the point of view of the other prisoners they would assume this to mean should they also escape, harm will come to them too - thus having their illusory perceptions of the dangerous world outside reinforced (Plato, 517 B.C.).

This example shows the relevance of Alexander Pope's saying, "A little learning is a dangerous thing" (Pope, 1709: 1). Not being fully aware of a situation leads to flawed perceptions. Not presenting as objective and broad a viewpoint as is necessary to correctly convey the details of a topic has the potential for a researcher to do more harm than good. A qualitative researcher must determine how far out of their own cave of perception they need to traverse in order to present an objective point of view. This is their positionality.

One means for accomplishing this is by the researcher explicitly acknowledging the risks the effects of their perception could have had on the research outcomes. As Feyerabend states:

> Knowledge is part of nature and is subjected to its general laws. The laws of dialectics apply to the motion of objects and concepts, as well as to the motion of higher units comprising objects and concepts. According to these general laws, every object participates in every other object and tries to change into its negation. This process cannot be understood by attending to those elements in our subjectivity which are still in relative isolation and whose internal contradictions are not yet revealed (Feyerabend, 2010:11).

3.4.1 **Positionality**

My positionality is being a US citizen who immigrated to the UK in 2003. I have extensive education and career experience in both financial services and information technology from living in the US, UK and Germany and the requisite background necessary for conducting an analysis of the twin-themed topic. I also viewed the two deglobalisation issues being researched as a situation where the autonomy being promised might not in fact be the ultimate goal of their proponents. Due to the concept of agency, these issues could mean persons acting in what was purported as being in the interests of everyone involved might actually be using the situation for their own benefit foremost.

Considering Feyerabend's statement on the Copernican theories on the behaviour of celestial bodies, when it comes to qualitative research, at some level all things are connected. The primary research obligation was to determine which information to include and what to leave out as not everything reviewed could be researched and included simultaneously. This was the greatest dilemma of the research project – discovering what was transpiring with deglobalisation and fintech that was most relevant and worthy of further analysis and inclusion.

Regarding Feyerabend's reference to dialectics, they are defined by Merriam-Webster as:

> Discussion and reasoning by dialogue as a method of intellectual investigation. Specifically, the Socratic techniques of exposing false beliefs and eliciting truth and the Platonic investigation of the external ideas (Merriam-Webster, 2021).

The goal of this thesis is to provide information in a manner that enables the reader to determine how the conclusions have been reached whilst enabling them to also form their own opinions. The information herein provides the reader the opportunity to engage in dialog by means of the Socratic method of cooperative argumentative conversation that seeks to find the truth through critical thinking and debate.

3.5 Time Horizon

Research was begun in June of 2018. Due to the Covid-19 pandemic and the subsequent effects of multiple periods of lockdown, the write up and submission dates were extended by three months to the end of Q2 2021. This provided the opportunity to include information and performance metrics pre and post-Brexit and Trump and the ability to attempt to gauge which economic effects could most likely be attributed to the pandemic. The planned key activities and phases of the research study as documented in the proposal are illustrated below in Table 3.2.

Table 3.2 Research Timeline

	2018		2019				2020				2021	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Literature review and report												
Refinement of the hypothesis and research question												
Report on the current regulatory landscape												
Establish a robust work plan												
Plan data collection												
Data collection												
Data analysis												
Workshop and lecture attendance												
Conference attendance												
Writing up												
Thesis submission												

3.6 Methods

Saunders et al. consider data collection to be central to the theme of research (Saunders et al., 2009). Shaikh emphasises the use of desk-based research, as it avoids the difficulties associated with primary data collection (Shaikh, 2019). What was experienced throughout the initial stage of data collection confirmed this, as individuals and organisations were consistently unwilling to provide information. Based on those experiences, research focused primarily on the use of secondary sources. These include books, previous theses, academic journals, research papers by major institutions and patent applications as well as information publicly available through websites.

A problem experienced in the research process was finding too many sources of information. In writing up the findings, attention was placed on including facts most relevant to the research question to provide an objective assessment. This employed a method of reliance on academic resources at the onset as a theoretical basis and then the use of more current sources so a timely and comprehensive analysis was created. A thesis is not timeless and has a limited period of relevancy; information becomes outdated and news becomes history. This research strived to extend the bounds of knowledge on the topics at hand to provide a factual, timely and unique assessment.

3.6.1 **Data Collection**

Data was collected through use of the following method:

1. Primary data was collected by attending conferences, lectures and workshops.
2. Secondary data was collected by means of the following:
    2.1 Scholarly works, including texts and journal articles, were sourced first.
    2.2 More timely sources were collected through the use of Google Scholar alerts. These were set up in June of 2018 at the beginning of the research period for the following terms: deglobalisation, deglobalization, fintech and blockchain.
    2.3 The alerts were discontinued at the end of 2019. They generated emails containing links to scholarly works containing the relevant terms. From there it was a matter of reviewing the sources found to discern which were of relevance. Many sources identified through this process were found to not be germane to the research question, while others were inaccessible due to paywalls or other barriers.
    2.4 When additional information was required, searches relied upon searching the University of Hull library online database for keywords, such as 'Savings & Loan Crisis' or 'Sarbanes Oxley'.

2.5 To provide detailed information on issues, like the finer points of how technology functions, or current information as was possible on the socioeconomic climate, in the last instance internet searches were utilised.

3.6.2 **Data Analysis**

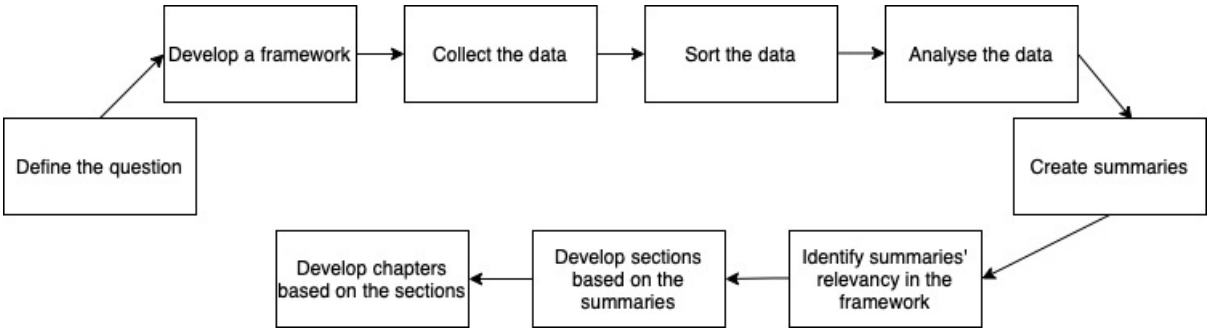
Data collection resulted identified over 1,100 relevant sources. These were first categorised according to the month and year they were found. They were then put into a second category based on their primary subject area. The motive was to have as defined a collection of sources as possible for use in the specific subject areas. The categorisations were not absolute. Some sources were relevant to multiple areas within the thesis. This provided a framework for assimilating the information and managing what was a large amount of data. The categories used were:

1. Qualitative/Quantitative Sources
2. Administration/Settlement/Management
3. Banking
4. Blockchain/Distributed Ledger Technology (DLT)
5. Crisis/Fraud/Crime
6. Debt
7. Deglobalisation
8. European Central Bank (ECB)
9. Foreign Direct Investment (FDI)
10. Financial Services

11. Fintech – General
12. Fintech – History
13. Malta – Legislation
14. Malta – Miscellaneous
15. Objectivism
16. Patents
17. Regulation – Fintech
18. Regulation – General
19. Robo-Advisory
20. Smart Contracts
21. Surveys
22. Taxation
23. Theses and Dissertations

Figure 3.1 illustrates the data analysis process.

Figure 3.1 Data Analysis Process



3.7 Techniques

The thesis integrated over 650 citations from the source material. NVIVO data analysis software was used for identifying the most relevant sources on a particular subject. This was accomplished by exporting an XML copy of the EndNote library into NVIVO and then by performing a word search for key terms.

A spreadsheet was used to further categorise the sources analysed. Sources were tagged with up to three sub-categories. During the major period of data collection and reading from June 2018 to December 2019, compendia of the sources read were compiled. This consisted of either writing short summaries of the source and using the copy and paste function to create an abridged version of the source material. These summary documents were useful in avoiding having to again read through an entire source when writing up the thesis.

During the data analysis period the functionality of an EndNote library accessible on a desktop computer as well as on a tablet computer was heavily utilised. The central EndNote library exists in a cloud based repository which is then updated on the client devices. It was possible to input a source

via a desktop computer, upload it to the repository and then download it to a tablet. From there the source could be read and highlighted and annotated. These modifications could then be uploaded to the repository and then back to the desktop client.

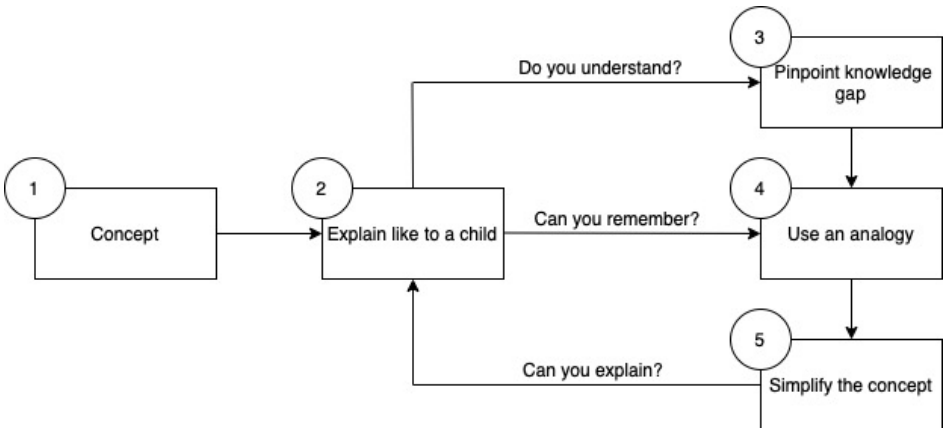
This functionality made reliance on reading at a desktop or from print versions unnecessary. Updates, such as highlighted text, could be later identified and included within the abridged reviews of works. The benefit was being able to devote more time to reading, like with a book, so the entirety of the data review process was not a desk based task. The result was the analysis of a very large amount of information and discovery of emerging themes throughout the source material.

3.7.1 Writing Technique

The writing style employed relied upon the Feynman technique, depicted in Figure 3.2. It is named for renown physicist Richard Feynman and detailed below:

1. Pick a concept or topic you want to understand and begin studying.
2. Pretend to teach it to someone young or unfamiliar with it.
3. Go back to the resource material when you get stuck.
4. Simplify and develop an analogy.
5. Repeat the process as necessary.
   (Feynman, 2015; Zhao et al., 2020)

Figure 3.2 Feynman Technique for Learning



This technique conveys information to readers in a simple, straightforward manner so the research can be accessible to as wide an audience as possible. A PhD thesis is a behemoth of information. If the writing style employed can entice someone to first begin reading and keep doing so, they just might choose to read it in its entirety. The result of this would be impact.

3.7.2 Research Impact

A prime example of the impact academic research can have is the book *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything* (Levitt & Dubner, 2005). One of the authors,

Steven D. Levitt, holds a BA from Harvard, a PhD from MIT and is a Professor of Economics at the University of Chicago (Levitt, 2022). These are impressive accomplishments. What matters most is he parlayed his research into a book that sold over four million copies and became a franchise including a second edition, a blog, documentary film, popular podcast and occasional columns in the *New York Times* (Gelman & Fung, 2022).

Research can be both impactful and entertaining. The reason it happened for those authors is because they gave the reader something, "light-hearted and contrarian, yet rigorous and quantitative" (Gelman & Fung, 2022). Most of all, they provided their readers facts and viewpoints in a manner that motivated them to keep reading and share their experience with others. That is the ultimate motive of this thesis – to make the reader *want* to read it enough so they keep reading, learn what it has to offer in the process, share this knowledge and encourage others to read it too.

3.8 Ethical Issues

A benefit of reliance on secondary sources of information is it avoids ethical issues that might be encountered through collection of primary information. Saunders et al. state:

> In the context of research, ethics refers to the appropriateness of your behaviour in relation to the rights of those who become the subject of your work, or are affected by it (Saunders et al., 2009:183-184)

The research relied primarily on information already in the public domain. It avoided potential repercussions that might arise from including information interviewees could in retrospect deem too revealing based on its subsequent interpretation and use.

3.9 Contribution to Knowledge

The full contribution this thesis makes to the omnibus of knowledge on deglobalisation and financial technology will be explored in later detail in its conclusions.

Prior to undertaking this project, the first topic researched was whether anyone had already researched the subjects of deglobalisation and fintech in the US, UK and EU. This was accomplished by searching the thesis and dissertation databases of the University of Hull, the British Library and a global database of such works accessible at OATD.org (Open Access Theses and Dissertations) None had. This task verified the thesis is making an original contribution to knowledge. Additionally, future researchers can use this thesis as guidance to revisit the subjects explored so as to provide similar, yet up to date assessments.

3.10 Research Limitations

The earlier paraphrasing of Plato's allegory provides a good example of the limits of qualitative research. Having first read it some 25 plus years ago and more recently researched it again, the summary given is on the whole correct, but the description of the exact layout of the prisoners in the cave is not exactly as was imagined by Plato.

This is the fundamental limitation with qualitative research – accurate and objective presentation of relevant facts by the primary element of data collection, the researcher themself, who is inherently unconsciously biased and possibly also unintentionally mistaken in their observations. Due to this limitation, focus has been on providing accurate, descriptive information coupled with critical analysis of what the information means in relation to the research themes as a whole.

Another research limitation was the availability of peer reviewed sources. Brexit, Trump and fintech were three recent topics promising an upending of the status quo without any long-term results available for substantiating the validity of their claims. The timescale of the research period needed to be extended so a full assessment of what transpired in Trump's final months in power and the extension of the Brexit transition period could be included.

A less volatile set of topics could have been chosen, but the research of bygone events might best be suited to historians. In any business situation what is most desired is forecasting of what current conditions indicate will be the future course of events. The writing period occurred after a moderate amount of time had passed since the initial stages of data collection. This made it possible to review what had been initially found and provide a more comprehensive perspective due to the passage of time.

Chapter 4 Financial Regulation in the EU, UK and US

4.1 Introduction

This chapter provides an overview of the financial regulations in the EU, UK and the US. It includes the most pertinent financial regulatory developments and those relevant to financial technology. It analyses the differences between the regulatory structures of the EU, UK and US, the most significant current regulations and how they are affecting the financial services industry. It is weighted towards what has transpired with US regulations. This is because they have undergone significant change since the turn of the century and have changed as well under Trump and due to fintech. At the time of this research, no information on the impact of Brexit on financial services regulation was available.

4.2 Regulatory Structure of the US and EU

America is regarded as the New World in comparison with Europe, yet the US has more than 200 years of experience in federalism, whereas the EU has less than 70. Yataganas defines the EU as an example of derived federalism, whereas the US is one of statutory federalism because legislative delegation is explicitly prohibited by the US Constitution. Power is delegated to a triumvirate comprised of executive powers held by the President, legislative powers held by a Congress composed of the House of Representatives and the Senate and judicial powers held by the Supreme Court (Madison, 1787; Yataganas, 2001).

The first three articles of the US Constitution are known as the 'non-delegation doctrine'. The US Supreme Court ruled non-delegation does not prevent Congress from receiving assistance from either the executive or judicial branches of government. For most of its history, the US saw power reside primarily with Congress. Until the New Deal period under Franklin D. Roosevelt in the 1930s, the executive branch was inferior to the legislative branch, owing to the spirit of 'We the people'. Since then, the power of the President has only ever increased (Yataganas, 2001).

Bello defines the US as being a Lockean democracy founded on the philosophies of 17th century English philosopher John Locke. Its power lies in its ability to project its vision of liberal rights and freedoms in the form of free elections (Bello, 2004). The greatest example of this was the US sponsored post-World War II Marshall Plan for rehabilitating the economies of 17 countries in western and southern Europe so as to create stability and curtail the spread of communism that had become appealing due to widespread unemployment and poverty in the aftermath of the war (Britannica, 2020). The actions of President Trump in declaring the results of the 2020 presidential

race fraudulent and the failed insurrection on the 6th of January, 2021 have done serious damage to the US' reputation in this regard.

Within the EU it is the Member States that have conferred power on the EU for it to have the authority to govern them. The attribution of powers is not segregated by area of action, like environment or housing, or by branch of government, but rather in a cumulative sense, as the form, procedure, relevant institution and area of activity are all specified within a particular EU treaty. It is a centralised form of governance with limited opportunity for the Member States to be empowered. Contrary to the US structure, which is a separation of powers, the structure of the EU is one wherein power is widely distributed across a broad swathe of institutions. They have very distinct, limited functions which renders them all highly interdependent on one another; it is a webwork of limited empowerment (Yataganas, 2001). Thus, within the EU, power has been conferred from the Member States up to the federal level, whereas in the US, power has been delegated from the federal level down to the states.

4.2.1 The Role of Agencies in the US Versus the EU

In the US, an agency is an independent administrative and legal entity incorporated by law, holds regulatory power over a particular area of activity and takes a pragmatic, practical approach. Core to their existence is an open administrative arena; their approach to governance is oftentimes investigatory and involves the oversight of hearings and first-hand collection of information from relevant persons in industry, like chairpersons of corporations or lending institutions. Legislative distrust of the executive branch, namely President Harrison in 1889, was the impetus for the first agency, the Interstate Commerce Commission. The Federal Trade Commission is another organisation that was set up as a check against the authority of the presidency. The power of federal agencies in the US is one of unlimited remit that allows them to delve into whatever information they see fit for the purpose of being a part of the US system of checks and balances (Yataganas, 2001).

This greatly contrasts the power of agencies in the EU, where they are relegated to a much more specific technical or scientific nature. They do not go looking into issues based on their own judgements; theirs is a role of defined task completion and not one of broad investigative authority (Yataganas, 2001). Because of these differing objectives, EU agencies do a job already assigned to them and remain within their remit. In the US, agencies go looking for reasons to exercise their power and justify their existence. An example of this is the Office of the Comptroller of the Currency (OCC), which Upton states has historically broadly interpreted relevant legislation governing it to expand the powers of banks under its jurisdiction and thereby its own budget and authority. This is

agency capture, which is where an agent or a tranche of management uses its power primarily not for executing its defined role, but rather for personal benefit (Upton, 2018).

4.3 History of the European Union

4.3.1 The European Union Versus the Council of Europe

The European Union, originally known as the European Economic Community (EEC) was established by the Treaty of Rome on 25 March, 1957. It created a, "unified economic area with a common market" (Bovis, 2010: 2) that enabled people, services, goods and most importantly, capital, to flow freely (Bovis, 2010). A primary reason for the treaty was to reduce the likelihood of another European war. The Treaty of the European Community prohibits all restrictions to the free movement of goods, capital, persons and the ability to establish and provide services. Member States have the right of access other Member States' markets. The EU is governed by the Council of the European Union, also known as the Council of Ministers. The Council of the European Union and the European Parliament are the governing bodies of the EU. The Council of Ministers makes law based on the recommendations of the European Parliament and the European Commission, which is the civil service division of the EU. Laws made by the EU are known as directives. The UK joined the EU in 1973 and voted to leave in 2016 (Bovis, 2010; Home Office, 2007; Yataganas, 2001).

The Council of Europe was founded in 1949 and predates the creation of the EU; the UK was a founding member. It is comprised of 47 member states, including the remaining 27 members of the EU. It has no legislative powers; its purpose is to draft conventions and charters that centre on the protection of democracy, the rule of law and human rights. The most well-known of these is the European Convention on Human Rights (ECHR). The first country to ratify the ECHR was the UK in 1951. The ECHR has received much criticism and was considered one of the reasons for the vote to leave the EU. The ECHR was incorporated into UK law with the 1998 Human Rights Act (Clear, 2019).

> Even if the Human Rights Act was reformed or repealed now, the UK would still be subject to the convention as a signatory. UK citizens would still have access to the protections the convention has introduced (Clear, 2019).

Although the UK left the EU, it is not leaving the Council of Europe and as of 2021 had no apparent plans to do so (Council of Europe, 2020; Home Office, 2007; UK Government, 2020c). What happens with the Human Rights Act post-Brexit is unknown.

4.3.2 History and Structure of Financial Services Regulation in the EU

The following section provides an overview of financial regulation in the EU. The supervisory authorities of the Member States of the European Union have autonomous rule over their financial

institutions, yet are overseen by the European Supervisory Committees. Business regulation is one area where convergence is inhibited, as the home country principle does not apply. According to Bovis, the EU has three incompatible objectives: a stable financial system, an integrated financial system and independent financial supervision. Authority in the EU converges in relation to passporting. By being compliant with EU regulations, EU members are able to provide financial services in other EU member states with no additional regulatory oversight (Bovis, 2010).

4.3.3 The Committee of Wise Men

The framework for implementation of EU directives on financial service industry regulation was established in July 2000 by the Committee of Wise Men on the Regulation of European Securities Markets which was headed by Baron Lamfalussy (Bovis, 2010). The 'wise men' are members of the German Council of Economic Experts, an independent body that has been advising the German government since 1963 (Popa, 2018). It is credited with improving regulatory response time within the Eurozone based on a four level legislative and regulatory approach:

Level 1 – European Council and European Parliament agree based on proposals from the European Commission.

Level 2 – A comitology structure of regulatory and supervisory committees deals with specific tasks at various levels. It includes entities such as the European Securities Committee (ESC) or Committee of European Securities Regulators (CESR); they advise the EC on technical matters.

Level 3 – Supervisory Committees consisting of national supervisory authorities from the EU the whole of the EU.

Level 4 – The EC ensures the Directives are implemented into national law.

(Bovis, 2010)

The four initial EU securities directives were enacted in 2003-2004. They are: the Market Abuse Directive, the Prospectus Directive, the Markets in Financial Instruments Directive (MiFID) and the Transparency Directive (Bovis, 2010). Illustration of how the EU has sought to develop a regulatory framework that initially replicated and then expanded upon that of the US follows in Table 4.1.

Table 4.1 Timeline of Financial Services Regulation in the European Union

Year		Regulation
1951	-	Establishment of the European Coal and Steel Community
1957	-	Establishment of the European Economic Community (EEC), also known as the 'common market', under the Treaty of Rome
1966	-	Merger Treaty
1977	-	First Banking Co-ordination Directive of December 1977 – Directive 77/780/EEC
1979	-	Stock Exchange Listing Directive – Directive 1979/279/EEC
1986	-	Single European Act
	-	Consolidated Supervision Directive (updated in 1992) - Directive 86/635/EEC
	-	Money Laundering Directive - Directive 91/308/EEC
1987	-	Single European Act followed by the internal market
1989	-	Second Banking Coordination Directive - Directive 89/646/EEC single banking license 'passporting' valid across community (first banking directive had no passporting)
	-	Insider Dealing Directive – 1989/592/EEC
	-	Own Funds Directive – Directive 89/299/EEC
	-	Solvency Ratio Directive - Directive 89/647/EEC
	-	Prospectus Directive - Directive 91/308/EEC
	-	Listings Particulars Directive - Directive 90/211/EEC
	-	Investment Services Directive (ISD) - Directive 93/22/EEC
1990	-	Mutual Recognition of Listings Directive - Directive 90/211/EEC
1992	-	Treaty of Maastricht/Treaty on European Union and its three pillars
	-	Capital Adequacy Directive - Directive 93/6/EEC CRD was an extension of the CAD 1992 by including operational risk (loss from failed internal processes)
1997	-	Amsterdam Treaty
1999	-	Launch of the Euro
	-	Financial Services Action Plan (FSAP) proposed 42 legislative measures in four key areas: 1. Accommodation of migration to the Euro 2. Create 'open and secure' retail markets 3. Update prudential regulation and supervision (2004 Basel II Capital Accord) 4. Holistic improvement of entire internal market by homogenization of tax and legal regimes
2000	-	Nice Treaty
2001	-	Stock Exchange Listing Directive II – Directive 2001/34/EC

2003 - Market Abuse Directive - Directive 2003/6/EC

- Prospectus Directive - Directive 2003/71/EC

2004 - Markets in Financial Instruments Directive (MiFID) - Directive 04/39/EC updated ISD's 'single passport' approach – made it applicable to a wider range of financial services and trading locales.

- Transparency Directive - 2004/109/EC

2006 - Capital Requirements Directive - Directive 2006/48/EC (accommodates 2004 Basel II)

2007 - Payment Services Directive (PSD1) – Directive 2007/64/EC

2012 - Short Selling Regulation – 2012/236/EU

2014 - Markets in Financial Instruments Directive (MiFID II) 2014/65/EU

- Market Abuse Directive (MAD) – 2014/596/EU
- Market Abuse Directive on Criminal Sanctions (MADCS) – 2014/57/EU
- Market Abuse Regulation – Replaced MAD and MADCS
- Administrative Cooperation Directive (European FATCA) – Directive 2014/107/EU

2015 - Payment Services Directive 2 (PSD2) – Directive 2015/2366

(Bovis, 2010; 2012; EC, 2014; Oliinyk & Echikson, 2018; PayPal, 2020; PwC, 2015; Ryan, 2019; Yataganas, 2001)

This timeline presents as complete an analysis as possible based on the sources reviewed and is presumed adequate for chronicling of the development of the EU's network of material financial regulations. The EU has transitioned from focusing on the creation of a regulatory system complimentary to that of the US and is now working on forward looking legislation, particularly in the areas of data privacy and data management. This list also shows how the EU approach to enacting regulation is subject specific. This is in contrast to the legislative process in the US where a single act can encompass a multitude of different aspects and updates to a variety of laws already enacted.

4.3.4 The Basel Accords

Basel is the common name for the regulatory standards and structure contained within the Basel Committee on Banking Supervision (BCBS) publications. It has had three different versions – Basel I, Basel II and the most current version - Basel III. They are an example of 'soft law', a term associated with international law that it is passed by intergovernmental organisations, but is within the remit of each member for enforcing compliance (Arner et al., 2017).

The Basel I Capital Accord was developed in response to insufficient capital levels which caused the Developing Country Debt Crisis in the 1980s. Repeated amendments in the 1990s, particularly

extension from overseeing just credit risk to an inclusion of market risk and netting off of derivatives contracts, increased its complexity and compliance costs. It was enforced in law by the Group of Ten (G-10) in 1992. Basel II was a consolidation of accounting, regulatory and economic capital into one single market framework. Its impetus was the 1997 Asian Financial Crisis. It relied on outsourcing the work of regulators to quantitative internal risk management systems of major global financial institutions and was not sufficient for avoiding the GFC (Arner et al., 2017).

4.3.4.1 Basel III

Basel III is formally known as *Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems* and *Basel III: International Framework for Liquidity Risk Measurement, Standards and Monitoring* (Arner et al., 2017). It is a collection of minimum requirement standards global in scope and dependent on members for compliance that focuses on minimum capital requirements and market liquidity risk, which are assessed by means of stress testing (BCBS, 2010). The Basel III framework consists of three pillars for reducing systemic risk by means of capital requirements, liquidity requirements and leverage ratios (Bourdon, 2017). Implementation was scheduled to take effect from January 1st, 2022 and be phased in over a five year period (FSB, 2020a). Due to the Covid-19 pandemic, implementation of the Basel III standards and the phase in period were deferred in late March 2020 by one year as detailed in Table 4.2.

Table 4.2 Revised Basel III Implementation Dates Due to Covid-19

Standard	Original Date	Revised Date
Revised leverage ratio framework and G-SIB buffer	1 January 2022	1 January 2023
Revised standardised approach for credit risk	1 January 2022	1 January 2023
Revised IRB approach for credit risk	1 January 2022	1 January 2023
Revised operational risk framework	1 January 2022	1 January 2023
Revised CVA framework	1 January 2022	1 January 2023
Revised Market Risk Framework	1 January 2022	1 January 2023
Output floor	1 January 2022; transitional arrangements to 1 January 2027	1 January 2023; transitional arrangements to 1 January 2028
Revised Pillar 3 disclosure framework	1 January 2022	1 January 2023
IRB = internal ratings-based approach		CVA =credit valuation adjustment

(BIS, 2020)

The Basel III accord is applicable to 24 jurisdictions of the Financial Stability Board (FSB). Application of the Basel rules was done in a tiered format in the US; in Europe they are applicable to all banks (Fay & Arcelli, 2018). The tiered approach in the US means smaller banks are subject to less regulatory oversight; in the EU they are not. As of 2020, all FSB jurisdictions had implemented the core aspects of the Basel III risk-based capital and liquidity rules, loss absorbency requirements for globally systemically important banks (G-SIBs) and all jurisdictions except China had applied the assessment methodologies for domestic systemically important banks (D-SIBS) (FSB, 2020a; b). As of 2017, thirty banks were deemed to be G-SIBs (Jones & Knaack, 2017).

Full implementation of Basel III has been delayed due to Covid-19, but will have happened by 2023. It is the unifying global regulatory response to the GFC. Legislative changes under Trump have enabled US community level banks to be exempted from Basel III regulations.

4.3.5 The Payment Services Directives

Prior to 2007, the EU did not have a legal framework for a single EU-wide payment market; only banks, telecommunications firms and money transmitters could perform payment services. PSD1 was created to allow non-banks into the market, especially regarding cross-border payments by means of passporting. PSD1 resulted in greater transparency and lower transfer fees. PSD2 was introduced in 2015 and contains 11 mandates on the European Banking Authority requiring open banking. These dictate account servicing payment service providers (ASPSP), otherwise known as a bank, must provide third-party payment service providers (PSP) access to their accounts. The motivation for PSD2 is to foster competition, diversify the types of product on offer and provide a means of inclusion for the underbanked. Banks are required to do this by providing an application programming interface (Oliinyk & Echikson, 2018).

PSD2 centres on the use of strong customer authentication (SCA) and secure communications. SCA takes the form of two-factor authentication. Interested parties must provide two of three pieces of information: knowledge, possession and inheritance. ASPSPs are able to identify PSPs by means of verifying their qualified certificate. This means ASPSPs place trust in the certification and not the PSP itself. It is the obligation of local regulators to create a registry of account information service providers (xCEEd Conference, 2017). PSD2 is one of the main ways technology is being used to provide trust in the provision of financial services in the EU; it became compulsory in September 2019 (Oliinyk & Echikson, 2018). An example of PSD2 two factor authentication can be seen in Figure 4.1. The UK was subject to and has implemented PSD2.

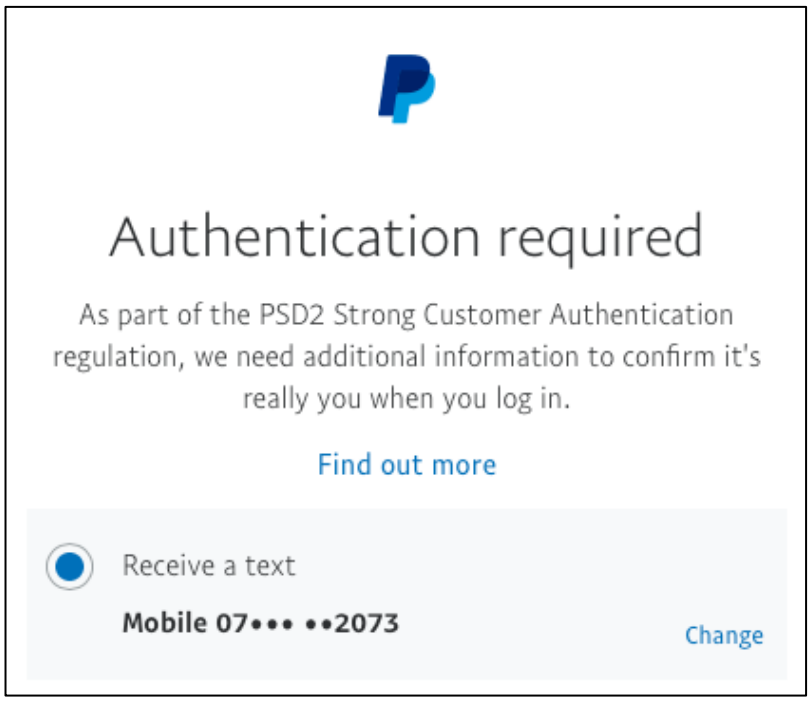


Figure 4.1 PayPal PSD2 Strong Customer Authentication Notice

(PayPal, 2020)

4.3.6 The General Data Protection Regulation

EU Directive 96/46/EC was the foundation for the General Data Protection Regulation (GDPR) and provided a broad definition of what constitutes personal data along with mandates of how it can be processed. GDPR came into effect on 25 May, 2018. Its intent is to give individuals control over their personal data by regulating five main areas:

1. Companies are required to write their privacy policies in simple, direct language.
2. Affirmative consent must be provided before a company may use an individual's data.
3. Encourage transparency in how data is processed, transferred and used in automated decision making processes.
4. Give persons greater rights over their data.
5. Provision of significant enforcement powers to the European Data Protection Board.

(Seventko, 2019)

At the turn of the century it was common to hear how information was the 'new gold'. Now it is not just information per se, but rather a user's personal data which is of most value. A good example is the photo sharing and messaging media platform Instagram (IG). IG has over 500 million daily users

and generated more than $20 billion in advertising revenue in 2019 (Frier & Grant, 2020). IG's end user licence agreement (EULA) states the licence granted to IG by the user is:

> A non-exclusive, royalty-free, transferable, sub-licensable, worldwide license to host, use, distribute, modify, run, copy, publicly perform or display, translate, and create derivative works of.

The user grants IG:

> Non-exclusive, fully paid and royalty-free transferable, sub-licensable, worldwide license to use their content (Bosher, 2018).

Anyone who intends to sell their photos and posts them on IG will be in breach. Sub-licensing means IG can use or sell user content or use it for its own purposes. License transferability allows IG to give these rights to another company worldwide (Bosher, 2018).

Section VI of Instagram's data policy states:

> Under the General Data Protection Regulation, you have the right to access, rectify, port and erase your data … You also have the right to object to and restrict certain processing of your data. This includes: the right to object to our processing of your data for direct marketing … the right to object to our processing of your data where we are performing a task in the public interest or pursuing our legitimate interests or those of a third party. You can exercise this right on Facebook and on Instagram (Instagram, 2020).

Were it not for GDPR, it would be IG's discretion whether users are afforded such privileges. Regarding Brexit, whether the full provisions of GDPR will prevail in the UK, or whether the US drive towards monetisation of user data will take precedent requires further research.

Section IX of Instagram's data policy states:

> We share information globally, both internally within the Facebook Companies and externally with our partners and with those you connect and share with around the world in accordance with this policy. Information controlled by Facebook Ireland will be transferred or transmitted to, or stored and processed in, the United States or other countries outside of where you live for the purposes as described in this policy. These data transfers are necessary to provide the services set forth in the Facebook Terms and Instagram Terms and to globally operate and provide our Products to you. We utilize standard contractual clauses approved by the European Commission and rely on the European Commission's adequacy decisions about certain countries, as applicable, for data transfers from the EEA to the United States and other countries (Instagram, 2020).

Once a user agrees to use either Facebook or IG, they are agreeing to the worldwide dissemination of their data. The only thing preventing information misuse is the threat of fines. With revenue in

the tens of billions of dollars and provision of data to third parties as another potential source of revenue, the onus of enforcement is on the individual.

Currently there are US companies, known as data aggregators or people finders, whose business model is to collect persons' private information like addresses, phone numbers, marital status, political affiliation, family members and whatever else can be found. Some examples are Spokeo, Whitepages and PeekYou. This is achieved without the permission of the individual and is possible because the US has no privacy law like GDPR. Having one's data removed requires dealing with each company separately and complying with their data removal procedures (Rashid, 2017). Thus, in the US, the combination of a persons' social media, publicly available information and anything else is able to be aggregated and provided to anyone willing to pay.

The UK's Digital Secretary, Oliver Dowden, stated in the 2020 UK National Data Strategy, "Data and data use are seen as opportunities to be embraced, rather than threats which to be guarded" (UK Government, 2020a). Dominic Cummings, Vote Leave campaign director and former chief adviser to PM Boris Johnson, stated in April 2018:

> The GDPR legislation is horrific. One of the many advantages of Brexit is we will soon be able to bin such idiotic laws. We will be able to navigate between America's poor protection of privacy and the EU's hostility to technology and entrepreneurs. It does not matter that this Government will sign up to a shockingly bad deal that purports to keep us in such stuff. The deal will be binned. With Brexit, it is the long-term that counts most (Cummings, 2018).

Ongoing research of the growing schism between the differing approaches to personal data in the EU versus the US is required. Due to Brexit, the UK appears poised to gravitate to a more American approach.

4.3.7 **European Data Governance Act**

As of November 2020 the EC proposed regulation specific to how data sharing will work across its sectors and EU member states in the form of the European Data Governance Act (EDGA). It is the first proposal put forward in the European strategy for data announced in 2020. Its purpose is to bolster methods for increasing data availability and remove technical barriers preventing data reuse to increase trust in data sharing. It calls for establishment and development of European specific public and private web domains for use in the areas of: agriculture, energy, environment, finance, health, manufacturing, public administration and skills (EC, 2020b; d).

EDGA's motive is to improve society by making only relevant information needed available by ensuring public sector data is not fully available as open data and is stripped of user specific information. Data sharing amongst businesses will be devoid of remuneration (EC, 2020b; d).

Development of trustworthy EU data-sharing systems has five key principles:

1. Creation of the European Data Innovation Board for presiding over data governance and the prioritisation of data standards.
2. Creation of EU specific data neutrality rules for the provision of trustworthy intermediaries tasked with organising data sharing.
3. Improving reuse of public sector data containing privileged information and unable to be used as open data.
4. Empowerment of Europeans so they are able to decide what data of theirs is shared - and with whom.
5. Facilitation of data altruism so companies can safely and easily provide their data on a voluntary basis for the benefit of society at large.

   (EC, 2020c)

EDGA is a major development in the growing digital divide between the US and the EU. Unlike GDPR, the UK will not be subject to the terms of EDGA. The EU forecasts EDGA will provide annual savings of €120 billion to its health sector and €1.3 trillion total in increased manufacturing productivity through the use of internet of things data by 2027 (EC, 2020c). With this regulation the EU is putting the concept of privacy in the use of personal data and the betterment of society at the forefront; this is ordoliberal behaviour.

Motivation for the European strategy for data is the fact:

> Currently, a small number of Big Tech firms hold a large part of the world's data. This could reduce the incentives for data-driven businesses to emerge, grow and innovate in the EU (EC, 2020a).

EDGA makes safeguards for individuals and the use of their data of paramount importance and is based on a belief people and their fundamental rights are - and should remain - at the centre of European values. The EU states:

> In the US, the organisation of the data space is left to the private sector, with considerable concentration effects. China has a combination of government

> surveillance with a strong control of Big Tech companies over massive amounts of data without sufficient safeguards for individuals (EC, 2020a).

EDGA is a compliment to other EU data initiatives including GDPR, the Regulation on the free flow of non-personal data, the Cybersecurity Act and the Open Data Directive (EC, 2020a). It is a direct rebuttal of the approach being taken by the two other major domains in the 21st century economy, the US and China.

4.4 UK and EU Fintech Regulation

4.4.1 **UK Fintech Regulation**

The UK Digital Economy Act 2017 granted authority to HM Treasury for recognition of non-interbank payment systems to be overseen by the Bank of England in accordance with the Banking Act of 2009. Non-bank payment systems can now be designated as systemically important and subject to the settlement finality regime. Should a payment provider become insolvent, preferential treatment regarding settlement finality will apply. This is in conjunction with increased access to the Real Time Gross Settlements system. Both actions were taken to provide diversification and eliminate single point of failure risks (Fujii-Rajani, 2018). Based on the resources reviewed, no other major recent UK changes to financial regulation have occurred. This was expected, as it was not possible to amend regulations while Brexit negotiations were happening. Maintaining regulatory equivalence was a primary concern.

4.4.2 **EU Fintech Regulation**

As of 2018, the EC had stated it views the fintech sector to be a major driver of growth with no present need to be regulated. According to Martin Merlin, Directorate-General for the Financial Stability, Financial Services and Capital Markets Union, “We have come to the conclusion that there is no need, at the moment at least, to regulate that sector” (Laidlaw, 2018). Their intent is to let the fintech market evolve and ensure existing rules are sufficient enough to regulate this developing market. This approach is in accord with the conclusions of Rohr upcoming in Chapter 7 that current regulation has previously been sufficient in dealing with technological change; there is no reason to presume regulation of current technological trends should be any different (Rohr, 2019).

The opinions of Messrs. Merlin and Rohr are contrary to that of Ana Botín, Executive Chairman of Banco Santander SA, who stated to the Brussels Economic Forum in June 2018:

> While I believe that disruption must be an integral part of innovation and growth, we need to remember that we often regulate by business model – and many new businesses do not fit those models. To offer consumers the same level of protection they have come to expect, and as a matter of both prudential policy and fairness, the

> new and the old must be regulated the same way when they do the same things – or maybe when they are the same size, when they become systemic - while allowing for innovation to thrive (Botín, 2018).

4.4.3 Maltese Fintech Regulation

The Maltese Parliament enacted three financial technology specific laws on the 4th of July 2018. This was the first ever regulatory framework established at the national level directly related to distributed ledger technology (DLT), blockchain, cryptocurrency and smart contracts. Malta's approach is considered unique versus other locations looking to capitalise on the wave of innovative financial technologies, like Zug, Switzerland or Liechtenstein, as it is a "technology first" approach (Wolfson, 2018b).

4.4.3.1 What are Malta's Laws?

The first Maltese law is the Malta Digital Innovation Authority Act, which establishes the Malta Digital Innovation Authority (MDIA). The MDIA's function is to develop the Maltese technology sector and avoid hindering innovation within the start-up sector (MDIA Act, 2018). What is unique is the law specifically defines DLT/distributed ledger technology/decentralised ledger technology to be a, "database system in which information is recorded, consensually shared, and synchronised across a network of multiple nodes, or any variations thereof" (MDIA Act, 2018). It also defines 'innovative technology arrangements' to mean:

> The intrinsic elements including software, codes, computer protocols and other architectures which are used in the context of DLT, smart contracts and related applications as well as other arrangements as may be further defined in the Innovative Technology Arrangements and Services Act, 2018 (MDIA Act, 2018).

It defines technology services to be:

> Those services in relation to innovative technology arrangements as are designated in the Innovative Technology Arrangements and Services Act, 2018 (MDIA Act, 2018).

It recognises smart contracts as:

> a form of innovative technology arrangement consisting of:
>
> a) a computer protocol; and, or
>
> b) an agreement concluded wholly or partly in an electronic form which is automatable and enforceable by execution of computer code, although some parts may require human input and control and which may be also enforceable by ordinary legal methods or by a mixture of both.

(MDIA Act, 2018)

The MDIA names the following organisations as national competent authorities:

a) Malta Financial Services Authority
b) Malta Gaming Authority
c) Malta Information Technology Agency
d) Malta Competition and Consumer Affairs Authority
e) Malta Statistics Authority

(MDIA Act, 2018)

The Maltese approach to financial technology is to capitalise on benefits available via innovation; be that in the realm of financial services, gaming (gambling) or consumer affairs. Malta is a land poor nation with the smallest economy in the euro-zone, which is heavily based around foreign trade and tourism (CIA, 2019). Lacking natural resources, technology appears to be its most viable means for future prosperity.

The second Maltese law is the Virtual Financial Assets Act. It defines a Distributed Ledger Technology Asset as:

a) a virtual token;
b) a virtual financial asset;
c) electronic money; or
d) a financial instrument.

(VFA Act, 2018)

The law also defines a 'DLT exchange' as:

> Any trading and, or exchange platform or facility, whether in Malta or in another jurisdiction, on which any form of DLT asset may be transacted in accordance with the rules of the platform or facility (VFA Act, 2018).

and a 'VFA exchange' as:

> A DLT exchange operating in or from within Malta, on which only virtual financial assets may be transacted in accordance with the rules of the platform or facility, which is licensed by the competent authority under this Act to provide such services (VFA Act, 2018).

These definitions and give leeway to the respective national authorities and encompass the relevant Maltese authorities for financial services and gaming. An overlap exists between what constitutes a financial product versus a more speculative asset, as cryptocurrency could be considered to be both. To differentiate between the two, Malta introduced a financial instrument test that defines a token as being an asset built on an existing blockchain, whereas a security token is a digitalized security and is considered an investment product (Hofer, 2019).

The third Maltese law is the Innovative Technology Arrangements and Services Act. This law defines two crucial administrative roles involved with the use of DLT and smart contracts. They are systems auditor and technical administrator and are defined as:

> 'Systems auditor' means a person who, upon a written engagement accepts to review and, or audit innovative technology arrangements and smart contracts or parts thereof who may not necessarily be an accountant or auditor with a practicing certificate under the Accountancy Profession Act (ITAS Act, 2018).

And:

> 'Technical administrator' means the person who, upon a written engagement accepts to carry out specific functions relating to the operation, of the whole or a designated part, of the system as are established in this Act, in guidelines issued by the Authority, as the same may be supplemented by the conditions applicable to the certification of the particular certified innovative technology arrangement (ITAS Act, 2018).

These two roles will act as trusted third parties. Macrinici et al. have also highlighted the role intermediaries play in the realm of contracts and note they add the value of trust to the contractual relationship. Entities, such as lawyers or central banks, will be most affected by blockchain technology, as it could modify their business model from being one of hourly charges to a charge per item (Macrinici et al., 2018).

The Maltese laws have created job descriptions for what could be the two most important positions in the supervision of smart contracts embedded in the blockchain The law states these persons "may not necessarily" (ITAS Act, 2018) be a chartered accountant or auditor, yet the role they hold is one of great importance. It is not necessary for them to be credentialed; the duty they perform is beyond the scope of any one profession, such as attorney, accountant, database administrator or software developer. These positions require skills which are a combination of them all and are not wholly within the remit of any one such profession.

Malta's laws are significant because both Cyprus and Gibraltar also are looking at financial technology as a way to diversify their economies. Binance and OKEx are two of the world's largest

cryptocurrency exchanges; both have offices in Malta. Maltese legislation needs to be compliant with EU regulations. In January 2018, Malta was the first EU member state found by an EU committee to have, "general and systematic shortcomings" (EBA, 2018) in its enforcement of Anti-Money Laundering (AML) rules (EBA, 2018). These small EU territories are competing against one another for blockchain business and offering the benefit of access to the EU market with a lax approach to oversight. It appears to be a regulatory race to the bottom which has been a recurring problem for the EU, as it has member states willing to ignore the full detail of EU legislation in return for economic benefits provided from dealing with questionable third parties.

4.4.3.2 Impetus for Malta's Legislation

Dr. Abdalla Kablan is an entrepreneur and senior technology advisor to the Maltese Government who assisted with drafting the legislation. He states a civilization requires two components, a means for trade and one for storing value, and believes blockchain and cryptocurrency provide both. He feels that as the cornerstone of the world economy, the US Dollar is a fiat issued by a country willingly eroding trust in itself by issuing ever increasing levels debt. Dr. Kablan sees this as an unstable system which cryptocurrency and its underlying blockchain architecture have the ability to disrupt (Wolfson, 2018a).

Dr. Kablan oversaw the Delta Summit Conference in Malta in October, 2019. Its theme was 'The Rise of Trustless Relationships'. In the version of the future fintech is promoting, trust will no longer be provided by intermediary institutions, but by the network infrastructure. The two cornerstones of fintech, blockchain and smart contracts, are also focused on creating an era of trustless relationships. Dr. Kablan thinks the tokenisation of assets will be the turning point in the development of blockchain, meaning when digital and physical assets are traded via blockchain and immutable ledgers provide transparency, trust in intermediaries will become redundant. He thinks this will not happen until technical issues, like identity verification on the blockchain, are resolved (Wolfson, 2018a).

4.5 Post-GFC Financial Services in Europe

The European banking sector has been in contraction since the GFC. As of 2017, the EU-28 had 6,250 credit institutions, or 2,275 fewer than in 2009. Bank branch numbers also declined due to the after effects of the GFC and the move towards internet based service provision. At the end of 2017, the number of branches had fallen by 21% versus ten years prior, or almost 50,000 in total. The rationalisations were most heavily felt in Italy (5,800), Germany (8,769) and Spain (18,020). As of 2017, there were 183,000 remaining bank branches in the EU-28 (EBF, 2018).

There have also been staff reductions. As of 2017, 2.7 million persons were employed in the banking sector; the lowest level since the ECB began documenting it in 1997, when it was at 3.13 million. As of 2016, around 1% of all jobs in the EU are in relation to banking, yet contribute 3-4% of the gross value added to the EU economy (EBF, 2018). From 2015-2017, assets held by EU banks contracted. In 2017 the figure fell again by €300 billion within the euro and non-euro EU countries. Assets dropped from €43.4 trillion in 2015 to €42.9 trillion in 2017. This was attributed to low interest rates motivating investors to seek higher returns elsewhere (EBF, 2018).

As illustrated in Figure 4.2, Germany saw a drastic rise in the number of startup fintech companies at the same time bank numbers were decreasing. Future growth of fintech was expected to slow down to an average rate of around 7% per annum from the 21% rate from 2016-2018. Of the 793 German fintech firms operating, 24% were in real estate, 20% were in financing and 11% in insurance. The remaining 44% were too diverse to be categorized (Emadi & Heyden, 2018).

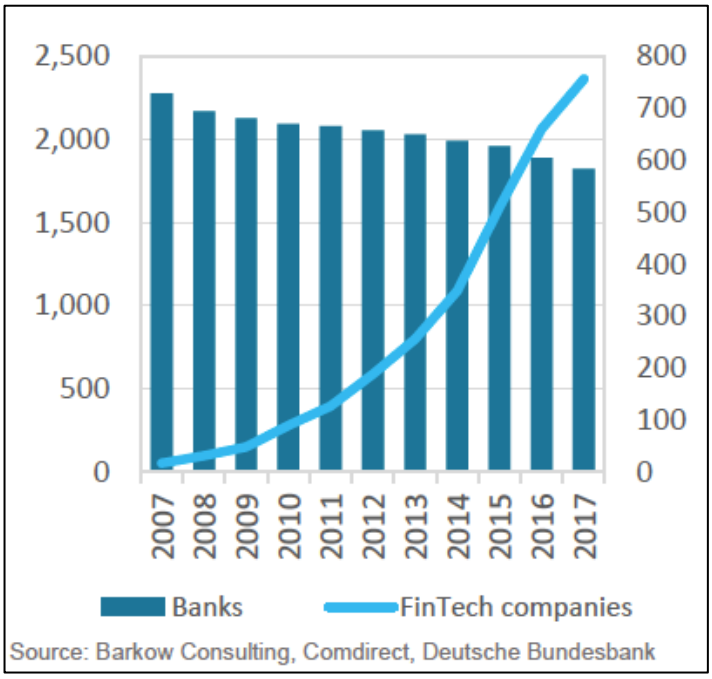


Figure 4.2 Number of Banks and Growth of FinTech Firms in Germany 2007-2017

(Emadi & Heyden, 2018)

The percentage of non-performing loans (NPL) held by EU banks had been on the decline from its high of 7.5% in 2012 to a value of 3.7% in 2017; this was congruent with the world average of 3.74%. With defaulted debt levels on the wane, return on equity for EU-28 banks was at 5.7% in 2017, the highest it had been before 2008 when it was 10.6%. This is a 2017 EU average. The best performer was Hungary at 14.5% and the worst was Cyprus at -11.5%. NPL levels peaked in June 2016 at more

than €1 trillion. As of the end of 2017, the value was approximately €800 billion (EBF, 2018). This shows how the EU banking sector is slowly recovering from the aftermath of the GFC by using a prudent approach while dealing with the combined issues of contracting asset levels, movement to electronic banking and the reduction of NPLs.

4.6 History of Banking Regulation in the United States

4.6.1 **Introduction**

Since passage of the National Bank Act of 1863, a dual banking system has existed that permits commercial banks to choose between either state or national charters. This gives banks the ability to determine their primary regulator and is considered as a means for creating regulatory competition whilst simultaneously catering to both federalist and democratic ideologies (Upton, 2018). It is often considered an opportunity for banks to choose the most lax regulator. An aspect of this duality is the fact, "federal bank charters supplement rather than supplant state charters" (Upton, 2018). As of January 2020, the US had more than 5,000 banks (Gara, 2020). Of these, approximately 867 banks and 57 federal branches of international banks were federally regulated with the remainder (around 79%) falling under state supervision (CSBS, 2020a; OCC, 2019). The 100 largest banks hold $14.4 trillion in assets, which is 81% of total bank assets held in the US (Gara, 2020; NIC, 2020).

In response to the stock market crash of October, 1929, US Congress passed the Banking act of 1933, known as Glass-Steagall. It imposed a separation between commercial and investment banks. Complicit federal regulators and liberal interpretations of the law by the Federal Reserve Board (FRB) and Comptroller over time weakened its provisions. It was fully repealed with the enactment of the Financial Services Modernization Act (FSMA) in 1999 (Macey, 2000).

The US also passed the Bank Holding Company Act (BHCA) in 1956, which prevented companies from having control over banks and commercial enterprises. The law was amended in 1970 to include ownership of even one bank, as the original law applied only to multibank holdings. This amendment was circumvented by the creation of non-bank banks making commercial loans; that loophole was closed in 1987 with the Competitive Equality Banking Act (CEBA) (Upton, 2018). Oversight by the FRB was then eliminated in 1994 by the Riegle-Neal Interstate Banking and Branching Efficiency Act (Michel, 2018).

US legislation is continually evolving to try to avoid lenders from circumventing specific wording of the law because the federal government does not want to be obligated to financially support failing businesses. This happened in the GFC with General Motors (GM) and its industrial loan company, General Motors Acceptance Corporation (GMAC) (Upton, 2018). The government lent GM $49.5

billion; $10.6 billion was never recouped. GM claimed bankruptcy in 2009 and as of 2014 was one of the US' most profitable companies, but its bailout deal did not include full repayment of its debt to the US.

GM was able to achieve profitability through renegotiation of labour agreements, writing-off of debts and the closure and dissolution of unprofitable factories and brands. As of 2014 the US government had actually made a gain on the loans it made during the GFC (Isidore, 2014). Regardless, it is the remit of banks to be in the business of lending and the role of government to regulate and not commingle its activities with those of lenders.

The FSMA's authors were Republican Senators Gramm, Leach and Bliley; it is by their names its sometimes referred. FSMA's motivation was to provide US banks a competitive edge by allowing insurance companies, commercial banks and investment banks to consolidate their services. The rationale was technological developments had already rendered segregation of these industries moot. It led to a massive consolidation of service providers in those three sectors (Macey, 2000). As illustrated in Figure 4.3, from 1990 to 2009, thirty-seven autonomous US commercial banking, investment and insurance companies merged to form the 'Big Four' (Arner et al., 2017).

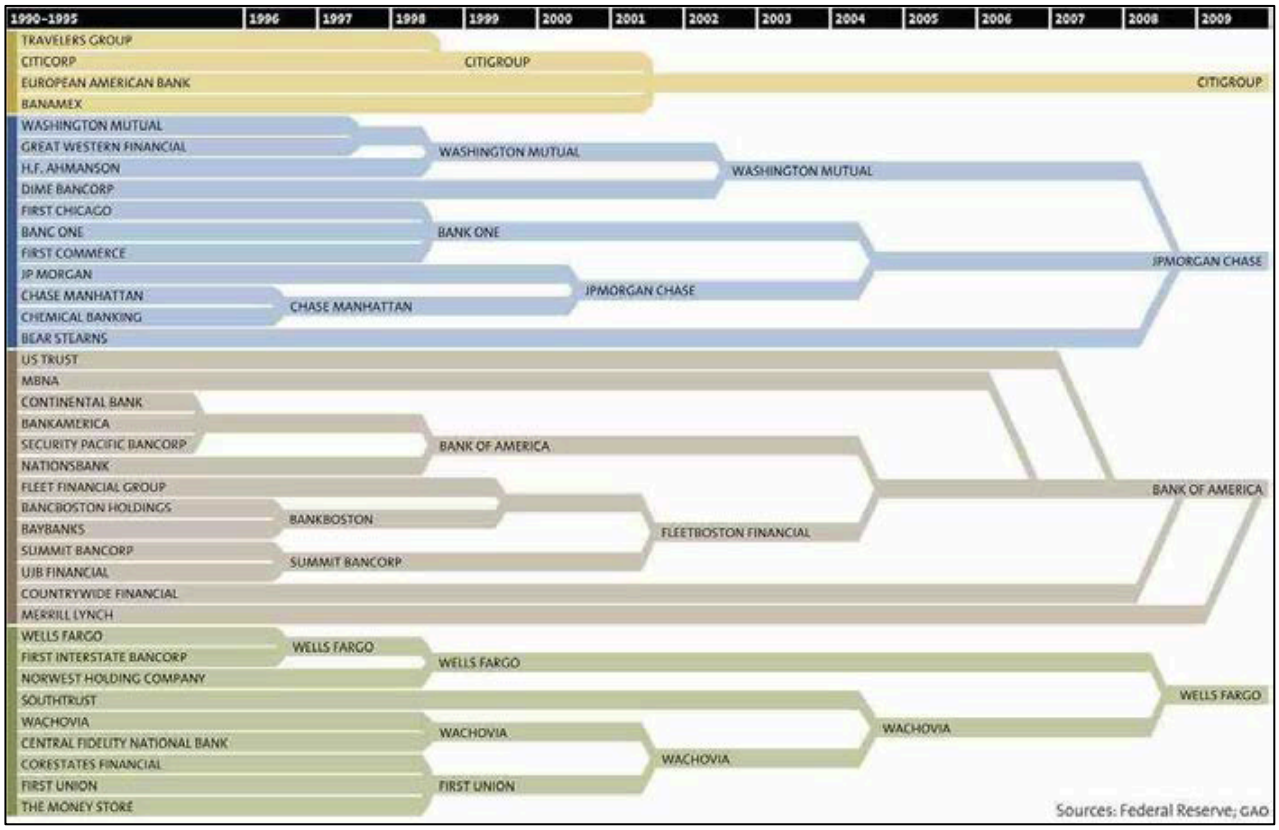


Figure 4.3 Consolidation of US Banks 1990-2009

(Arner et al., 2017)

This meant as of 2009 there were four major accountancy firms – also known as the 'Big Four' – PwC, Deloitte, EY and KPMG and four major US banks – Citigroup, JP Morgan Chase, Bank of America and Wells Fargo. Thus these two heavily intertwined industries, one of which is tasked with monitoring the other, were controlled by oligopolies. Through economies of scale, it is a situation which prevents market entrance and is a systemic risk. The Commodities and Futures Modernization Act of 2000 was previously referenced in the literature review. With both it and FSMA in effect, the results were a lack of competition, lack of consumer choice and reduced oversight which resulted in the GFC.

4.6.2 Domestic Regulations with Global Implications

Any one nation's laws are generally limited to its territorial jurisdiction. The exception to this is the US, which has issued several laws in the past 20 years aimed at controlling the behaviour of foreign companies in exchange for allowing them to operate with the US. It can do this is because as of 2016, 38% of the total global market capitalisation was listed on US based exchanges (Desjardins, 2016). While no business is forced to trade with or within the US, in exchange for access to this market, they and their respective governments comply with US demands.

According to Arner:

> The United States in particular has been very active, especially post-9/11, in enforcing its rules not only on U.S. financial institutions, but also foreign financial institutions with operations in the United States (Arner et al., 2017:391).

Several institutions have been subject to US regulatory action (Barclays, BNP Paribas, HSBC, Standard Chartered) resulting in fines deferred prosecution by agreeing to implement AML systems congruent with US standards throughout their global operations (Arner et al., 2017). Likewise, Swiss banks were forced to 'open up' beginning in 2009 by the US Department of Justice (US DOJ, 2013b). It caused their share of the world's offshore wealth drop from 50% to less than 33% (Bullough, 2018).

The turn of the 21st century was the scene of a multitude of US corporate scandals. In addition to the Enron, there were dozens of other cases of corporate fraud. Some of the more notable cases were: Tyco, Adelphia, Global Crossing, Lucent, ImClone, Qwest and WorldCom. The crimes committed by these firms were fraud in the sense they misrepresented their true value and also a false claim, as the fraudulently declared values were reported to the US Internal Revenue Service (IRS) and Securities and Exchange Commission (SEC) (Jackson, 2019; Stimson, 2011).

4.6.3 Sarbanes-Oxley

In reaction to these scandals, the Public Company Accounting Reform and Investor Protection Act of 2002, commonly known as Sarbanes-Oxley (SOX) was enacted. It is heavily focused on the financial accounting requirements of exchange listed companies and is comprised of 11 sections (US Congress, 2002). SOX had global ramifications because many non US firms, wary of falling on the wrong side of the US regulation, chose to implement its directives (Arner et al., 2017). This has to do with the far-reaching effects of long-term US foreign direct investment on the global economy.

Because so many companies are either a subsidiary of a publicly traded US firm or engage with one, at some point not being SOX compliant could become a liability. Stimson notes SOX is unique from the perspective that it is US legislation that integrates well with ISO 9001- Quality Management, meaning SOX compliance and ISO compliance are similarly aligned. In terms of normal dealings with the US, it is a rare serendipity providing international firms an opportunity to follow a single prescribed set of procedures with a result of being compliant on two fronts (Stimson, 2011). The following analysis of SOX's 11 titles is given great attention due to its global reach.

4.6.3.1 Title I – Public Company Accounting Oversight Board

Establishment of a non-governmental non-profit organization that registers accounting firms who can prepare audits for public companies. It establishes rules for these audits and enforces compliance. The title's focus is the accounting firms and not the companies they audit (Stimson, 2011; US Congress, 2002).

4.6.3.2 Title II – Auditor Independence

This title requires auditors to not perform any other non-audit services for a client and rotation of the lead auditing firm every five years. Auditing is a rote task with limited financial gain for accountancy firms, as their greatest source of revenue is consultancy. It specifically prohibits the situation that occurred at Enron, where the consultancy division of Arthur Andersen would advise them how to beneficially structure their corporation and accounts and then the audit division would validate the accounts (Li, 2010). This title exists to prevent collusion by accountants (Stimson, 2011; US Congress, 2002).

4.6.3.3 Title III – Corporate Responsibility

It is one of two certification requirements. It requires the CFO and CEO of a company sign and certify they have read and are in agreement with the company's quarterly (10Q) and annual (10K) reports filed with the SEC (Stimson, 2011; US Congress, 2002).

4.6.3.4 Title IV – Enhanced Financial Disclosures

This requires the establishment and annual review of internal financial controls which must be attested to by a registered accounting firm. It demands executive involvement with the finance department and eliminates wilful ignorance on the part of executives as an alibi. It also requires formulation of a code of ethics for the company and real-time disclosure of material changes in a company's financial condition (Stimson, 2011; US Congress, 2002).

4.6.3.5 Title V – Analyst Conflicts of Interest

This title is relevant to securities associations and exchanges. It involves the adoption of rules requiring analysts to act foremost in the interest of their clients and is akin to similar existing securities laws that prevent practices such as frontrunning or churning of client assets (Stimson, 2011; US Congress, 2002).

4.6.3.6 Title VI – Commission Resources and Authority

This title provides authorization of additional funding to the SEC for the execution of their enhanced role under SOX. It also gives the SEC authority for setting requisite professional standards and qualifications for securities dealers, brokers and advisors. It makes any ethical 'grey areas' a matter of regulation (Stimson, 2011; US Congress, 2002). Its rationale is why financial regulations need to be proactive by design:

> By its very nature, the stock market is a place of opportunity and pragmatism ... those who would anticipate the ingenuity of humans to bend the rules for self-gain will always lag behind errant practice (Stimson, 2011).

4.6.3.7 Title VII – Studies and Reports

Previously mentioned, the global accounting industry is dominated by four major companies. Others exist; the difference is their market capitalisation is measured in millions, not billions of dollars (Bunney, 2018). Because of this, title VII tasks the comptroller general to study the operation and consolidation of public accounting firms and the loss of competition, increased costs, decreased services and diminishing auditor independence caused. It also requires a similar analysis of investment banking, with emphasis on how increase competition in these two sectors (Stimson, 2011; US Congress, 2002).

4.6.3.8 Title VIII – Corporate and Criminal Fraud Accountability

Unique in that it applies to private companies as well, title VIII defines criminal penalties for the destruction of records, creation of fraudulent records and the defrauding of shareholders of public companies. It creates provisions for protection of employees who expose fraud and is not limited to financial matters; any fraud in a publicly traded company is considered an act committed against shareholders (Stimson, 2011; US Congress, 2002).

4.6.3.9 Title IX – White-Collar Crime Penalty Enhancements

This title is centred around prohibiting attempts to commit conspiracies and fraud. § 906 is most important; it defines the criminal provisions, their fines and imprisonment terms. It also requires financial statements filed pursuant to the Securities and Exchange Act of 1934 have an accompanying certification by the CEO and CFO that the report fairly represents the results of operations and the financial condition of the company. This certification is absolute – there is no qualifying of 'materiality' or 'knowledge' of the said parties. It means the CEO and CFO are fully responsible for the contents of the financial reports and cannot blame someone else (Stimson, 2011; US Congress, 2002).

4.6.3.10 Title X – Corporate Tax Returns

This is by far the most succinct title in SOX. It states in its entirety:

> It is the sense of the Senate that the Federal income tax return of a corporation should be signed by the chief executive officer of such corporation (US Congress, 2002).

It is a direct demand for CEOs to take full responsibility for their financial records.

4.6.3.11 Title XI – Corporate Fraud and Accountability

This title is an extension of title VIII regarding the destruction or altering of records so as to obstruct any official proceedings. Title VIII makes these actions illegal, whereas Title XI makes the fact these records were needed for investigatory purposes also illegal, meaning if one first falsifies records and then is found to have destroyed them, they have committed two crimes. It also provides protections for informants, who are different from whistleblowers as they may not be current employees of the company in question, such as an outside auditor, subcontractor or former employee (Stimson, 2011; US Congress, 2002).

4.6.4 Trump Amendments to SOX

On February 3rd, 2017 the Trump administration issued an Executive Order (EO) stating its, *Core Principles for Regulating the Financial System*; its objective was to reduce provisions in SOX and in Dodd-Frank. It wanted to amend Title IV, § 404 – Management Assessment of Internal Controls, based on the belief that its stipulations were motivating private companies to avoid accessing capital by means of public offerings and listing on a stock exchange (Peregrine et al., 2017; US Congress, 2002). This EO took form in a proposal by the SEC in May 2019 and was implemented in March, 2020 by means of, *Amendments to the Accelerated Filer and Large Accelerated Filer Definitions*. It increases transition thresholds for accelerated and large accelerated filers becoming non-accelerated filers and excludes smaller companies from having an outside auditor attest to the effectiveness of its internal control over financial reporting (bakertilly, 2020).

SEC Commissioner Robert J. Jackson, Jr. reported in 2019 information used for justifying the change to attestation was based on old data from 2004 that showed companies 'bunching' under the $75 million threshold (Jackson, 2019), as can be seen in Figure 4.4.

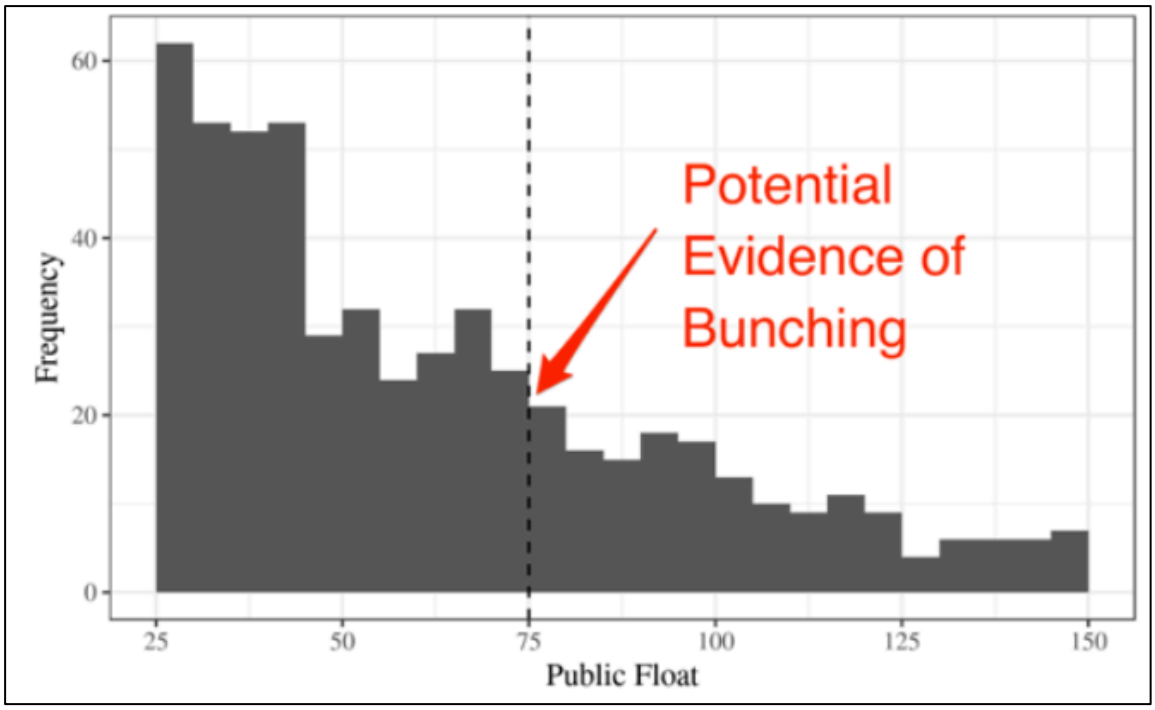


Figure 4.4 Bunching of Public Float < $150 MM Market Cap Under 404(b) Threshold – 2004 Data

(Jackson, 2019)

As seen in Figure 4.5, when the same analysis was conducted and based on data from 2017, no bunching was apparent.

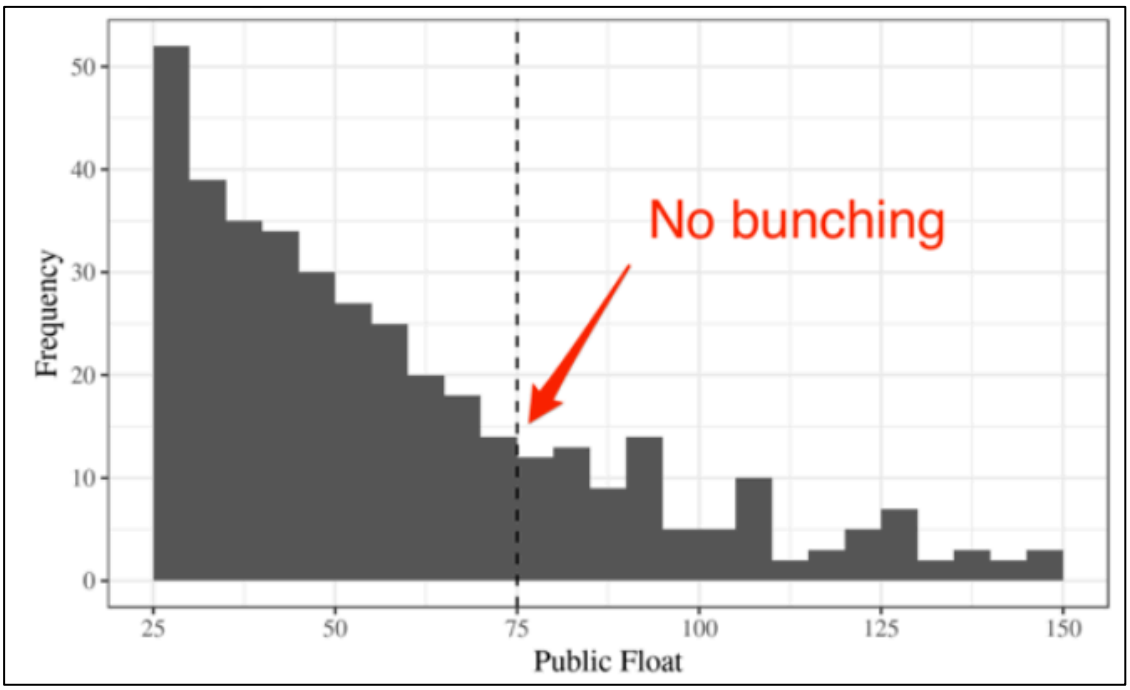


Figure 4.5 Bunching of Public Float < $150 MM Market Cap Under 404(b) threshold – 2017 Data

(Jackson, 2019)

Illustrated in Figure 4.6, Commissioner Jackson's office examined how investors react to news of internal control failures for two groups of companies – those who would (green) and would not (purple) receive exemptions under the changes to 404(b). The data shows the rollback is aimed at the type of companies that need to be making the types of disclosures attestation by outside auditors corroborate (Jackson, 2019). The Commissioner was not alone in his opinion. The Council of Institutional Investors, a non-profit association representing entities with $4 trillion of assets was also against the change (CII, 2013; Dzinkowski, 2020).

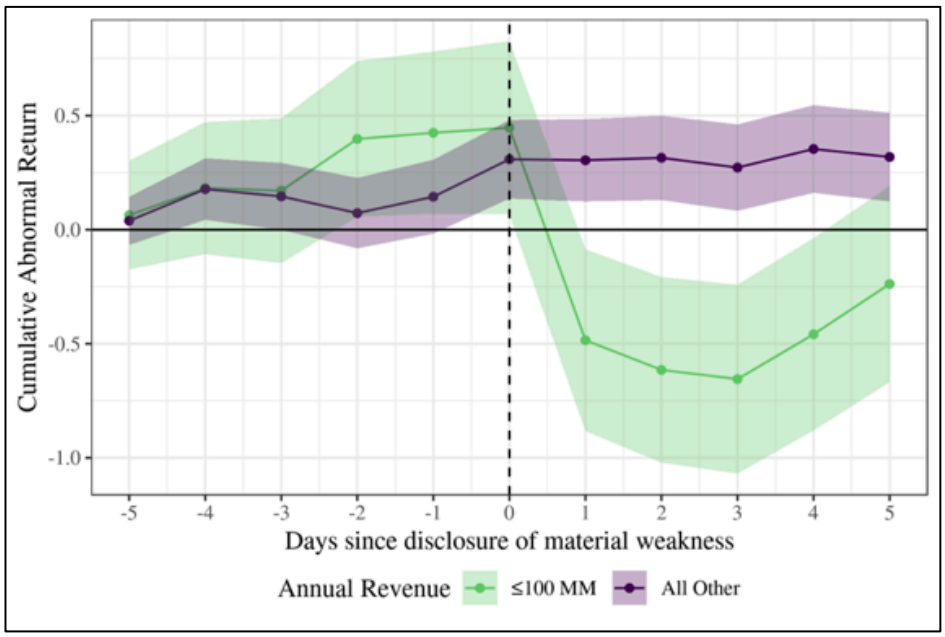


Figure 4.6 Stock Price Reactions to Disclosures of Material Weakness

(Jackson, 2019)

4.6.5 **SOX - Summary**

The biggest effect SOX had on financial reporting was titles III, IV and IX make a company's executives accountable for the validity of its financial statements. It takes direct aim at the behaviour American economist Thorstein Veblen described as 'absentee ownership', which is the state of being in charge, but not involved in the actual operations of a company (Hunt, 1995). Due to SOX, this is no longer possible. As the previous list of corporate failures shows it was something greatly needed.

The need for regulations such as SOX is simple; if investors do not have faith in the US' financial system, they will seek means to circumvent it. Anyone with a pension plan or other type of securitised investment with ties to the US is a part of the system SOX seeks to regulate. This law was designed to protect not only investors but also the US' reputation and dominance in the capital markets. It makes law of President Harry S. Truman's motto, "The buck stops here!", see Figure 4.7. That is simple, sound logic stating the person with ultimate authority also has final responsibility.

Figure 4.7 President Harry S. Truman

(Pigney, 2017)

This type of thought has fallen by the wayside; its loss has resulted in of an erosion of trust in the financial system which has led to deglobalisation. It is profoundly different to the words of Donald Trump when he stated, "I do not take responsibility at all" (Oprysko, 2020) in relation to the Covid-19 outbreak in March 2020 when he chose, without evidence or reason, to blame his predecessor. His administration made a minor, yet potentially substantial alteration to SOX. Whether it negatively impacts on the US markets and if anyone takes responsibility for any detrimental effects the change has is an issue for future research.

4.6.6 **Dodd-Frank**

The Wall Street Reform and Consumer Protection Act of 2010, commonly known as Dodd-Frank, was passed in reaction to the GFC; it was the most extensive reform of US financial regulation since the Great Depression (Magnuson, 2018). It was the American complement to the European move away from light touch regulation, as had been the modus operandi of the Financial Services Authority in the UK (Ryan, 2019). Its intent was to reduce systemic risk due to the existence of banks deemed too big to fail.

That is what happened with the S&L Crisis, the Asian Financial Crisis and the GFC because it was not one bank, but rather entire sectors of the banking market that had engaged in risky behaviour which was exposed when a lack of liquidity in short-term debt prevented lending institutions from covering their long-term obligations. Dodd-Frank seeks to reduce systemic risk by establishment of the Financial Stability Oversight Council (FSOC), implementation of higher capital and liquidity requirements for banks, mandatory stress testing and designation of specific banks and non-banks

as systemically important financial intermediaries (SIFIs) subject to enhanced scrutiny and capital requirements. It was in essence the implementation of Basel III in the US (Richardson et al., 2018).

The act also introduced the Volcker Rule, which restricts banks from proprietary trading in the majority of securities and derivatives and places strong limitations on their relationships with private equity and hedge funds (Magnuson, 2018; Richardson et al., 2018). Dodd-Frank is designed to prevent the US Government from again having to intervene in the financial sector due to misbehaviour on the part of lending institutions or the holding companies that own them. Its key provisions are:

1. Prevents the creation of large institutions by limiting mergers or acquisitions that give a company more than 10% of the liabilities of certain financial firms or groups or having more than 10% of the total deposits of insured depository institutions.
2. Gives the Federal Reserve authority to require companies with greater than $50 billion in assets to sell off assets or cease activities if the Federal Reserve determines the company to be detrimental to the US' financial stability.
3. SIFIs must create a 'living will', which is a contingency plan on how to liquidate their assets in an orderly fashion that will prevent them from relying on government assistance in the event of their failure.
4. Prohibits any intervention from the federal government, such as happened with the GFC.
5. Requires Federal Deposit Insurance Corporation (FDIC) controlled receivership for liquidation of assets of failing financial firms and prevents the US Treasury from creating a program similar to the Troubled Asset Relief Program that was used in the GFC.

   (Magnuson, 2018)

These legislative provisions are designed to prevent asset concentrations and to inhibit moral hazard on the part of large lending institutions. Like SOX, it is aimed at preventing the recurrence of another financial crisis. The Economic Growth, Regulatory Relief and Consumer Protection Act of 2018 has since modified key provisions of Dodd-Frank. Analysis of those changes is in Chapter 8.

4.6.7 **FATCA**

The Foreign Account Tax Compliance Act (FATCA), is the common name for chapter four of the US Internal Revenue Code. It was enacted in 2010 and became fully effective in 2014. It requires non-US foreign financial institutions and non-US non-financial entities to audit their customer records for links to the US and to report the identities and assets to the US Department of Treasury (DOT).

Failure to do so results in a 30% withholding tax on any US sourced income or the proceeds from the sale of debt or equities of US issuers (Grinberg, 2012). US persons are also subject to these reporting requirements, dependent on specific financial thresholds, and must report their account details and balances to the DOT on an annual basis (Grinberg, 2012; USDT, 2012).

The reporting agreement with other countries is reciprocal and requires signing up to the Common Reporting Standard (CRS). This is a world standard regarding the Automatic Exchange of Information (AEOI). The AEOI is the product of the Organisation for Economic Co-operation and Development (OECD) and the Council of Europe for the purpose of combatting tax evasion. Its legal basis is the Convention on Mutual Administrative Assistance in Tax Matters (CMAA), which was available for ratification by members of both organisations as early as 1988 and entered into force in 1995. The US has not yet complied with the CMAA and the CRS (OECD, 2019). Although the US has yet to become compliant, as a data controller PayPal is required to be and is compliant with both the CRS and FATCA (PayPal, 2021).

According to Tera Ferris, Principal at EY and principal draftsperson of FATCA, the issue is the CRS expects a reciprocal exchange of data, however the IRS asks for more data than it can legally provide (Bennett, 2016; SIFMA, 2022). The US has yet to comply with a decades old international agreement whilst simultaneously requiring other countries to comply with its own similar demands. FATCA's motivation was one of revenue generation; it was part of the Hiring Incentives to Restore Employment (HIRE) Act domestic jobs stimulus bill from March 2010 (IRS, 2021).

Its intent was to create jobs and generate revenue by identifying taxes due to the US, not make the US have reciprocate and provide tax information to other jurisdictions. In this regard, it is one-sided. Individuals who fail to report offshore assets as required on the Report of Foreign Bank and Financial Accounts (FBAR) form can be subject to fines up to $10,000 (IRS, 2021). The FBAR form from 2013 states these fines could be as high as $500,000 and include imprisonment of up to five years (USDT, 2013).

As illustrated in Figure 4.8, the US is the only major jurisdiction with a status of only having signed the CMAA.

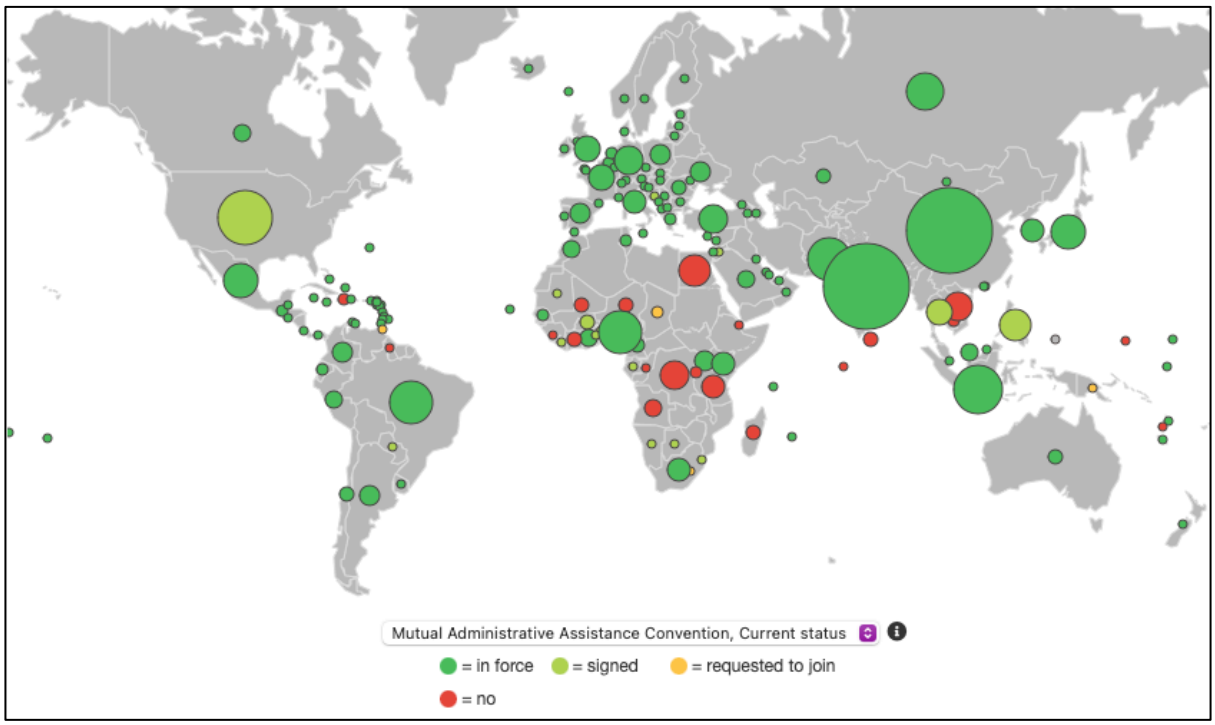


Figure 4.8 CMAA Status - November 2020

(OECD, 2020b)

Figure 4.9 shows how the US is the only jurisdiction that has not committed to the AEOI.

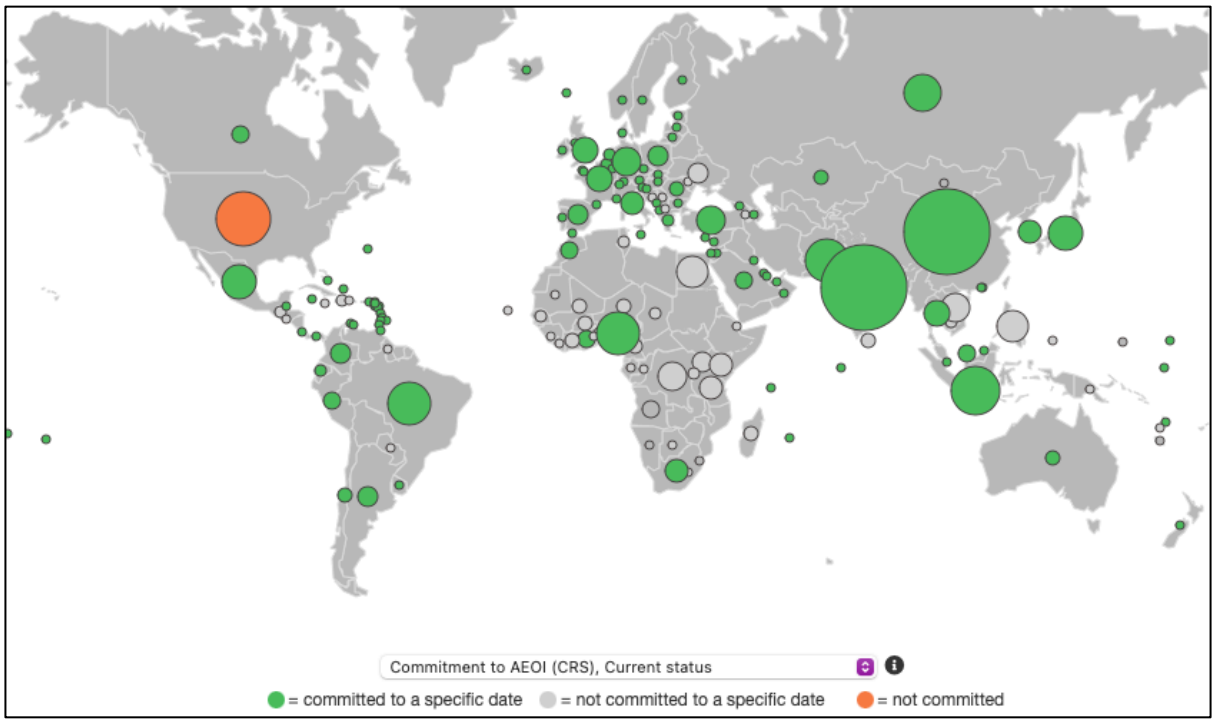


Figure 4.9 Commitment to AEOI (CRS) – November 2020

(OECD, 2020b)

Figure 4.10 shows how the US is one of few jurisdictions, and the only jurisdiction of significance, yet to ratify the MCAA.

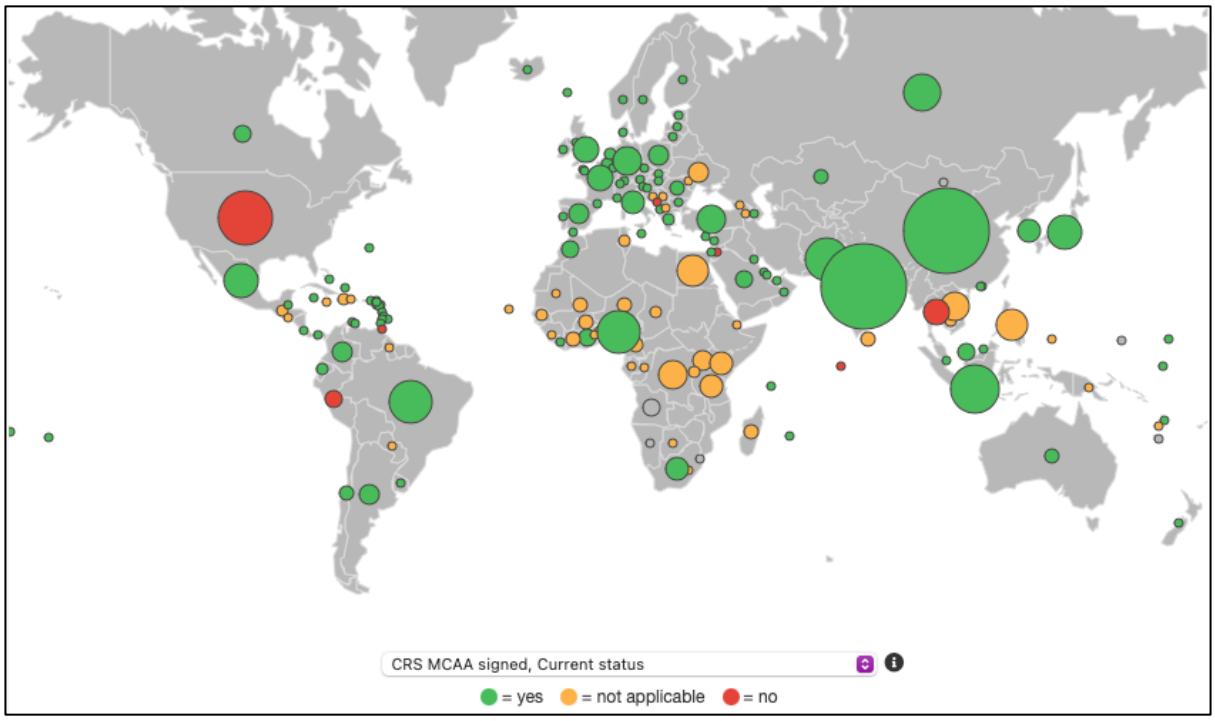


Figure 4.10 CRS CMAA Signed Status – November 2020

(OECD, 2020b)

A sampling of the OECD's status of the CMAA, including the three most economically significant European countries as well as several jurisdictions repeatedly mentioned as being complicit in global tax avoidance is listed in Table 4.3. As it and the previous images show, the US is the outlier.

Table 4.3 Convention on Mutual Administrative Assistance in Tax Matters Status – 27 November 2019

Country/Jurisdiction	Original Convention			Protocol (P) / Amended Convention (AC)		
	Signature (Opened on 25/01/98)	Deposit of Instrument of Ratification, Acceptance or Approval	Entry Into Force	Signature (Opened on 27/05/2010)	Deposit of Instrument of Ratification, Acceptance or Approval	Entry Into Force
Germany	17/04/2008	28/08/2015	01/12/2015	03/11/2011 (P)	28/08/2015	01/12/2015
France	17/09/2003	25/05/2005	01/09/2005	27/05/2010 (P)	13/12/2011	01/04/2012
Ireland				30/06/2011 (AC)	29/05/2013	01/09/2013
Luxembourg	29/05/2013	11/07/2014	01/11/2014	29/05/2013 (P)	11/07/2014	01/11/2014
Malta				26/10/2012 (AC)	29/05/2013	01/09/2013
Panama				27/10/2016 (AC)	16/03/2017	01/07/2017
St. Kitts & Nevis				25/08/2016 (AC)	25/08/2016	01/12/2016
United Kingdom	24/05/2007	24/01/2008	01/05/2008	27/05/2010 (P)	30/06/2011	01/10/2011
United States	28/06/1989	13/02/1991	01/04/1995	27/05/2010 (P)	NO	NO

(OECD, 2019)

In July 2018, the Treasury Inspector General for Tax Administration reported that although $380 million had been spent on enforcement of FATCA by the IRS, they still were not at a point to enforce compliance (USDT, 2018). Common IRS practice is to force general compliance and make demands for information; whether or not it acts on the information provided is another matter. Based on other happenings at the IRS, the enforcement delay could be due to a lack of financial resources for enforcing FATCA.

This is evidenced by the fact in 2015 the IRS closed the last of its overseas taxpayer-assistance centres, which it claims were designed for the benefit of US citizens living or travelling abroad. This manoeuvre was attributed to years of budget cuts and was expected to save the agency around $4 million per annum and redeploy 12 staff (Kocieniewski, 2015). In fiscal year 2019 the IRS had a budget of £11.1 billion and full time equivalent staffing of 71,429 (USDT, 2019); the quoted savings of 0.04% are immaterial.

As of 2019, IRS funding was 25% less than it was at the beginning of the decade and the headcount of enforcement personnel was down by a third, which equated to the same number of auditors the

IRS had in the 1950s, but with an economy seven times larger (Horsley, 2019). In 2010, the Republicans took control of the House of Representatives. They prioritised weakening the IRS' ability to function by reducing their funding. This equated to 42% lower audit ratios in total, but for those earning over $500,000 versus the number of persons earning under $200,000 the ratio fell even more (Horsley, 2019).

The working poor and wealthiest 1% of Americans are audited by the IRS at around the same rate. The IRS acknowledged this and blames it on budgetary constraints due to budget cuts over the previous nine years, see Figure 4.11. They state auditing low-income taxpayers who claim earned income tax credits is a low effort task that can be completed through the post; 380,000 such audits were conducted in 2018, which was 39% of all IRS audits conducted (Kiel, 2019). From fiscal year 2018-2019 the IRS' full time equivalent (FTE) dropped by 3,475 persons, which was a loss of 4.64% (USDT, 2019). Audits of the wealthy require the expertise of senior staff, which have experienced much higher rates of attrition and take several hours. IRS Commissioner Charles Rettig states that due to the IRS' current budget, this is the, "most efficient use of available IRS examination resources" (Kiel, 2019).

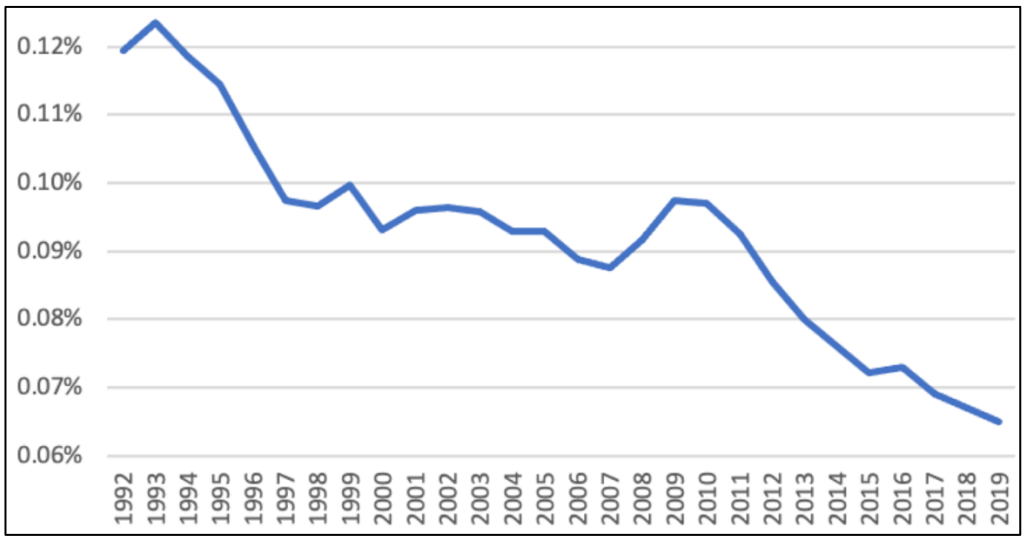


Figure 4.11 IRS Budget (% of US national income)

(Zucman, 2020)

The Trump administration suggested spending $362 million in 2020 on tax enforcement (IRS, 2019b), however the tax cuts enacted by the Trump administration equated to a larger deficit. As will be covered in Chapter 8, due to the cuts the funding was never going to be available.

According to National Public Radio, the reason Republicans wanted to defund the IRS was twofold. First, they are the agency tasked with enforcing the Affordable Care Act, which they opposed and labelled early on with the dog whistle moniker 'Obamacare'. Second, the IRS was charged with penalising conservative groups that applied for tax-exempt status (Horsley, 2019).

This amounted to delay in issuing tax exempt status as a social welfare organization, known as 501(c)(4) groups, for several entities with words, such as 'tea party', 'patriot', or '9/12' in their names (Eilperin & Goldfarb, 2013). To be eligible for 501(c)(4) tax-exempt status, an organization, by definition, "must not be organized for profit and must be operated exclusively to promote social welfare" (IRS, 2020b). In 2021, we learned the full meaning of those terms, which was not evident then. Overt racism, protests both against and in support of racism and riots in the US became commonplace under Trump and culminated with an attempted insurrection on the US Capitol.

A Senate subcommittee later found there'd been, "no evidence of White House involvement or political motivation" (US Congress, 2014:3) in scrutinising the groups. Republicans dissented and noted that 83% of groups whose 501(c)(4) status was delayed were right-leaning (US Congress, 2014). That was in 2014. Since then, there has been a rise of racial tension in the US and drastic social polarisation. In November 2020, the Federal Bureau of Investigation (FBI) reported for 2019 hate crimes were at their highest point in more than a decade at 7,314. Also disconcerting is of 15,000 participating agencies that are supposed to report hate crimes to the FBI, only 2,172 did, which was also a reduction from the number of agencies who reported the year before (FBI, 2019). We also now know the full intents of those organisations, who by any definition of the term 'social welfare' provided nothing of the sort.

This is a recent example of how the US tax code is easily manipulated. It requires general compliance, which is comparatively easier to manage, and is oftentimes all that is done versus analysing what has been reported. Little agency is vested in the IRS at large and it operates on limited resources. This illustrates the use of agencies for political or jurisdictional gain by political parties in the US and how in the long-term it has become a barrier to effective, reliable financial integration on the part of the US, like compliance with the CRS.

The protracted issue of FATCA versus CRS is akin to the US' multiple failed attempts to transition to the metric system. In 1866 it passed a law allowing, but not requiring, use of the metric system (Geiger, 2018). The Metric Conversion Act was passed in 1975 and created the United States Metric Board. Adoption of the system was to be on a voluntary basis (US Congress, 1975). This came to an abrupt end under the Reagan administration in 1982 with dissolution of the board. It was one of

many efforts of the era taken against regulation and was due primarily because of a report indicating the huge costs of conversion and a general move towards reduction of federal spending (Anderman, 2013; Maven, 2014). At the time of its dissolution, Louis F. Polk, Chairman of the US Metric Board stated:

> Our country holds dear this spirit of individual independence, liberty, justice and freedom of speech. You will notice that the report reflects this spirit ... and different views about the metric system (Anderman, 2013).

It is an example of how conversion to a more efficient worldwide system was viewed as an attack on the rights and liberty of the individual – much like wearing a face mask in the midst of an airborne pandemic. Now, some 38 plus years later, the US is still using a system of weights and measures that it shares in common only with Myanmar and Liberia (Buchholz, 2019).

Soda bottles in the US are measured in litres as their advent in the late 1970s was when the US was promoting a move to the metric system. Automobiles either imported to the US or produced by a foreign company in the US are metric. The metric system is standard in teaching science, within the medical field and by NASA due to the $200 million loss of the Mars climate orbiter where the use of both systems caused errors that led to its failure (Geiger, 2018). The problem is not that Americans do not already know and understand the metric system.

Regarding metrication, historically the US' behavior is not unique. According to Geiger, in many instances, such as with China and the UK, it was only when regulations dictated the metric system be used as the standard system of measure for conducting business transactions that its full integration was accomplished (Geiger, 2018). Cooperation with the US federal government repeatedly appears to be a concept of others cooperating with them, not vice versa. Like with metrication, it was unwilling to adapt and in the long-run finds its processes to be a hindrance to cooperating with global trading partners because a program that was already in place was stopped due to the short-term costs associated with it, even though industry was already adopting the switch. What was not considered at the time were the long-term costs of not moving to the metric system because they were not of immediate concern; this has not always been the case.

Just as how the UK decimalized its currency in 1971, the SEC ordered all US stock markets to decimalize stock prices in 2001 (SEC, 2000). The rationale for this might appear to be because it is much easier. It is, but in actuality it had to do with the fact when stocks were quoted in sixteenths, the smallest price increment was $0.0625. Under decimalization, the bid/offer spread can be just one cent, meaning tighter spreads and a more simplified trading experience. Also recall May Day

from the literature review. These are examples of regulation that stimulated competition, which is a core theory behind the superiority of the market economy. In those instances it was forward looking regulation that fostered movement to a more efficient and simpler way of conducting business.

4.7 US Fintech Regulation

As previously stated, US banks are regulated at either the state or federal level. Most banks function under state charter, even when they have operations in several states. The Office of the Comptroller of the Currency (OCC) is the federal regulator. It was established in 1863 to assist financing the US Civil War by creating a national currency (OCC, 2022).

As of 2016, the OCC had proposed the idea of offering fintech firms access to a federal charter (Curry, 2016). In May of 2018 they acted on this proposal after it was endorsed by the US Treasury and meant non-depository fintech companies could operate in the US under a special purpose charter. As of 2018, depository fintech firms were excluded from the provision due to the risk of taxpayers having to underwrite possible losses (OCC, 2018b; Price & Schroeder, 2018). The OCC's action was opposed by state regulators; they saw it being outside the OCC's statutory authority. Several state based organisations, such as the Independent Community Bankers of America, the Conference of State Bank Supervisors (CSBS) and the New York Department of Financial Services (NYDFS) opposed the action. They sued the OCC in 2017 to block the offering of national fintech charter but lost (Price & Schroeder, 2018).

Comptroller of the Currency Keith Noreika stated in 2017 that the OCC has 154 years of having its position upheld by unanimous Supreme Court cases, meaning § 247 of the National Bank Act (1864), which states the OCC has, "all such incidental powers to the business of banking" (Edwards, 2007:441). Thus, as of 2017 individual states could pass legislation related to the minutiae of integrating financial technology, but regulation of non-depository fintech companies was within the remit of the federal government.

The CSBS stated in 2017 the OCC's proposed national charter for fintech firms exceeded its national authority and is a potential future harm to consumers and taxpayers by risking exposure to fintech failures and a distortion of the marketplace. The seriousness of the move by the OCC to have fintech firms fall completely under its regulatory authority is best illustrated by the previously mentioned statistic that 79% of all US banks are chartered and regulated at the state level. State regulators are the sole licensing authority for non-bank provision of financial services (CSBS, 2017). This meant at that time, companies engaging in consumer finance mortgage provision were regulated by the

states, but fintech firms wanting to engage in those lines of business would have access to federal regulation. This was considered an encroachment on state regulators' regulatory domain.

As stated in the US Constitution, it is the authority of US Congress for it to do what is necessary to effectively govern (Madison, 1787). This has been extended through case law to mean the establishment of bank charters and is based on four legal precedents:

1866 - McCullough v. Maryland:

> As an appropriate means for executing 'the great powers, to lay and collect taxes; to borrow money; to regulate commerce; to declare and conduct a war; and to raise and support armies ... ,' Congress may incorporate banks and kindred institutions.

1867 - Osborn v. Bank of the United States:

> It may confer upon them private powers, which, standing alone, have no relation to the functions of the Federal Government, if those privileges are essential to the effective operation of such corporations.

1868 - First National Bank v. Follows ex rel. Union:

> Where necessary to meet the competition of state banks, Congress may authorize national banks to perform fiduciary functions, even though, apart from the competitive situation, federal instrumentalities might not be permitted to engage in such business.

1869 – Smith v. Kansas City Title Company:

> The Court will not undertake to assess the relative importance of the public and private functions of a financial institution Congress has seen fit to create. It sustained the act setting up the Federal Farm Loan Banks to provide funds for mortgage loans on agricultural land against the contention that the right of the Secretary of the Treasury, which he had not exercised, to use these banks as depositories of public funds, was merely a pretext for chartering those banks for private purposes.

(LII, 2020)

The US Congress defines an institution that takes deposits as being a bank; it may also provide services, such as payment processing or the provision of loans, but it is the taking of deposits that makes a bank a bank. As of 2018, the OCC had been reviewing applicants for special-purpose non-bank charters, specifically fintech companies, stating that it was within its remit to determine what defines a bank (OCC, 2018a).

The NYDFS challenged the OCC's authority on this under the National Bank Act in US District Court for the Southern District of New York. The OCC's motion to dismiss the complaint was denied on May 2, 2019. In determining its ruling, the court stated:

> New York already provides a comprehensive regulatory system for non-depository fintechs companies …New York state's regulations for over 600 non-bank financial services firms are all at risk of becoming null and void, (US District Court Southern District of New York, 2019:25).

The court used its authority to focus on the 'ripeness doctrine', which enables it to review recent regulatory actions that have been perpetrated under the interpretation of regulation by a US agency (LII, 2022). It reasoned the OCC's national charter on fintech firms poses a risk to New York State. Firms situated there may choose to leave New York; there exists an opportunity for the OCC's charter to inflict harm on the interests and sovereignty of individual states.

It focused on the fact banking requires the receipt of deposits. The OCC's argument about its ability to regulate companies involved in 'the business of banking' is ambiguous and would give the OCC too much authority. Normally, the OCC is only able to provide national charters to depository institutions. The OCC's interpretation of the National Bank Act was more akin to a, "fundamental revision" (US District Court Southern District of New York, 2019:47) of the law. The court stated its decision applies explicitly nationwide (Ryan, 2020). This behaviour on the part of the OCC is not new; Upton states it likes to, "aggressively interpret the powers of national banks" and, "act first, and if necessary fight the courts for after-the-fact permission" (Upton, 2018).

As of July 29, 2020 the NYDFS had filed opening briefs regarding the OCC's appeal in the Second Circuit US District Court. Since the court's earlier ruling, the OCC has not been able to approve any special purpose national bank charters for non-depository fintech companies. This motivated the OCC to make plans for the introduction of another type of federal special purpose national bank charter which allows payment service providers to pre-empt state level licensing and regulation for payment service providers and money transmitters (Kaplinsky, 2020).

This new national bank charter is specifically for payment companies and is purposefully designed to replace the state by state approach. Introduction of the charter is to be completed in two phases, Payments Charter 1.0, which will be similar to a national license for money transmitting, and Payments Charter 2.0, that will include features for directly accessing the payment system of the Federal Reserve. When Payments Charter 2.0 is in effect, fintech payment companies will be able to avoid using financial institutions, such as clearinghouses or correspondent banks for clearing payments through the Federal Reserve system (Harris, 2020).

To combat the most recent move by the OCC, the CSBS has announced its own plans to provide a multiple state plan of regulation for money transmitters in 2021, known as MSB Networked Supervision. It would enable payment services companies, cryptocurrency companies and money transmitters licensed in 40 or more states to have a single, comprehensive exam for satisfying all state examination requirements. As of September, 2020, 78 companies meet the definition. Despite a unified approach, companies will still be subject to state-specific requirements for initial filing, ongoing reporting, documentation, bonding, fees and any other requirements that are not covered by the MSB Networked Supervision programme (Harris et al., 2020).

The CSBS defines itself as the main regulator (and not the OCC) in the US for non-banking services - such as funds transmission, mortgage lending services, debt collection and consumer finance - that are within the remit of fintech; as of 2020 it oversaw more than 23,000 nonbank companies. In order to better regulate the emerging fintech sector, it has created Vision 2020, which is a wide range of initiatives designed to oversee the licensing and supervision of fintech and other nonbanks; the MSB Networked Supervision programme is a part of this (CSBS, 2020b; c) The main focus of Vision 2020 is to harmonize state level regulations so it is easier to be regulated at the state level and eliminate the OCC's competitive edge of offering registration with one regulator that enables companies to then conduct business throughout the entire US.

This movement towards states acting in unison against the OCC has been going on since at least April 2008 when state banking regulators for New Jersey, New York and Pennsylvania formed a union so banks could have regulatory pre-emption in those jurisdictions. It was specifically designed so lending institutions already operating under a federal charter could switch to a state charter without it affecting the products and services they have on offer (Hill, 2008).

Vision 2020 has the following goals: the replacement of the Nationwide Multistate Licensing System (NMLS) with a risk based licensing system, harmonisation of the State Examination System, deployment of an online accreditation system for state regulatory staff, encouragement of banks to provide banking services to nonbanks and improving regulatory coordination. This last item is specific to the sharing of information regarding examinations and regulations between the state and federal agencies, i.e. the OCC and the CSBS (CSBS, 2020c).

As of August 2018, the CSBS stated 84% of states were using the NMLS for the licensing of money transmitters (Hughes, 2019). It has been approved by the US Congress by passage of the Bank Service Company Examination Coordination Act of 2019, H.R. 241. As shown in Figure 4.12, it has been awaiting review by the US Senate since September, 2019 (CSBS, 2020c; US Congress, 2020).

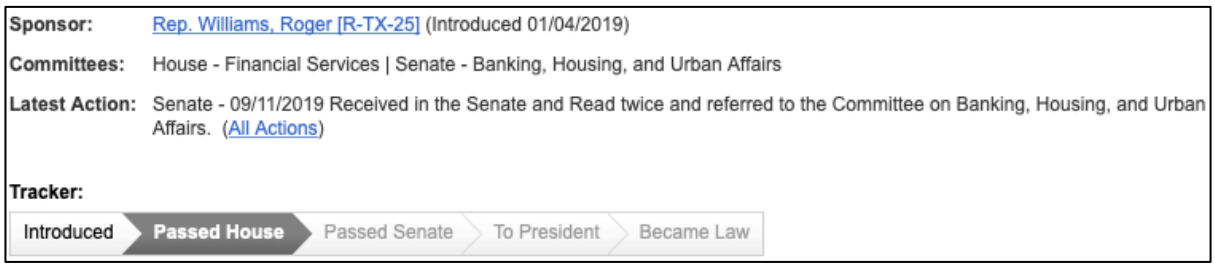


Figure 4.12 H.R. 241 Status – November 2020

(US Congress, 2020)

At the time of this writing, the most recent battle over fintech jurisdiction has been won by the state regulators. This issue is ongoing and the OCC is still attempting to provide a federal system of regulation for non-depository fintech companies. Currently within the US, the role of states' rights versus the power of federal agencies is relying upon the courts to determine the outcome. This process could also be subject to appeal and review by higher courts, and ultimately the US Supreme Court.

Determining the jurisdictional boundary between state and federal regulators in the regulation of fintech financial services firms may continue to be a protracted battle. In the case of the CSBS Vision 2020 program, greater cooperation between federal and state banking regulators is awaiting action from the US Senate, which chose to delay debate on the bill passed by the House of Representatives. Both instances are indicative of the fact the boundaries of regulatory jurisdictions in the US between state and federal regulators is an area of continued friction.

Lazare believes this lack of cooperation on the part of government in the US is intentional:

> In their infinite wisdom, the Founders created a deliberately unresponsive system in order to narrow the governmental options and force us to seek alternative routes. Politics were dangerous; therefore politics had to be limited and constrained (Bello, 2004:12).

The reason for the constrained power of the US government is structural. The number of legislators in the House of Representatives has been fixed at 435 since the passing of the Permanent Apportionment Act in 1929 (US House of Representatives, 2021). Seats are allocated based on population and are reapportioned every decade per census results; its members are elected for two years. Its authority is inferior to the US Senate, whose members are fixed at 100 with two seats apportioned to every state and whose members are elected for six years. As of the 2019 US Census Bureau estimates the two most populous states, California and Texas, which have a combined

population of 68,508,104 persons and 53 and 36 members respectively in the House of Representatives have just as much clout in the US Senate as the two least populous states. Those two, Vermont and Wyoming, have a combined population of 1,202,748 persons and just two members collectively in the House of Representatives (US Census Bureau, 2021). The US government is structured so sovereign statehood is superior to population. Regarding voting patterns in the US it is said, “land does not vote, people do”, but in the power dynamics between the US House of Representatives and the US Senate this is not true.

4.8 Regtech

Regulatory technology, known as regtech, is defined by Christophe Chazot, Group Head of Innovation for HSBC as, “technological solutions to regulatory processes”(Arner et al., 2017). Its impetus is to enable regulators to take a detailed, risk-based approach to the supervision of financial markets and their participants and minimize regulatory capture (Arner et al., 2017). Regtech is primarily a means for reducing costs, which are estimated at $280 billion per annum and involve approximately 10% of the financial services workforce (Arner et al., 2017; Treleaven, 2017).

Its main focus is on automating systems and removing the human element and costs from the regulatory process, but can also remove biases from assessment processes (Kümmerle & Conen, 2018). What is happening with regtech is the ‘UBERisation’ of the finance sector by means of algorithmic regulation. The goal is greater automation of regulatory processes, which will lead to the loss of professional jobs (Treleaven, 2017).

An example of the need for regtech efficiencies is the fact that Deutsche Bank is governed by 54 different regulators with disparate requirements. The Financial Conduct Authority (FCA) in the UK has seen the number of regulated firms rise from 25,000 to 56,000, yet operates with the same number of staff. Places like the US and Singapore use their regulatory approach as an enticement for companies to locate their operations there (Treleaven, 2017). In this situation it is the regulators who are the customers looking to fintech in the form of regtech to cut costs and provide a competitive advantage. As shown in Figure 4.13 Professor Philip Treleaven, defines regtech as the automation of advice, monitoring, reporting and regulation based on codified versions of regulatory policy by means of smart contract technology. They foresee the end result being a move towards self-regulation through the use of regulator provided software (Treleaven, 2017).

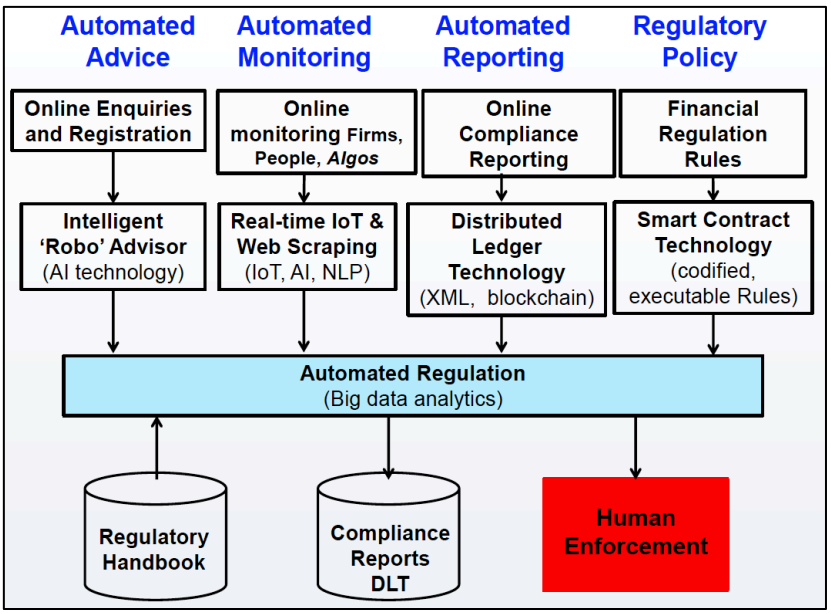


Figure 4.13 Algorithmic Regulation

(Treleaven, 2017)

4.8.1 Global Financial Innovation Network

The Global Financial Innovation Network (GFIN) was launched in January 2019. It is chaired by the FCA and includes more than 60 international organisations. They are categorised as: Coordinators, who are national financial sector regulators, all of whom are also members tasked with managing the work of the GFIN; Members, who are either supervisors or regulators of a national financial sector committed to supporting financial services innovation; and Observers, which are non-regulator participants, like governmental bodies or intergovernmental international organisations, who are stakeholders in financial services innovation (GFIN, 2020c).

The primary mission of the GFIN is to create a 'global sandbox' for supporting cross-border testing (GFIN, 2020a). The application for the cross-border testing focuses on the jurisdiction in which the business intends to test the business proposal, target clients, how their product or service will either directly or indirectly benefit the financial services sector and consumers and what pre-testing they have done. In order to be eligible for participation in the program, businesses' innovation, service or application must meet all of the following criteria:

1. Provides identifiable benefits to other businesses, consumers and/or regulators in the financial services industry.
2. It is established and ready for sandbox testing in at least one jurisdiction.
3. Where relevant, has already been discussed with the primary regulatory authority.

4. They have reviewed the GFIN Regulatory Compendiums and it falls within their scope.
5. Risks involved are understood and mitigating steps have been put in place, including in regard to investors and consumers.
6. They'll be responsive to the inquiries and concerns of GFIN members and will allocate adequate resources to the project.
7. Consent to the use of information provided by them to the GFIN.

(GFIN, 2020b)

44 applications from firms overseen by 17 participating regulators were received. Of those, eight were approved. As of October 2020, none of the eight firms involved were able to progress to the level of live testing (GFIN, 2020a). This is disconcerting for two reasons, the first being it appears UK taxpayers are funding an experiment that so far has yielded no results. The second reason is that the very existence of the FCA is due to the massive failures of the Financial Services Authority (FSA), which only existed from 1997 to 2013. Its name was so tarnished from the complete failure of its 'light touch' regulatory approach before the GFC that it was best to start anew and divide it into two regulators, the FCA and the Prudential Regulation Authority (PRA) (FCA, 2020). The FCA has no past performance nor reputation on which to rely. In light of its predecessor's reputation, this might be of benefit.

From the perspective of fintech in the era of deglobalisation, the GFIN has laid the foundations for a system for cross-border testing and has attracted several notable members from disparate jurisdictions. Cooperation between places as diverse as Wyoming, Kazakhstan and Eswatini may be unique; whether it is of significance remains to be seen. From the US, the CFPB, CFTC, FINRA, FRB and SEC are all participating, indicating US authorities from multiple agencies are interested in cooperating (GFIN, 2020c). As US agencies in general are keen to expand the scope of their duties. In regard to development of a cross-border testing system, this may be of great consequence. At the time research was begun in June 2018, the GFIN did not even exist; it is still in the early stages of development.

Nick Cook, Director of Innovation for the FCA spoke at the FinTech North Conference in Leeds in May 2019 about the cross-border testing program. At that time there were only 35 organisations and 28 regulators from 21 countries participating in GFIN (Fintech North Conference, 2019); momentum is building. The project is emblematic of what 21st century financial reporting should strive to achieve, which is a technology driven means for accurate, comparable reporting of financial information with a goal of real-time dissemination of information.

A problem with the GFIN cross-border testing program is the onus of bringing an idea or product to the GFIN within the remit of the program is placed on businesses. As not one applicant was able to be progressed through to the testing stage, for the next round of testing it would behove the GFIN to provide more direct guidance on a dataset for testing. The first goal of the cross-border program needs to be getting some sort of data, even sample data, submitted and consolidated from as many jurisdictions as possible and then disseminated back to the provider for integrity verification and transmission the stakeholders the data concerns.

4.8.2 Digital Regulatory Reporting

Another FCA project is Digital Regulatory Reporting (DRR). It was begun in 2016 and involves the development of a machine executable version of the UK's financial regulations. It is being pursued because the interpretation and implementation of regulation is an expensive endeavour on the part of regulated firms (Fintech North Conference, 2019). Through collaboration with the Bank of England, Barclays, Credit Suisse, Lloyds, Nationwide, NatWest and Santander they carried out a six month pilot program on how technology could be used by regulators and firms to make reporting be more efficient, consistent and accurate in three key areas:

1. Standardisation of firms' data.
2. Creating machine executable code versions of regulatory instructions.
3. Development of a system for automated regulatory report generation.

   (FCA, 2018)

The pilot program focused on two use cases:

1. PSD001 loan to Income (LTI) compliance check. It is a quarterly report of mortgages sold by an authorised firm requiring no more than 15% of mortgage contracts sold exceed 4.5 times declared income of the recipient.
2. Basel III Capital Equity Tier 1 (CET1) Ratio. It is a ratio of the minimum capital a firm must maintain and is required to be a minimum of 4.5% of risk-weighted assets.

   (FCA, 2018)

The processes for this testing were:

1. Conversion of regulations into machine executable code.
2. Definition of standard firm data.
3. Execution of the machine executable regulations versus a standardised version of firm data.

(FCA, 2018)

Testing makes use of blockchain and smart contracts. It is an attempt at realisation of the automating of regulatory policy as predicted by Treleaven (Treleaven, 2017). The machine executable version of the regulations were uploaded to the FSA's node on the blockchain system in the form of smart contracts and then distributed only to the relevant firms. At that point, the contracts were executed against test data and the results were provided back to the FSA and the relevant firm by means of a Graphical User Interface. The system also allows the regulator to make ad hoc requests by means of smart contracts and data to be uploaded by means of a spreadsheet (FCA, 2018).

4.8.3 **DRR - Results**

The program found code conversion to be a complicated task that involved taking what is written in a document and converting it into computer code, such as C++, Java, Javascript or Python. Even simple rules were difficult to convert due to the technical nature of computer code. This is because the person creating the code requires two particular skill sets – the ability to understand the exact intent of the regulation and the ability to transform it into code (FCA, 2018). As will be covered in Chapter 7, it is the exact problem Nick Szabo defined where trusted third parties are required as intermediaries in creation of smart contracts and is the role of systems auditor as defined in the Maltese Innovative Technology Arrangements and Services Act (ITAS Act, 2018; Szabo, 1996). In order to complete this task, the DRR relied on two persons, a programmer and a regulatory expert (FCA, 2018).

The DRR project found it would be most efficient to use a Domain Specific Language (DSL). This would be a new computer language specifically created for reproducing regulation as machine code. The test program created a rudimentary DSL and successfully converted regulation, but did not progress it to the level of testing due to time constraints. Another solution proposed for creating code is the use of Natural Language Processing technology that extracts data from text documents and populates a database by placing the information into relevant fields (FCA, 2018).

The DRR programme concluded the process of making regulations into code cannot at present be considered scalable. There may be efficiencies for converting regulation to code by first restating the regulations in more simpler written terms and then using this as the basis for code creation. This is because what they are initially working with is a regulatory requirement contained in multiple documents designed to state the legal regulatory intent and not function as a basis for the project at hand. The conclusion thus far is that DRR is best applied at present on a case by case basis where the

least amount of interpretation of regulations is required. Despite these outcomes, the DRR project showed efficiencies are gained through the centralising of processes, like interpretation and code creation for report generation, and reduction of duplicated data and its subsequent use of storage space. Most importantly, it demonstrated that feasibility for real-time regulatory reporting exists (FCA, 2018).

4.9 Financial Regulation in the EU, UK and US - Summary

This chapter researched the major occurrences in the development of the regulatory framework for financial services in the EU and the US and how they differ in regard to the power invested in agencies. It reviewed how the EU is progressing beyond trying to replicate the framework of the US and is now focused on regulating data privacy, which is an area where the two differ greatly in their approach. It also reviewed examples of how the US is continually absorbed with battles between its opposing political parties regarding the level of regulation required, the use of agencies as a political tool and jurisdictional battles between its federal and state regulators and how it prefers to implement its regulations on others (SOX, FATCA) than integrate the regulations of others into its own systems where possible.

This evidence gives credence to the opinion that the US sees its role in global financial regulation as being one of rule-maker. It is not interested in the harmonising of financial regulations as long as its own needs are being met. The US is a vast nation and has several internal conflicts for it to also be concerned with the global regulatory landscape, so long as it does not infringe on anything perceived as being emblematic of its liberty. The analysis provided highlights the difference between governance in coordinated (EU) and liberal market (US) economies.

Regtech is the application of data and technology for lowering the cost base of regulators. By instigating the GFIN and DRR projects, the FCA is a leading regulator. Its projects thus far have been of little result, but development and integration of technology takes time and effort and its projects are very new. What is most important is the FCA is focused on using innovation for making global regulatory reporting more comprehensive and efficient.

Chapter 5 Recent Fintech Developments

5.1 Introduction

The GFC was the most severe post-Great Depression failure of the financial system. Even more consequential to fostering public distrust was the lack of punitive measures taken against its instigators in the US. Due to the impact of the recession caused by the GFC and the increased regulatory burden that followed, the financial services industry chose to curtail investment in IT systems. Even seasoned professionals found themselves unemployed.

These conditions and the simultaneous coming to fruition of greater interconnectivity through mobile technology and the availability of big data created a gap in the market for financial services to move away from being dominated by major organisations and their legacy systems. This is manifesting as a surge in smaller firms integrating novel technological developments into their product offerings enabling finance to function in unique ways that personalise and automate financial services. It also means dominant firms in the industry are having to compete against this new market niche, which can be accomplished by acquisition of smaller upstart fintech firms or purchase of turnkey solutions from major technology companies. Arner has summed this up as being five reasons for the emergence of fintech:

1. General public distrust in the financial services industry, particularly in the US and EU
2. Market deficiencies caused by the GFC and the resulting regulatory response
3. Unemployed financial professionals looking to redeploy their talents
4. The rise of the smart phone and the commoditisation of technology
5. SMEs applying political pressure for alternative sources of finance

(Arner et al., 2017)

This chapter will review what types of novel technological developments are being utilised by the financial services industry in the period defined as fintech 3.5 (Arner et al., 2015). It concludes with analysis of recent US fintech patent applications and what the sum of these developments indicates for the future of the financial services industry. The developments presented are those appearing most able to provide value to financial services. This was accomplished by approaching the issue as defined by Steve Jobs in 1997 at the Worldwide Developers Conference:

> You have got to start with the customer experience and work backwards to the technology … I have made this mistake probably more than anybody else in this room … As we have tried to come up with a strategy and a vision for Apple, it started with 'What

> incredible benefits can we give to the customer? Where can we take the customer?' ... I think that is the right path to take (Cane, 1997).

The primary benefits are presumed to be trust, automation, enhanced functionality and reduced costs in the form of reduced labour requirements.

5.2 The Concept of Trust

Trust provided by the system is a primary motive of fintech developments. Any trust dependent interaction has four characteristics:

1. A relationship where one party is trusting (the trustor) and another party is trusted (the trustee).
2. Action by a partner in the relationship, such as risk taking, where something could conceivably be lost.
3. Vulnerability exists on the part of one party in the relationship.
4. Subjectivity regarding the trustor's perception of trust in the trustee, such as trust in their ability and intent to perform the contract.

(Loebbecke et al., 2018; Wang & Emurian, 2005)

For trust to be achieved, there must exist an interpersonal trust relation, meaning all parties believe each other will act accordingly in the completion of the contract, as well as the delegation of power to an intermediary who will enforce all parties to act within the terms of the agreement (Loebbecke et al., 2018). As detailed in Chapter 4, banks are given special treatment due to their structural role as trusted intermediaries for the dual purposes of protecting its customers (assets) and also the national economy from systemic risk (Upton, 2018). Banks use control methods, such as know your customer (KYC) rules or segregation of duties to prevent and mitigate illicit and fraudulent activity. The paradigm under which banks traditionally operate is the ATOMIC model: Assets, Trust, Ownership, Money, Identity and Contracts (Mougayar, 2016: 45).

> Today's financial industry is marked by outdated flaws … Concepts that are common in current-day financial services are centralisation, banks as trusted intermediaries, high costs, slow transaction settlements and risk management (van Lennep, 2018).

These are the problems fintech wants to solve. Evidence of how this is transpiring will be presented later in this chapter.

5.3 The Need for Trust

5.3.1 **Modern Perceptions**

Banks have always been a target for criminals. Based on their chequered history of risk-taking and unscrupulous behaviours they are often viewed with derision. As noted earlier, one reason for the advent of fintech is, "public distrust in the financial services industry, particularly in the US and EU" (Arner et al., 2017:13). Popular culture oftentimes glamourizes bank robbers. A recent example is Robert Redford in the film *The Old Man and the Gun*. It is a dramatization of the true story of Forrest Tucker, a 70 year old prison escapee who is portrayed as a charming antihero, regardless of the fact he was a serial bank robber (Lowery & Grann, 2018). The myth of the gentleman bandit is a romanticised falsehood.

In past times banks would present themselves as being reputable and trustworthy by housing their operations in grand buildings. In the age of the internet, they no longer have this advantage. It is the same issue faced by modern media. Whereas *The New York Times* or *The Daily Telegraph* newspapers are housed in grand buildings that impart a sense of awe in the observer, their websites are reduced to being on the same level as the most dubious sources of information. There is no longer a physical presence that acts as a connection between the producer and consumer. As time passes, younger generations are not even aware such a connection ever existed; everything has been reduced to an image on a screen. This exacerbates the problem of knowing who to trust.

5.3.2 **Modern Crime**

21st century bank robbers are part of a worldwide network of organised criminals acting in concert that has adopted highly sophisticated and lucrative methods of theft. Two of the most recent and egregious malware attacks infected over 100 worldwide financial institutions (Europol, 2018). These attacks entailed targeted the electronic payment systems used by banks and financial systems. Carbanak and Cobalt were the names of the malware programs used. They were perpetrated in more than 40 countries. Cumulative losses to the financial industry were estimated to have been more than €1 billion. With the Cobalt malware losses were up to €10 million per single act (EBF, 2018; Europol, 2018).

The group behind these malware attacks first began their activities in 2013 using the Anunak malware campaign to steal from ATM networks and financial transfers. The method for perpetrating these crimes was sending 'spear phishing' emails, which are seemingly valid emails from reputable companies that contain a software virus as an attachment. Downloading the software provided the criminals the ability to remotely control infected computers and implant remote access software into ATMs (Europol, 2018). Once a means of access to the banks' intranets was in place, the

criminals would then obtain funds via a few methods. Remote control of an ATM would be used so that it would automatically dispense cash when a low-level member of the syndicate would be available to collect. Databases containing account balances would also be manipulated; the money would then be either withdrawn or transferred to other accounts, often in foreign countries (Europol, 2018).

ThreatMetrix reported the following cybercrime statistics for July-December 2018:

- 3 billion bot attacks
- 244 million human initiated attacks (including 103 million mobile attacks)
- 61% of transactions originating from a mobile device
- Largest source of attacks: United States
- 2.1 billion bot attacks against online merchants; a year on year growth of 142%

(ThreatMetrix, 2018)

The majority of growth in financial services cybercrime has been in attacks originating from mobile devices attempting to login to accounts. This is done by using the methods of either brute force, by means of a bot, or by stealth via remote access attacks from a mobile device (ThreatMetrix, 2018).

5.4 Fintech Investment

Since the GFC, there has been a tremendous amount of investment in fintech. Consultancy firm Oliver Wyman state 15-20% of wholesale banking's cost base is technology. Capgemini determined as of the end of 2018, there were 2,000 financial technology specific start-ups in Europe, and a further 7,500 worldwide. EY recorded a value of €27 billion in worldwide fintech investment in 2017 alone, €4.6 billion of which was in Europe; both values were double what they were one year prior (EBF, 2018). In 2017, venture capital (VC) fintech investment in Germany accounted for 41% (€292 million) of all VC investment (€713 million). As of September 2018, the value of fintech VC investment for Germany was at €778 million. A breakdown of this shows that 25% was into the financing sector, 17% into the investments sector and 8% into FinTech start-ups. This was considered to be representative of a maturing of the fintech market there (Emadi & Heyden, 2018).

Research by the Private Equity Forum of Justus Liebig University anticipates the next phase of German fintech investment to be one of market expansion by established fintech firms, consolidation by means of acquisition by established banking companies for smaller firms and failure of those companies lacking either the necessary capital or profit to continue as a going concern. This later phase of the market cycle will likely experience VC exits from the market with private equity

inflows and mergers and acquisition transaction volumes being the most appropriate means for monitoring future trends (Emadi & Heyden, 2018).

One of the greatest areas for global investment has been blockchain. According to Greenwich Associates, as of 2017, blockchain had accounted for €1.5 billion of the financial services industry's investments per annum. These investments are moving past the proof-of-concept stage and are coming to fruition as commercially available blockchain products. By 2020, 77% of financial services providers expected to have adopted some sort of blockchain based system (EBF, 2018).

Research by EY in 2018 found 85% of banks had digital transformation as a core business priority. This is seen as a means for greater efficiency and an avenue for growth opportunities. Of the firms surveyed, 60-80% stated data and analytics, mobile technology and cloud technology are where they are investing now and where they plan to increase investment. The respondents ranked blockchain, smart contracts and robo-advisory services as forms of technology in which they are *not* investing. For those planning to invest in these technologies, 40-60% see the purchase of turnkey technology to be the most direct means for acquisition of the technology versus developing it in house. EY also state banks overestimate the ability of technology for driving business growth. Banking investments have largely been on front-end user interfaces; there is little evidence these initiatives actually grow business. What is considered the most prudent approach is being a fast follower rather than a first mover. An IT-centric approach is regarded as inferior to a problem-based means approach with deep understanding of how new technologies can be used collectively and in combination with one another as the best strategy (EY, 2018).

Technology is considered a primary means for driving down costs and ensuring future profitability. However adoption of technology needs to be applied in a targeted manner that provides end-to-end digitalization. EY's survey results show many banks are using traditional approaches to innovation when they should be using a more dynamic approach, such as partnering (EY, 2018). Any gamble on new technology that is incorrect in its approach could prove costly.

5.5 Effects of Fintech on Employment

Several studies with contradicting results have been conducted on the threat posed by automation on the loss of jobs in the US market. The OECD reported it could be as low as 9%, whereas PwC thinks 38% of jobs are at threat. Research by Oxford University arrived at a value of 47% (Frey & Osborne, 2017), whereas a research by McKinsey sees the figure being as high as 50%. The variance in these figures is due to the methodologies used, such as whether an entire occupation is subject to automation versus if particular tasks are able to be automated. The PwC calculations are favoured by

Kai-Fu Lee, former president of Google China because it uses a task-based approach. Lee believes a ground-up disruption method is the best means for calculating job losses. It looks at industries as a whole from the perception of a technologist, whereas the other studies rely on economists attempting to use like for like comparisons of what a human can do versus what technology can replace in calculating job losses (Lee, 2018).

Lee estimates industries involving high levels of routine work centred around customer service, such as financial services, fast food or security are likely to be most affected; ground-up disruption will affect about 10% of the US workforce. This is on top of the 38% of the task based automation predicted by PwC, meaning within 10 to 20 years up to 40-50% of US jobs could be automated. This would not equate to 40-50% expected unemployment rates due to a lack of inertia, regulatory restrictions and social friction. A move to greater automation will inevitably also be a source of job creation, which by Lee's estimates could mean total job losses due to automation will be more in the range of 10-25% (Lee, 2018). Contrary to this, Accenture estimates for banks, adoption of AI and human-machine collaboration will result in job gains of potentially 14% between 2018-2022 (Accenture, 2018).

5.6 Minor Fintech Developments

Various emerging technologies extend the definition of what constitutes financial technology. What these developments have in common is the gathering of disparate sources of information for integration with already established financial systems. The more promising ancillary technological developments being applied to financial services are:

- Augmented reality. This superimposes digital imagery on the real world, for solutions like providing directions to cash machines.
- Biometric technology further enhances anti money laundering procedures through multi-factorial user identification, like fingerprint scans, face and voice recognition.
- Drones can perform data collection in tasks such as real estate appraisals and insurance damage assessments.
- Gamification uses scorekeeping, prizes and point keeping to motivate users to meet specific goals.
- Robotics now includes autonomous vehicles. There is also the potential for motor insurance to no longer be based upon only the history and demographics of the driver, but also on their vehicle's digitally recorded usage.

- Virtual reality is being used in the form of a Holographic Workstation. It presents data as a 3D image that allows interaction by means of hand and voice instruction, as shown in Figure 5.1.
  (Fujii-Rajani, 2018)

Figure 5.1 Citibank VR Trading Workstation

(8ninths, 2020)

What these novel technologies have in common is they either replace the user or further integrate them into the IT system. None are specific to financial services, but all make the merging of data into the financial system more possible, thereby enabling virtually all data to be used as financial data on some level.

5.7 Major Fintech Developments

Based on the previous analysis on the effects of fintech on investment in Section 5.4 and fintech employment in Section 5.5, blockchain and smart contracts will be covered in separate chapters. In addition to those technologies, machine learning and the Internet of Things were found to have the most significant potential for future impact on the financial services industry. This is in addition to blockchain and smart contracts.

5.7.1 **Machine Learning**

Machine learning (ML) involves using a variety of logic structures, such as decision trees, support vector machines (SVM) or neural networks (NN) for enabling a computer to complete high volumes of trial and error experiments (Bazarbash, 2019). Most important are NNs, which involve first training a computer to recognise patterns by giving it an already processed set of data with millions of examples to learn from and then allowing it to use this knowledge to process new sets of data and expand its intelligence. It is different from traditional artificial intelligence because it does not try to replicate the processes of the conscious human brain, rather it focuses on replicating the outcomes of human thought, the subconscious included. Even its creators do not understand some of the things NNs do (Hillman, 2018).

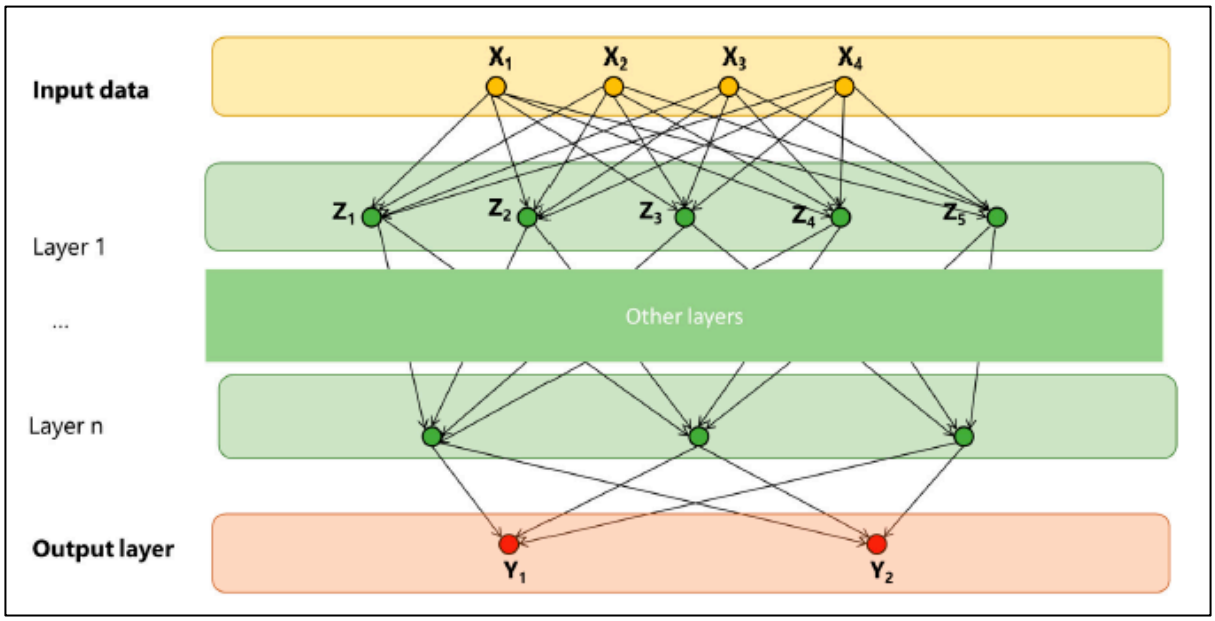


Figure 5.2 Neural Network with Four Inputs, Two Outcomes and Multiple Hidden Layers

(Bazarbash, 2019)

ML is unique in that it is able to develop on its own and is distinctly different from econometrics in that it makes predictions based on the best of its results, whereas econometrics focuses on causation and defining where a relationship exists between variables (Bazarbash, 2019). More important is that ML logic builds on past logic, so it is continually improving itself. What ML cannot do is understand concepts; it finds patterns, but has no reference for what they mean. Where it differs from humans is that humans learn concepts and patterns simultaneously. Machine learning cannot do this – yet. Google's DeepMind project is focused on using NNs to change the world. Their goal is:

> Our long term aim is to solve intelligence, developing more general and capable problem-solving systems, known as artificial general intelligence (AGI). Guided by safety and ethics, this invention could help society find answers to some of the world's most pressing and fundamental scientific challenges (DeepMind, 2021).

The effects ML is having are beyond the scope of financial services and have already begun radically changing the world with abilities such as speech recognition and language translation (Hillman, 2018). It is the most disruptive technological change happening in the world. Regarding financial services, ML is being used for automating processes that would otherwise require a highly trained person, such as with risk analysis, as detailed in Figure 5.3.

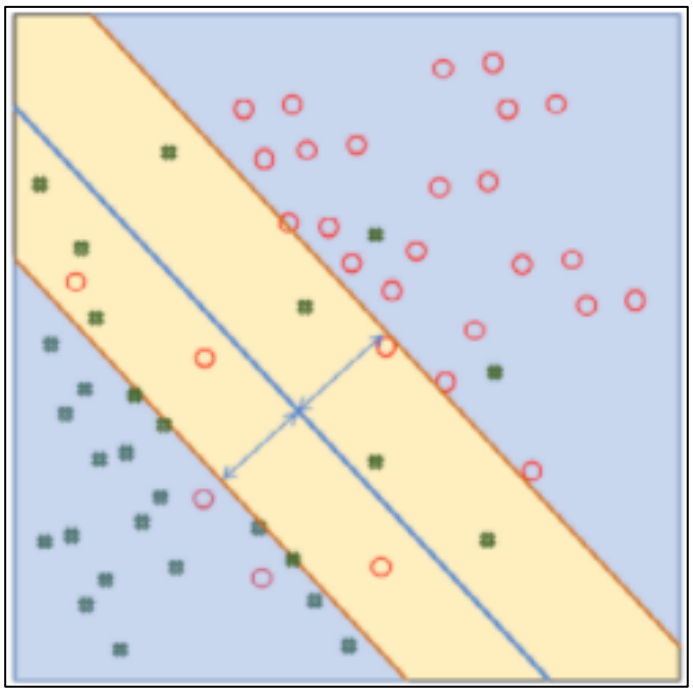


Figure 5.3 SVM Model for Predicting Default Outcome Based on Debt-to-Income and Loan-to-Value Ratios

Legend: X axis = Debt-to-Income, Y axis = Loan-to-Value TV, red circles = no default, green squares = default, blue line = separating line estimated by Support Vector Machine, red lines = support vectors

(Bazarbash, 2019)

The existence of ML is not obvious, as it is the logic operating behind the scenes. What is apparent is the quality of the results it produces, which must be judged versus previous forms of technology.

5.7.2 Internet of Things

The Internet of Things (IoT) is a diverse network of various electronic devices working together to collect, process, analyse and transfer data (Ramezan & Leung, 2018). It is a product of the fact

passive data monitoring is becoming an integral part of the electronic devices. As new data sources become available, they can be implemented and make tasks like inventory management a proactive activity.

The biggest impetus for the IoT revolution has been the development of the smartphone, whose numbers have gone from 1.4 billion in 2015 to an approximated 6.3 billion in 2020. Smartphones have up to 20 different types of integrated sensors that record data on speed, proximity, location and more. The ubiquity of sensors has brought about a sharp decline in their cost and further increased their usage in unique ways, like in cars, identification tags for livestock and home security systems. Cisco Systems estimated the proliferation of sensors means by 2020 there would be 50 billion devices capable of interconnectivity (Schulte & Liu, 2018).

IoT is being used for the implementation of the Sensing-as-a-Service (S^2aaS) business model, which involves the selling of sensor data to customers (Papadodimas et al., 2018). As shown in Figure 5.4, by 2020 it was estimated that about one half of sensors would be of use to financial services (Schulte & Liu, 2018).

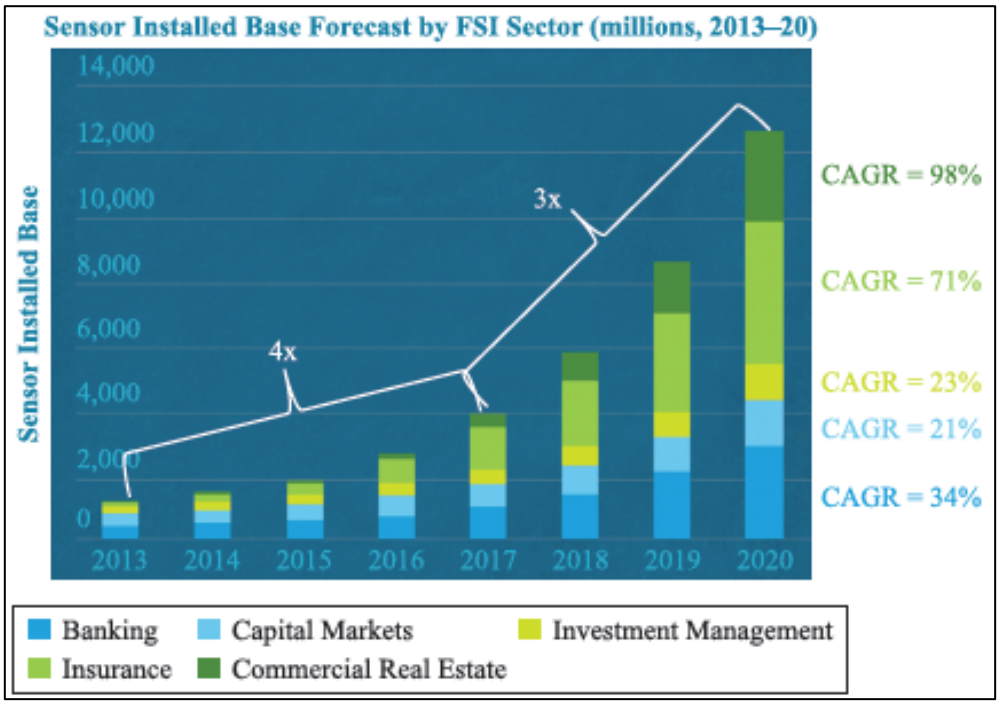


Figure 5.4 Use of Sensors by Financial Services

(Schulte & Liu, 2018)

5.7.2.1 Smart Meters and IoT

One of the greatest areas for proliferation of sensors has been through the introduction of smart meters. These are internet enabled meters that automatically collect and transmit the energy consumption data of a business or residence. As illustrated in Figure 5.5, since 2011 China has led this trend, but other locations have accelerated the pace of their adoption of smart meters and costs have dropped (IEA, 2019).

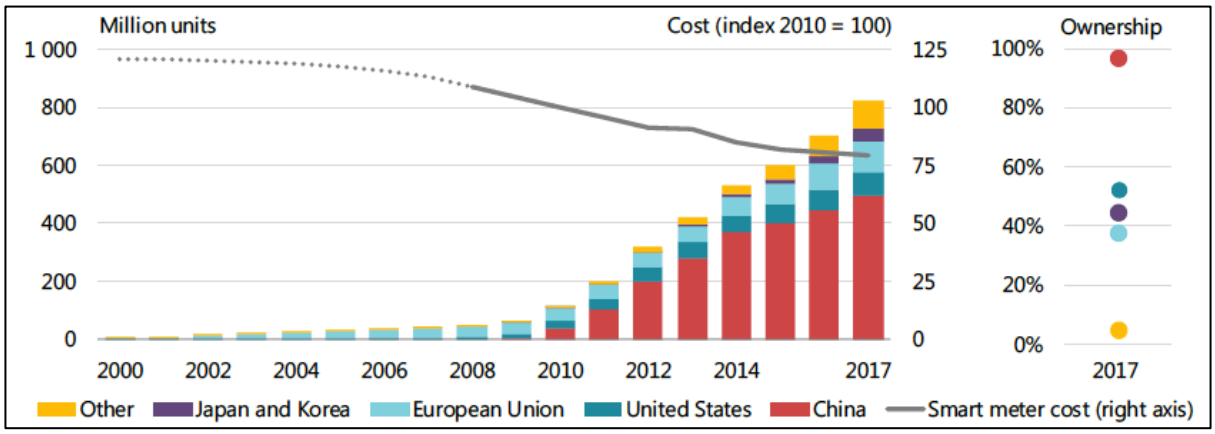


Figure 5.5 Global Smart Meter Deployment, Cost and Penetration, 2000-2017

(IEA, 2019)

5.7.2.2 IoT in Financial Services

Companies such as Monzo and IFTTT (If This Then That) are leading the way with implementation of IoT for financial services (Feltwell et al., 2019). IFTTT is the type of logic used in smart contracts where instructions are listed consecutively in the order to be committed (Bhattacharya, 2018). These companies provide a mobile application linked to a bank account for connecting applets for managing saving and spending or so users can develop their own applications. The applications do not need to be financial in nature and can involve behaviour management. What is most common is for users to install already developed applications and link them to other applications. The platforms allow use of outside data triggers for thing like instigating funds transfers (Feltwell et al., 2019). With IoT there is now a means for users to tailor financial systems to work how they want them to and can apply the proliferation of data sensors for their own personal use.

5.7.2.3 Routing and Trust Issues with IoT

Routing is a major issue with IoT, as secure communication impervious to malicious attacks is required. IoT systems are always on and are comprised of a wide range of embedded devices that rely on low power and lossy networks (LLN), which are subject to misuse. There are two main categories of attackers, known as selfish and malicious nodes. Selfish nodes drop the routing messages of other nodes while using other nodes' resources for routing their own messages. This

behaviour is difficult to detect and limit, as it is not actively violating any protocol. Malicious attackers intentionally disrupt message routing; this happens when an IoT device has enough tokens to join a network and then interferes with the routing (Ramezan & Leung, 2018). Because of the potential for misuse the IoT industry is working on enhancing security.

Vendors have not yet agreed on a centralised management system due to a lack of trust between them and high costs of implementing a trust management infrastructure. Some examples are the Public Key Infrastructure, Ad-hoc On-Demand Distance Vector (AODV) and the Blockchain-Based Contractual Routing protocol (BCR). BCR does not rely on either central authorities or a secret key sharing mechanism, can be applied to ad-hoc networks. In comparison with AODV, it reduces routing overhead by a factor of five (Ramezan & Leung, 2018). This indicates is that expansion of IoT integration is happening and a variety of options are being explored, yet the market is still figuring out how to provide trust. There is no present industry standard, but integration of blockchain might be a solution.

5.8 Recent Patent Applications in the US

5.8.1 **What is a Patent?**

A patent is a grant of property rights to an inventor. The terms of a US patent are generally for 20 years from the date of the patent application filing. The specific rights conferred by a patent grant are, “the right to exclude others from making, using, offering for sale, selling or importing” (USPTO, 2015) the invention into the country which issued the patent. These are rights of exclusion, meaning a patent does not give a patent holder rights to produce something, rather it gives them the right to exclude other from doing so. It is the obligation of the patentee to enforce these rights (USPTO, 2015).

5.8.2 **Patent Laws of the US**

The rights conveyed by a patent are enforceable only within the territory that issued the patent; anyone seeking the protection afforded by a patent must apply for a patent in each country. One common theme of non-US patents is that publication of the invention prior to the date of the patent application is an automatic preclusion from the right to a patent. Non-US jurisdictions often require an invention be manufactured within the country within a certain time frame; US patent laws are an exception to this (USDOC, 2018). A grace period of one year exists from the time of public disclosure and the need to file for US patent protection (Panitch & Miller, 2018). Although the US is unique in this respect, in all foreseeable instances it provides no strategic benefit. Unless they are a resubmission of an earlier application, the patent applications analysed are presumably the first disclosure of this technology.

The UN Patent Cooperation Treaty (PCT) of 1970 has been in force since 24 January, 1978. As of 2019, there were 153 contracting states, see Figure 5.6 (WIPO, 2020). For the purpose of this analysis, although the technological innovations in question are being reviewed only on their filing status in the US, they are representative of a global omnibus of patents in multiple jurisdictions.

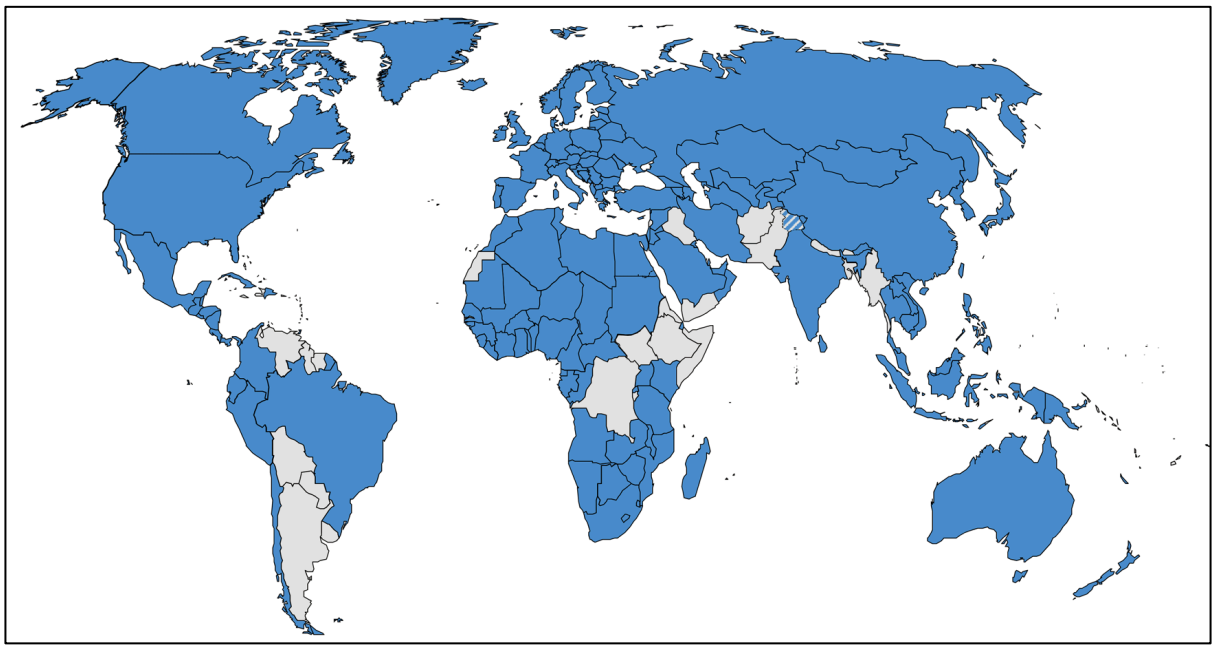


Figure 5.6 Countries Covered by the Patent Cooperation Treaty

(WIPO, 2020)

5.8.3 Types of Patent and Their Attributes

US patents fall within three main categories. These are:

Utility patents – These are granted to someone who has discovered or invented some novel composition, article of manufacture, machine, process, or any useful improvement thereof.

Design patents – These involve the creation of an original and ornamental design for an article of manufacture.

Plant patents – These pertain to the discovery or asexual reproduction of a new and distinct variety of plant; it involves some type of living organism.

(USPTO, 2015)

Regarding fintech, it is the category of utility patents which is of concern. Of particular importance regard to patents is the term 'useful'. What useful means in the context of patents is that the

proposed idea has a useful purpose, including operativeness. Patents cannot be obtained for a vague idea; applications must include a complete description of the product (USPTO, 2015). If there is something for which a patent has either been applied or granted, then it actually has to exist and function. It mustn't work well, but must be operable. This means the following patents are functional technological innovations.

IBM has been the number one company in the world in terms of number of patent grants for the past 26 years; in 2018 alone it was awarded 9,100 patents. In 2018 and 2017, IBM, Samsung, Canon, Intel and LG were the top five companies based on number of patents. For 2018, 46% of all US applications were from entities in the US (Lunden, 2019).

There is a distinction between a patent application and a patent that has been granted. In 2010, the percentages of approval for US and foreign applications were 44.55% and 45.04% respectively. By 2018, these numbers had risen to be 50.65% and 52.35% (Adam, 2019; USPTO, 2020). Should a patent application be rejected, inventors are required to reapply for a new patent; this is known as a continuation. Based on analysis from Yale University of US patents granted between 1963-2005, only 11.4% of patent grants were unrelated to another patent application. This means the lifecycle of a patent grant is in the majority of instances one of application, rejection, resubmission (continuation) and eventual approval or abandonment (Carley et al., 2015).

5.8.4 Patents Versus Copyright and Trademark

Patent, trademark and copyright are the three different types of US protection available for intellectual property. Copyright applies to authors of 'original works of authorship' and is based on the 1976 Copyright Act (USPTO, 2015). The patents reviewed are based around software code, which as a written product, falls within the remit of copyright law and as software is patentable in the US, can also fall under patent law. For software to be covered by US patent law it must provide some type of distinctly new improvement; it cannot just be a standard software program (IP Watchdog, 2018). Trademark refers to a symbol, word, name or device that uniquely identifies the source of goods (USPTO, 2015).

The following US patent applications were collected between June 2018 to December 2019 by means of a Google Scholar alert for the terms 'blockchain' and 'fintech'. The applications have been segregated into three categories based on their relevance to the financial services industry:

- Architecture
- Investment and Market Specific Use

- Compliance and Verification

The rationale for this analysis is to provide a timely assessment of real world solutions being developed for integrating fintech into the IT systems of financial services providers. Of the 39 patents identified, these 11 are most relevant to how fintech is being developed for use in financial services.

5.8.4.1 Architecture Patents

5.8.4.1.1 US 2019/0173667 / June 6th, 2019 / Cloudminds

This patent is focused on providing additional security for decentralised blockchain systems against 51% attacks, which are explained in Chapter 6. It achieves this by using private key information to sign a block generated by the block generation mechanism and then issuing it to an issuing process to specific 'first' nodes on the network. It then passes these blocks to 'second' nodes on the network where signature verification is performed based on public-key information. After this is complete, proof-of-work verification is completed (Wang & Xie, 2019).

With this patent blockchain developers are looking to integrate a means for permissionless blockchain architecture to have some sort of preferential node hierarchy built into it for the purpose of providing trust and preventing unknown parties perpetrating 51% attacks. This is especially important for future blockchain developments, as these type of attacks are one of public blockchain's primary vulnerabilities regarding fraud.

5.8.4.1.2 US 2018/0294956 / October 11th, 2018 / Walmart Apollo

Walmart is the dominant retailer in the US. In 2020 it recorded net income of $14.88 billion, year on year sales growth of 1.86%, gross income growth of 0.20% and net margin growth of 2.86% (MarketWatch, 2021b).This filing is evidence of implementation of blockchain into its current processes for systems backup and authentication purposes. Walmart is also a participant in the IBM Hyperledger Fabric based Food Trust provenance project that is using blockchain in supply chains (Dmitrov, 2019). Due to its market share, any solution they implement could have ramifications on their nationwide employment levels as well as industry standards and average operating margins (O'Brien et al., 2018).

5.8.4.1.3 US 2019/0205884 / July 4th, 2019 / International Business Machines

This application is for use in analysis of current IT workflow systems for identification and consolidation of similar processes for smart contract development. The problem it is looking to solve is similar to what was reported as being the biggest obstacle found by the DRR project of the FCA as

covered in Chapter 4 of conversion of standard contracts to machine code not being scalable (FCA, 2018).

Based on its abstract and the commercial solution IBM has brought to market, which is covered more in Chapter 7, it appears that this patent is for use in enabling companies to transition the workflow logic in their current systems to a blockchain based platform (Batra et al., 2019). This is one of the biggest problems that fintech is looking to solve – migration away from legacy systems. With this application IBM is looking to make this happen, which will enable uptake of their blockchain solution.

5.8.4.1.4 US 2018/0278596 / September 27th, 2018 / Accenture Global Solutions

As will be covered in Chapter 6, one of blockchain's most unique characteristics is immutability, which means any information placed in the blockchain cannot be undone. This application is for use in a blockchain that has different levels of trust assigned to certain users. As seen in Figure 5.7, by means of a 'key secret' or portions thereof, a user or others with whom they must collaborate to complete the process are able to modify information in the blockchain. Changes can be implemented in ways that either allow the change to be apparent or obscured. Typically such changes are supposed to cause the blockchain to report a different hash value and indicate something has been modified. This application states that in such an instance an 'integrity code' will be used in its place, enabling the blockchain to be modified and the change recorded without causing the entire blockchain to cease functioning (Ateniese et al., 2018).

This application provides a solution to the problem of inappropriate or incorrect data in the chain whilst still allowing use of the database by multiple users with differing levels of trust. By updating the original block, there is no need to append the blockchain and increase the size of the database. It is a continuation of an application filed in August, 2017.

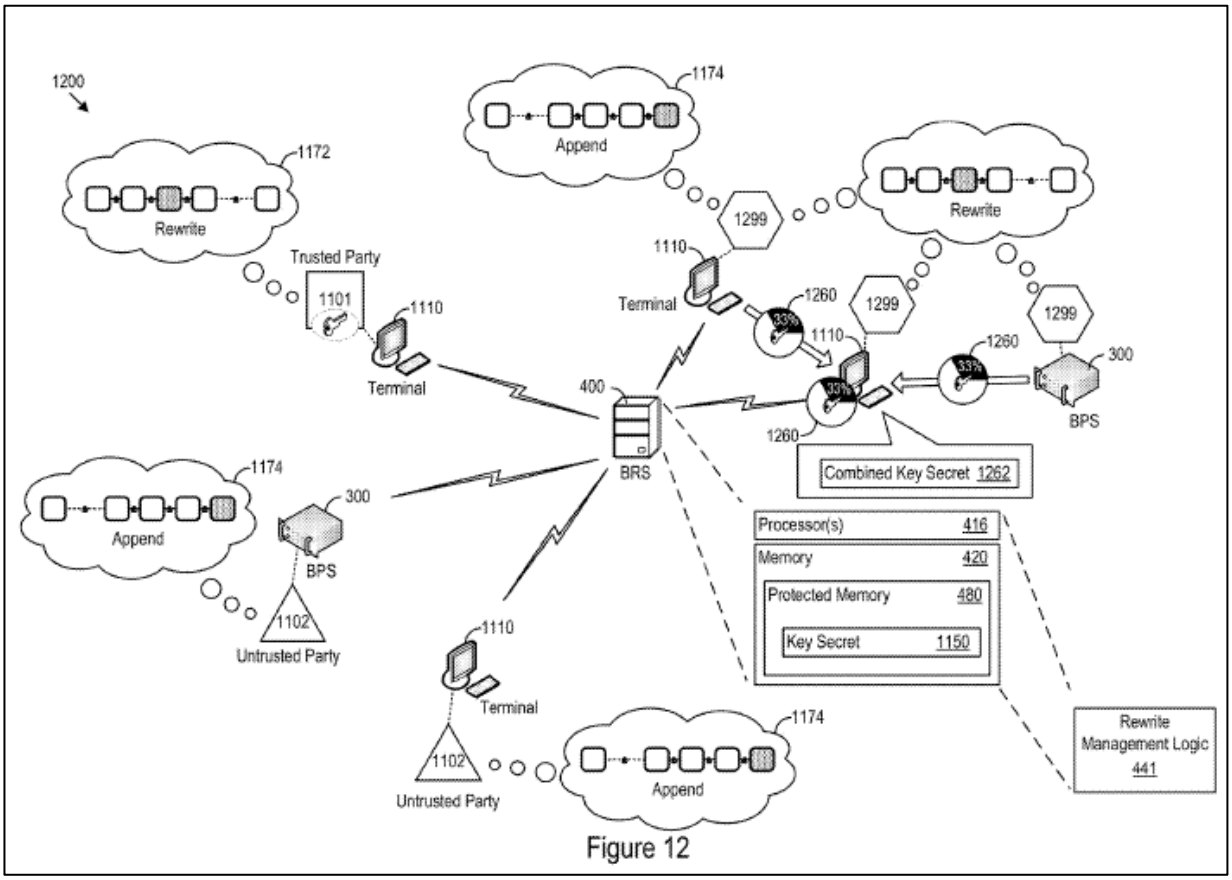


Figure 12

Figure 5.7 Diagram of Distributed Key Secret for use in a Rewriteable Blockchain

(Ateniese et al., 2018)

5.8.4.1.5 US 2019/0158475 / May 23rd, 2019 / Accenture Global Solutions

As shown in Figure 5.8, this application details how the circuitry for rewriting information in the blockchain will function. Its technology works in tandem with the previous application by Accenture reviewed (Ateniese et al., 2019). The type of changes these patents allow and the fact that there is a hierarchy of users means it is for private or permissioned blockchain systems, which at present are the most viable type of blockchain technology for business use.

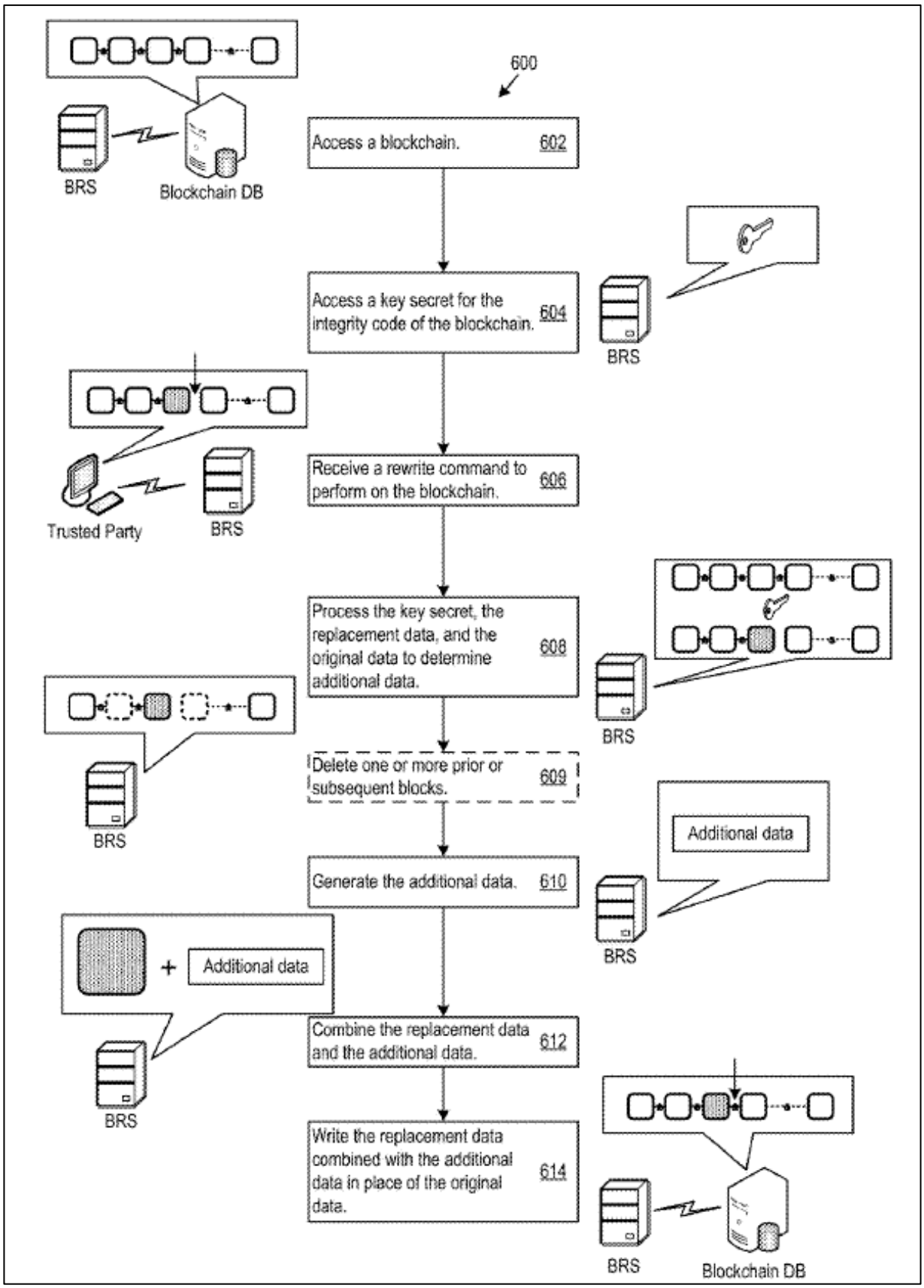


Figure 5.8 Hybrid Blockchain

(Ateniese et al., 2019)

5.8.4.2 Investment and Asset Market Related Patents

5.8.4.2.1 US 2019/0028276 / January 24th, 2019 / Chicago Mercantile Exchange Inc. (CMEX)

This technology is focused on using blockchain for the trading of commodity futures by means of a Central Counter Party (CCP). In standard transactions without a CCP, the credit risk of the seller is borne by the buyer and vice versa. The CCP functions as a trusted party between buyer and seller and assumes the majority of the credit risk in completing a transaction. As shown in Figure 5.9, in the case of a commodities exchange this entails the dissemination of a large amount of data held in multiple databases and periodic reconciliation by multiple users in their own versions of the databases (Pierce et al., 2019). CMEX is looking to use blockchain to automate this process to eliminate the duplication of reconciliation efforts. As it is an 'in-house' system, CMEX is able to develop it for their own use and by means of permissions can grant access to others; the knock-on effect being that fewer staff are needed for reconciliation.

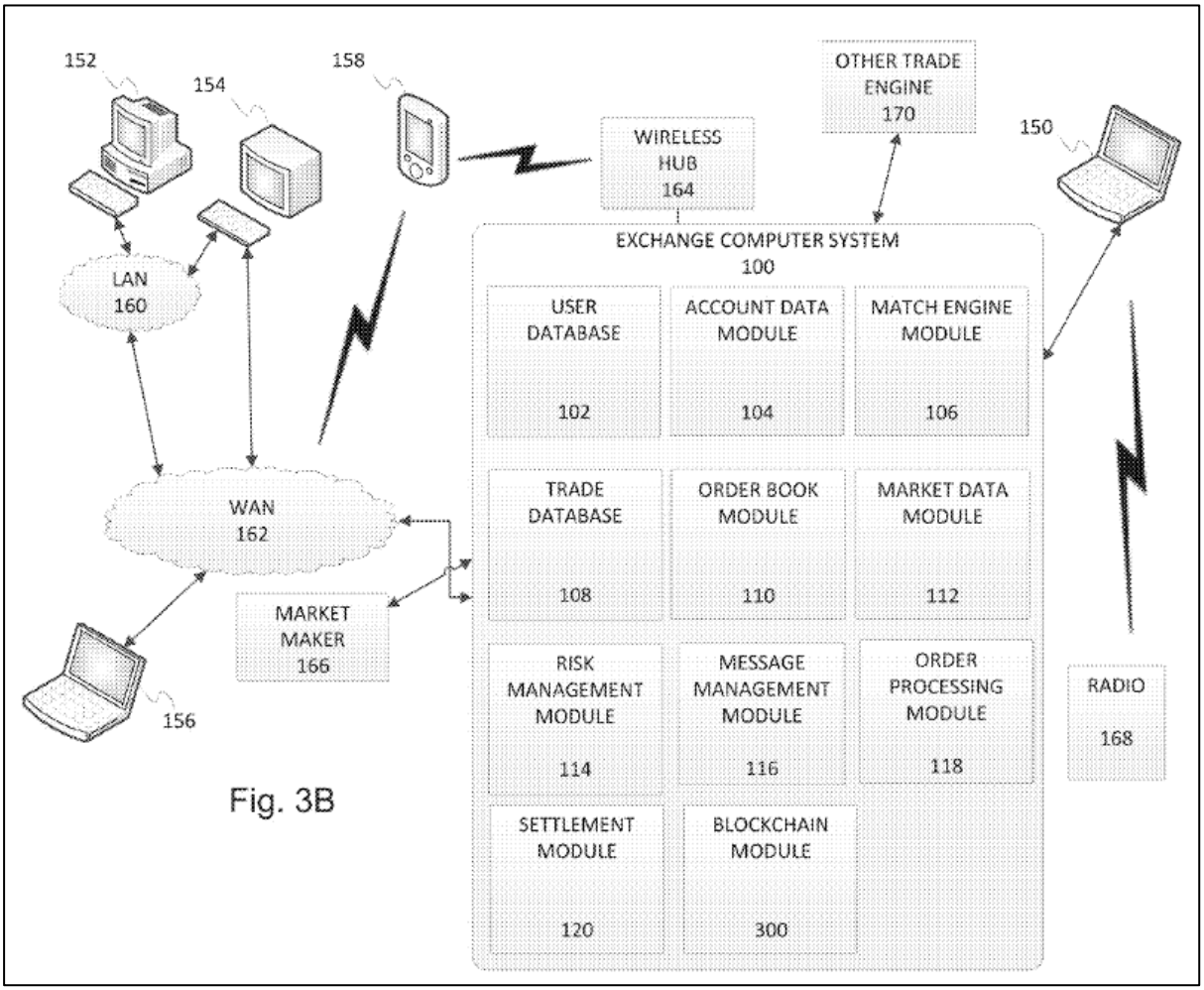


Figure 5.9 Schematic of CMEX Blockchain Trading System

(Pierce et al., 2019)

This is the type of use that has been highlighted by the Federal Reserve Bank of New Zealand as being the most immediate beneficial application of blockchain and the biggest problem being implementing it across all parties involved (Fujii-Rajani, 2018). In the case of CMEX, this is avoided as it is a proprietary system others will be using. CMEX already began dismantling over half of its 35 open outcry pits in 2015, examples of which are in Figure 5.10, as web trading had rendered them obsolete (Marek & Martinez, 2015).

Figure 5.10 CMEX Trading Pits - 2015

(Marek & Martinez, 2015)

5.8.4.2.2 US 2018/0285971 / October 4th, 2018 / International Business Machines

This technology uses blockchain and ML for consumer debt collection. Instead of people being employed for this task, in the future it could be managed by ML. Debt collection involves compliance requirements, which by means of a smart contract can be integrated into the system so information about the debt can be appended to the record and no legal stipulations are broken (Rosenoer, 2018). It represents the fact technology can be expected to take on some of the burden of collecting private debt, which was $130 trillion worldwide as of 2018 (IMF, 2020b).

5.8.4.2.3 US 2019/0139136 / May 9th, 2019 / Templum, Inc.

This application is for using blockchain and smart contracts for security, commodity and derivative transactions using digital wallets and is a continuation of patents filed in 2015 and 2016. It aims to

eliminate the fragmented manner currently used for transaction processing and is focused on streamlining back office settlement procedures for securities and providing transparency (Molinari et al., 2019). This is a prime example of how the application of blockchain could be used for reduction or elimination of low-level reconciliatory jobs.

Application of this type of technology is being undertaken by companies such as A Better Exchange (ABE), which is integrating asset tokenization and blockchain to its 24 hour asset trading platform (Business Wire, 2019). Their product was on display at the 2019 Delta Summit in Malta. Its advisors include Frank Bishop, former CEO of Invesco Funds and economist Art Laffer, Sr., creator of the Laffer Curve and former advisor to US Presidents Ronald Reagan and Donald Trump (ABE, 2021).

5.8.4.2.4 US 2019/0165931 / May 30th, 2019 / International Business Machines

Energy demands are forecast by energy transmission companies and provided to their suppliers for sourcing adequate supply through the use of forward purchase agreements. This requires coordination between multiple suppliers and transmitters, as shown in Figure 5.11. There exists in this situation the liability of double spread, which is when a supplier commits to providing more energy than it can produce. This application uses blockchain and smart contract technology as a solution because multiple parties would benefit from using a shared database. It is the type of use of blockchain the US Commodities and Futures Trade Commission considers viable, which will be detailed in Chapter 7 (Bharti et al., 2019; CFTC, 2018).

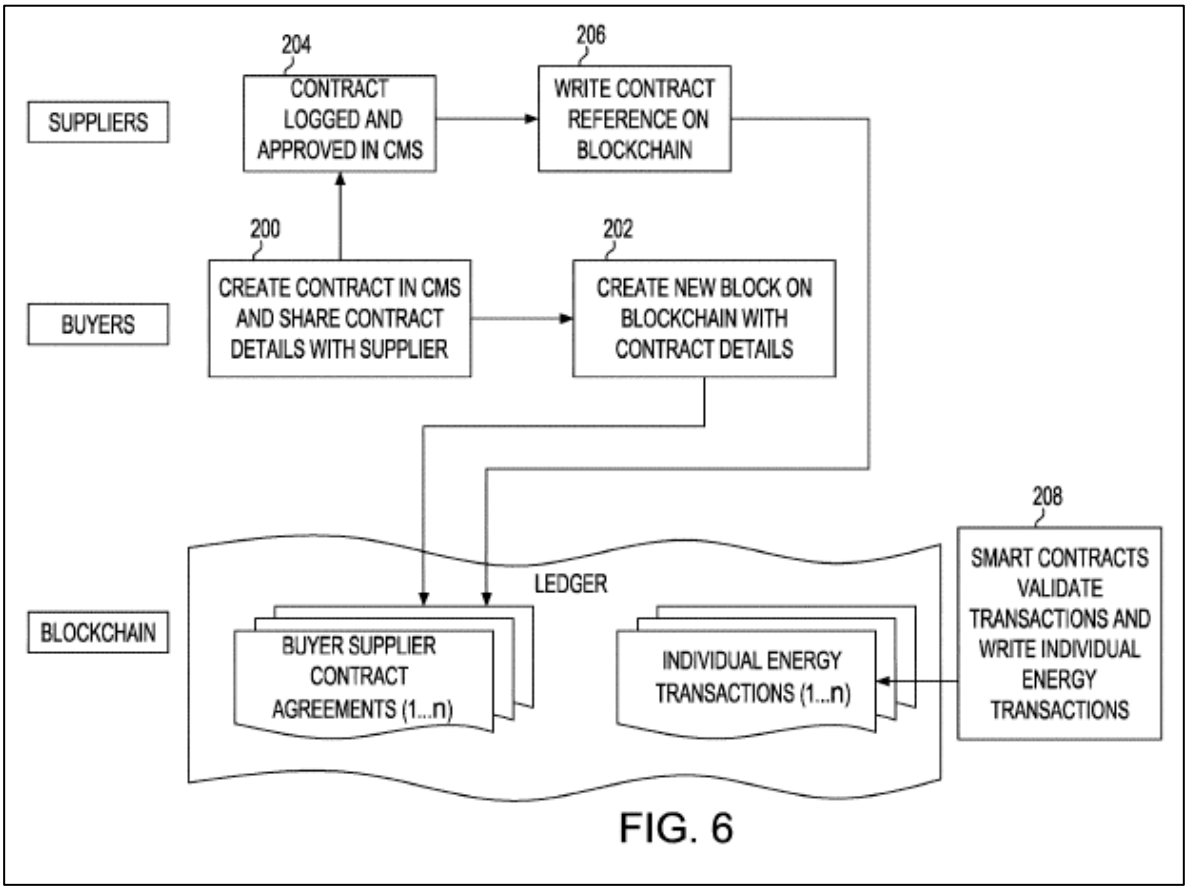


Figure 5.11 Blockchain Based Energy Purchase Agreement System

(Bharti et al., 2019)

5.8.4.3 Compliance and Verification

5.8.4.3.1 US 2018/0293547 / October 11th, 2018 / Jaspreet Randhawa

Unlike the other patent applications, this one was filed by a private person. Its novelty is the creation of an immutable blockchain record of prospective employees' consolidated academic, career and social media history. The privacy conflicts this poses in relation to GDPR were mentioned in Chapter 4 and will be further covered in Chapter 6. For the purpose of consistency, the details of the patent are listed here. Financial services is one of the main areas they are targeting for uptake of their product. (Randhawa, 2018).

5.8.4.3.2 US 2018/0342171 / November 29th, 2018 / International Business Machines

This application is focused on creating consolidated, tamper-proof educational records that enable teachers and students to monitor learning outcomes stored in a centralised blockchain database. As evidenced in Figure 5.12, it seeks to eliminate the risk of event changes not being relayed to a central authority, provides provenance for any changes made and acts as a repository for multiple

learning institutions. What it shows is how blockchain systems are focused on making centralisation of data storage for multiple institutions a primary function (Darnell et al., 2018).

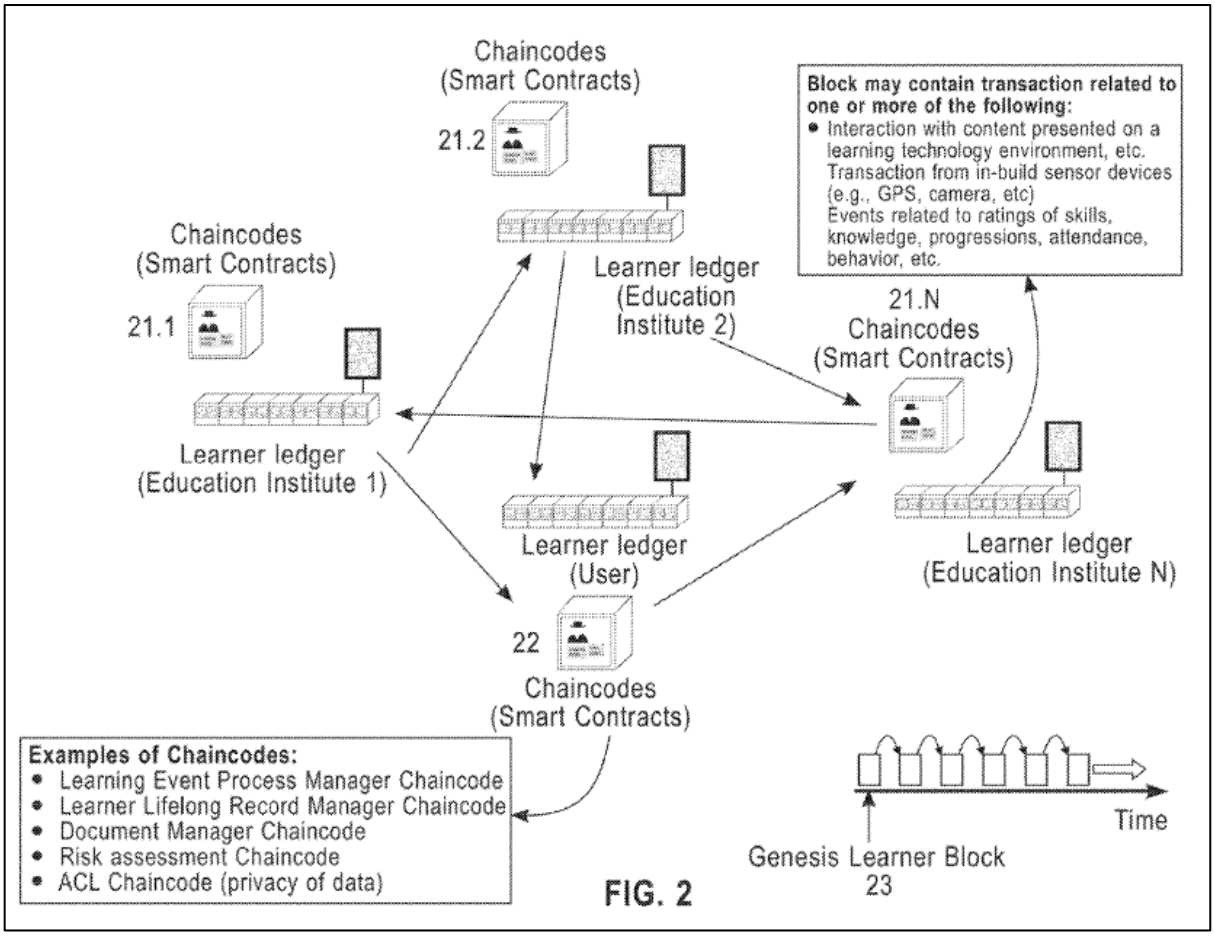


Figure 5.12 Blockchain Based Lifelong Learner Event Data Management

(Darnell et al., 2018)

5.9 Recent Fintech Developments – Summary

This chapter has defined how the landscape of the financial services industry post GFC led to the rise of fintech. Many developments are occurring outside the realm of what constituted past definitions of financial technology. It has reviewed the concept of trust, investments in fintech, the threat technology poses to future employment and the minor and major technological developments of relevance to the financial services industry occurring in parallel with blockchain and smart contracts. It has also analysed several patent applications in the US that show how blockchain, smart contracts and ML technology are being improved for implementation in the financial services industry.

The combination of enhanced systems integration with APIs, user-integration by means of augmented reality and biometric technology and access to vast quantities of steady streams of

disparate information sources provided by drones, robots, S^2aaS and IoT and processing of this data by ML are making the vision of all data being some form of financial data a reality. Unlike previous times when technology quickly improved, such as adoption of the internet in the late 1990s, change is now happening more rapidly and on multiple technological fronts.

Of particular interest is the combination of blockchain, smart contracts, ML and IoT. On their own, any of these has limited uses. The synergy provided by integration of these four has the potential for major disruption. Their implementation with the use of multiple minor points of data from sensing devices, recording the data in a unified, shared blockchain database available to multiple users who do not need to know or trust one another, analysed by ML and acted upon by smart contracts embedded in the system will be revolutionary in automating the way financial services are provided. The result will be the reduction of human intervention in the mundanity of data collection and cross reconciliation of transactions. The unifying theme of the technological advancements reviewed is how the widespread collection and centralisation of data for use by automated systems will be used to provide trust.

Chapter 6 Blockchain

6.1 What is Blockchain?

This chapter analyses blockchain and how it is being implemented in financial services. This is due to the large amount of attention given to this technology in the sources analysed during the data collection period. Blockchain is a distributed record of transactions akin to an accounting ledger stored in a permanent and near unalterable method through the use of cryptographic techniques. What differentiates blockchain from traditional databases is it is administered by a peer-to-peer network not under the control of any one party. Transactions are authenticated via a consensus protocol, which is a set of rules that determine whether the blockchain can be updated. The crux of the protocol is to enable parties which do not fully trust one another to collaborate without reliance on a third party (Ganne, 2018).

The name Satoshi Nakamoto is synonymous with the creation of blockchain, as this person(s) is considered to be the founder of Bitcoin, the first successful cryptocurrency network, which was outlined in the 2008 paper *Bitcoin: A Peer-to-Peer Electronic Cash System* (Bogdanov et al., 2018; van Lennep, 2018). No one knows who this person is or whether it is a pseudonym. Although this paper is widely considered to be the origin of blockchain, it was actually conceived in 1991 when the concept of unalterable timestamps was developed by Haber and Stornetta (Haber & Stornetta, 1991).

Despite its origin, blockchain is not limited to use with cryptocurrencies and has many relevancies from a business perspective for digital transaction processing, such as identity management, records management and 'e-voting' (Fenwick & Vermeulen, 2019). According to Mahajan, blockchain is the fifth disruptive computing technology, the other four being mainframe computers, personal computers, the internet and mobile communications (Mahajan, 2018).

6.1.1 **Blockchain Versus Distributed Ledger Technology**

The terms blockchain and distributed ledger technology are often used interchangeably. According to the Bank for International Settlements (BIS):

> Distributed ledger technology (DLT) refers to the processes and related technologies that enable participating computers (nodes) in a network or arrangement to securely propose, validate and record state changes to a synchronised ledger that is distributed across the network's nodes (BIS, 2017).

The Reserve Bank of New Zealand states: "blockchain is a specific instance of DLT with certain characteristics that make it highly resilient to cyber-attacks" (Fujii-Rajani, 2018).

6.1.2 Blockchain Types

According to the WTO, there are three categories of blockchain: public, private and managed, (Ganne, 2018) whereas Miranda defines these as public, private and permissioned (Miranda, 2018) and Van Lennep as public, private and consortium (van Lennep, 2018). These types can also be classified as permissioned or permissionless, which refers to whom the blockchain is available and who can read and write to it (Ganne, 2018).

6.1.3 Blockchain Functionality

Blockchain consists of a continuously growing 'chain' of 'blocks' of information that exist in the form of a distributed digital ledger database. A block can contain records of transactions, such as with digital assets, or other information. Once a record has been validated and verified, a new block of data is added to the chain of blocks in a chronologically linear fashion. A block consists of a hash of the previous block header, its own block header that contains hashes of the transactions within itself and the transactions or data that is contained within the block (Bogdanov et al., 2018).

There are two core technologies within blockchain, the first is the hash pointers which are used to link blocks of transactions. These provide security as tampering with the transaction data in past blocks alters the tampered block's hash value and corrupts the link between the blocks. The other technology is the public key infrastructure. It establishes the identities of the involved parties and relies on the use of private keys for provision of digital signatures and data encryption (Bacon et al., 2018).

Blockchain exists as a ledger distributed via nodes. The nodes are arranged in a peer-to-peer network accessed in either a public fashion, like the internet, or in a private or permissioned manner, such as a company intranet. Rather than rely on standard intermediaries for maintaining trust amongst the participants, blockchain uses code, community, connectivity and collaboration (the 4 Cs) (Fenwick & Vermeulen, 2019). The nodes are synchronised using a special protocol known as consensus (Bogdanov et al., 2018). Unlike traditional databases that operate in fully trusted environments, blockchain systems do not assume the nodes trust one another. This means they are Byzantine fault tolerant (Dinh et al., 2017).

A blockchain is essentially a replicated state machine system wherein all nodes are designed to maintain the same data. This is contrary to other multi-node database systems that partition (shard) data across the various nodes for the purpose of lowering computing cost and faster transaction processing. What blockchain and traditional databases have in common is both require ACID (atomicity, consistency, isolation and durability) semantics (Dinh et al., 2017).

In the case of the first blockchain network, Bitcoin, its novelty was it is a peer-to-peer payment network that eliminates reliance on Trusted Third Parties (TTP) to eliminate the problem of double-spending assets. This is achieved by the transfer of funds directly between any two parties and is a realisation of Satoshi Nakamoto's vision of capitalism where distribution is superior to redistribution. All of this can be completed by means of a mobile device without a bank acting as intermediary (van Lennep, 2018).

6.1.4 Blockchain Architecture

The architecture of a block is similar to that of the Transmission Control Protocol (TCP) packets, see Figure 6.1, which are used for transporting data across the internet. Both have metadata fields that hold data about the actual data within the packet or block and how it relates to the other blocks or packets of data within the system.

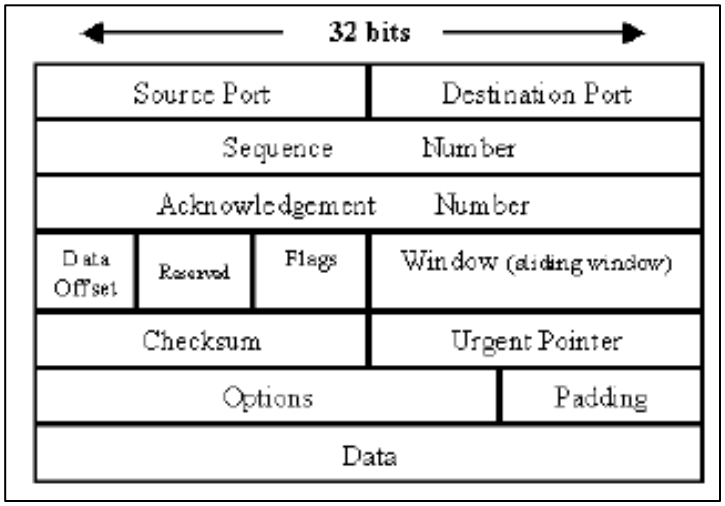


Figure 6.1 Illustration of a TCP Packet

(Mullins, 2001)

Both also consist of autonomous building blocks whose structure can be endlessly replicated and is designed to function seamlessly with other similar structures in the flow of data, see Figure 6.2. They are akin to a modern version of the standardisation and usage of interchangeable parts that was a cornerstone of the industrial revolution. Zakhary, et al. consider the blockchain model to be similar in nature to an object-oriented programming language (OOPL), as both have primitive data types and primitive functions. Examples of what constitutes a primitive data type in blockchain would be items such as assets and asset ownership, whereas asset transfer between owners would be an example of a blockchain primitive function. What would be defined as a class in an OOPL exists in the blockchain in the form of smart contracts (Zakhary et al., 2019).

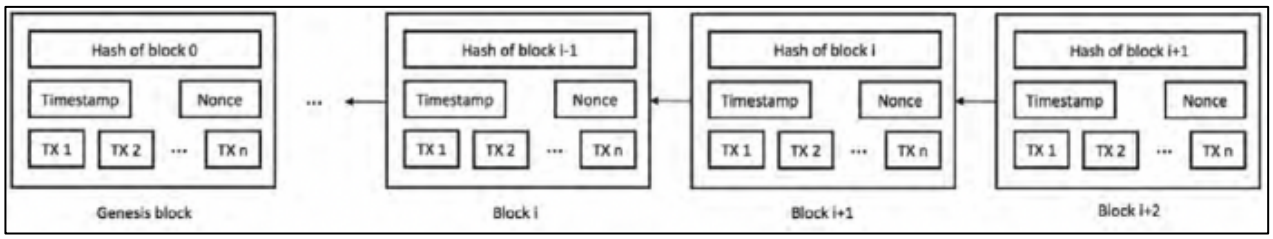


Figure 6.2 Illustration of a Blockchain

(van Lennep, 2018)

6.1.5 **Nonce and the Hash**

Also like the structure of a data packet on the internet, a block within blockchain contains a header, like a letter or invoice, containing its metadata. Within this is the nonce, an abbreviation for 'number used only once', see Figure 6.3. It is an arbitrary four byte string of numbers used in calculating consensus amongst the blockchain's participants and for adding additional blocks to the chain (Asolo, 2018).

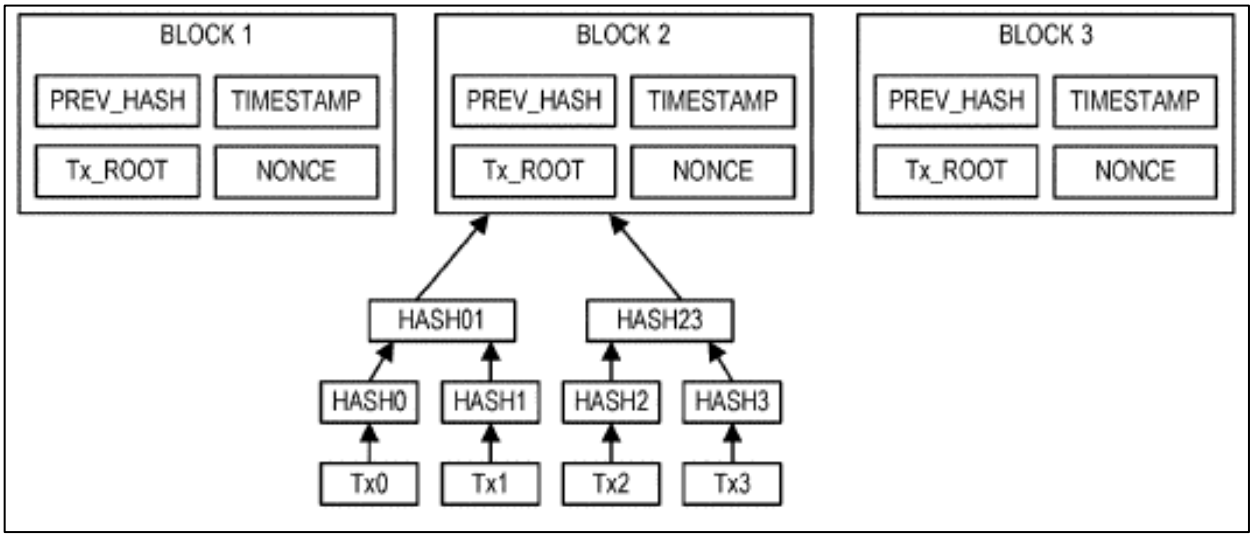


Figure 6.3 Illustration of a Block within the Blockchain

(Peffers & Gulley, 2019)

The hash is a mathematical function that creates an encrypted code based on the information within the block. This means if single character within the block is modified, the hash value for that block - and all subsequent blocks built upon that block - changes. The function is deterministic; the hashed contents of a particular block will always produce the exact same value unless data within the block is modified, like how checksums are used in standard relational database management systems (RDBMS) to prevent unauthorised data changes. The hash value of the previous block is appended to

the nonce. This value is then hashed. Should the new hash have a value equal to or less than the value of the target hash, it is accepted as the correct solution. This results in the miner being rewarded for their work and addition of the block to the blockchain (Frankenfeld, 2019).

6.1.6 **The Merkle**

The merkle root is an amalgamation of hashes within a block. Blocks contain a multitude of transactions; there is a hash value for each. The merkle root is a hashing of the multiple transaction level hash values in a block; it is a metahash. (Kenton, 2020). The merkle root values are stored in the hash tree or merkle tree, which is an indexing of the hashes, see Figure 6.4. This means there is not actually a sequential order of data within a block itself. Rather the data is stored in a tree-like structure, similar to the tree and forest architecture style of internet/intranet domains. The merkle root and merkle tree provide the functionality of acting as a signature of the transactions within a block and also enable nodes to verify transactions within any particular block without having to fully access the information within that block. (Carr, 2017; Kenton, 2020).

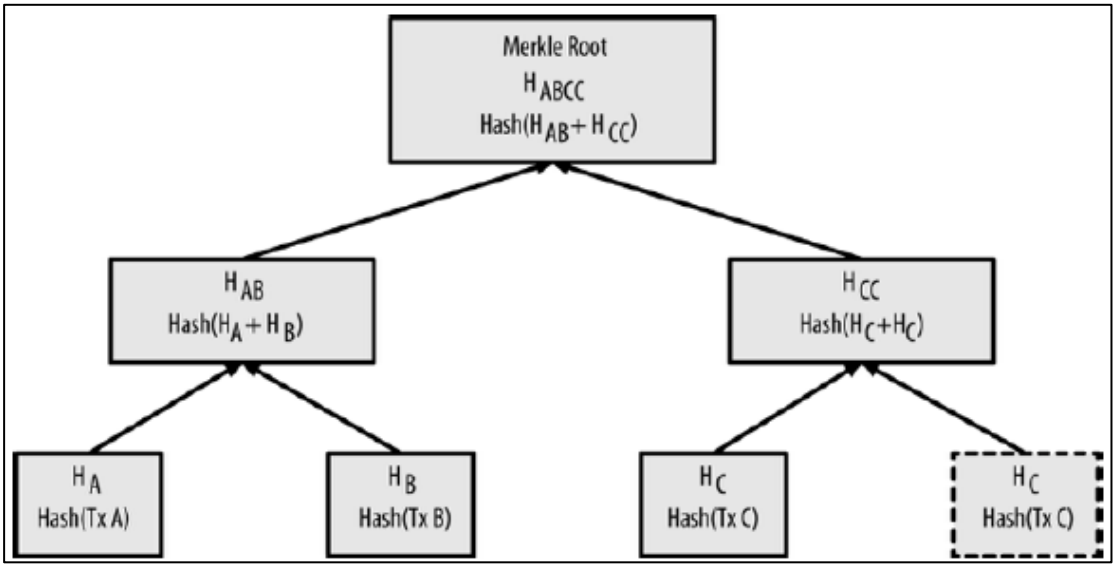


Figure 6.4 Illustration of a Merkle Tree

(Carr, 2017)

Transaction verification by means of merkle technology relies on the use of the light and heavyweight model for peer production within the node system. This model enables micro-participation from a multitude of lightly invested individuals within a virtual community model. The virtual community consists of a committed set of connected members who are strongly connected (Haythornethwaite, 2009). Lightweight peers contact full peers to request the merkle path for a transaction as shown in Figure 6.5. The full peer provides a list of the hashes leading to that

particular transaction. To determine if the transaction is valid, the lightweight peer then 'hashes' through the path by beginning at transaction level and working to the root. The use of lightweight and full peer systems is compatible with private or centralised types of blockchain (Carr, 2017)

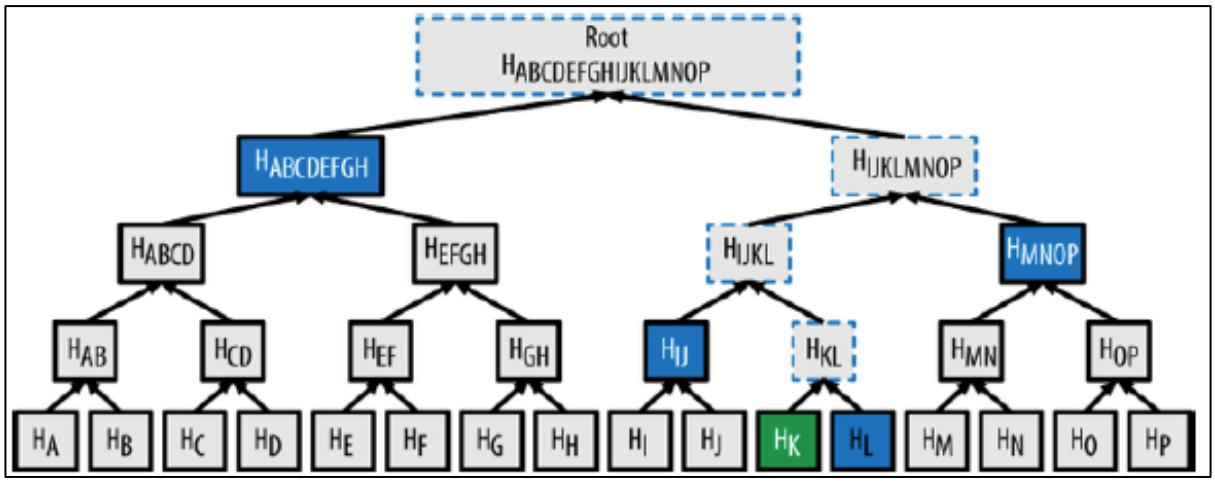


Figure 6.5 Illustration of a Merkle Path

(Carr, 2017)

6.2 Layers of the Blockchain

Blockchain consists of four layers, known as the full stack. The hierarchy of these from the bottom up consists of:

Physical Nodes – This is the peer-to-peer (P2P) network of miners. It is presumed to be fully decentralised; this is not always true, as miners using application-specific integrated chips (ASIC) or mining pools are effectively centralising computing power.

Platform Software – This layer of software is where consensus programs and smart contract runtimes exist. The runtime environment is the configuration of software, hardware, runtime engines and system software. This layer is also referred to as the consensus layer.

Smart Contract – Also known as decentralised applications. These are the actual programs and functions that execute the transactions a blockchain is set up to process.

Client – This layer is the gateway for end user input and output that interacts with the blockchain users via an API.

(Chu & Wang, 2018; Dinh et al., 2017).

6.3 Types of Blockchain

6.3.1 **Public Blockchain**

A public blockchain consists of a distributed platform open in nature; its fundamental characteristic is no specific entity manages the platform (Ganne, 2018). Anyone can store a copy of the ledger and create a new node on the chain. With cryptocurrencies, these nodes contribute to the process of adding new blocks by means of transaction verification, also known as mining. Access is open/permissionless and anyone can join. Because the database is public, anyone can see the transactions within the blockchain and also store a copy of the ledger (Bacon et al., 2018). These types of blockchain are theoretically uncontrolled and rely on cryptographic methods, normally either proof-of-work or proof-of-stake, to provide security (van Lennep, 2018).

Public blockchains provide resilience and integrity as the failure of one node does not prevent the network from functioning and it is very difficult to simultaneously tamper with multiple nodes of the database. As anyone can view the transactions and users are identified by only their public key and address, public blockchains provide both transparency and privacy. Because a public blockchain consists of countless numbers of nodes which need to remain synchronised, much effort is required for providing consensus. This has the disadvantage of increased transaction time (Bacon et al., 2018).

6.3.2 **Managed/Permissioned/Consortium Blockchain**

Hybrid versions of blockchain rely on a predetermined group of users for providing security by giving certain nodes greater administrative capabilities on the network, similar to a shared folder on a network drive where certain members only have read privileges and others have additional privileges, such as write, delete, rename, etc. They are a cross between public and private blockchains. Public blockchain requires complete consensus amongst all members, which is a time consuming and arduous task. Permissioned types of blockchain provide greater processing efficiencies by eliminating the requirement for complete consensus (van Lennep, 2018).

6.3.3 **Private Blockchain**

A private blockchain is a centralised platform. Only users given permission are allowed to use the system and the database is private. These systems rely on either TTPs or trusted nodes for the purposes of ledger storage, creation of new blocks and user administration (Bacon et al., 2018). Either a single entity or a consortium controls the blockchain (Ganne, 2018). This structure of blockchain diverges from the classic blockchain definition as it is not solely reliant on the use of protocol for establishing trust and still requires an outside mechanism or status. Private or

permissioned blockchain systems are the most efficient, as it is not necessary for users to satisfy either proof-of-work or proof-of-stake requirements to authenticate transactions.

6.4 Blockchain and Trust

Implementation of a private or permissioned blockchain requires users to place trust in the system administrators for ledger security and system functionality. Because trust is restricted, these systems do not require resource intensive consensus protocols to add blocks to the chain. This means they are more able to process large numbers of transactions and are potentially scalable (Bacon et al., 2018). They also have the advantage of being able to amend and modify balances and do not provide the anonymity associated with public blockchains, meaning all parties validating transactions are known and can be held liable for their actions (van Lennep, 2018).

The difference between public and private/permissioned blockchain systems is the concentration of trust. In open systems, trust is divided equally amongst all participants. Closed systems centralise trust by creating a hierarchy of users. With public blockchains, trust is provided by the nodes of the blockchain by means of algorithmic consensus. Should the data in a block be altered, this causes its hash value, and the hash values of all subsequent blocks to become invalid, thus breaking the chain and exposing the illicit activity. This means the transactions themselves are the source of trust, rather than a central authority (van Lennep, 2018). Elimination of the need for trust in a central party and its cost is what makes blockchain so appealing for business purposes and which threatens the dominance of banks and other TTPs.

6.4.1 **Zero-Knowledge Proofs**

In order to provide trust between unknown parties, blockchain relies on mathematical algorithms. A zero-knowledge proof (ZKP) is a group of mathematical algorithms used to prove a secret bit of information, such as a fact or user's identity, without having to reveal the secret. The parties included are the verifier (who desires the information to be proved) and the prover (the information's owner). The prover uses a ZKP to prove to the verifier the information is true without having to confirm the process used for verification (Samuel & Kinsky, 2019). ZKPs were first conceptualised in 1989 by Goldwasser, Micali and Rackoff, who stated:

> Zero-knowledge proofs are defined as those proofs that convey no additional knowledge other than the correctness of the proposition in question (Goldwasser et al., 1989).

ZKPs are relevant to documenting transactions as they enable them to be processed without having to reveal any sensitive information; any parties who have not been classified as valid by a ZKP can

only see the transaction as being deemed valid and do not have access to any additional information about the transaction (Miranda, 2018). The primary benefit of a ZKP is the ability to eliminate the need for trust in any one participant as trust is placed in the ZKP. The use of ZKP protocol is not without problems. They require large amounts of interactions between nodes for establishing validity, as they use a type of regression analysis for determining trust, which equates to greater computational cost and increased transaction size (Yang et al., 2016).

Several variations of ZKPs exist. Ingenious as they are, reliance on algorithms for validating transactions instead of TTPs is an expensive endeavour due to the amount of time and processing power it takes. According to Gilbert, the average verification time for a single transaction on the Bitcoin network is 43 minutes. In comparison, the Visa payment system processes an average of 2,000 transactions per second and can scale up to 56,000 transactions per second when required. This has caused Bitcoin to experience bottlenecks of up to 40,000 transactions awaiting validation (Gilbert, 2016).

This is the fundamental problem with fully public, decentralised blockchains – they are too slow to be a practical alternative to the systems already in place. Transaction processing time is not public blockchain's only problem. The way in which a public blockchain reaches consensus and appends new blocks to the chain also uses an incredible amount of energy.

6.4.2 **Proof-of-Work**

The most common means for determining consensus in blockchain is known as proof-of-work (PoW). It was conceived by Dwork and Naor as a means for the prevention of spam emails by making them economically unviable (Rückeshäuser, 2017). In their paper *Pricing via Processing or Combatting Junk Mail* they state:

> The main idea is to require a user to compute a moderately hard, but not intractable, function in order to gain access to the resource, thus preventing frivolous use (Dwork & Naor, 1993).

Around 90% of public blockchain systems use some form of PoW protocol (Dinh et al., 2017). Because computation of the function requires time and processing power, it acts as a deterrent to attacks. Once the function has been calculated, users (nodes) must then submit their answer, which must be agreed on by other nodes in the network. When a majority of nodes are in agreement, the block is deemed valid and is committed to the chain (Sims et al., 2018). PoW as a means of determining consensus has an inherent weakness, known as a 51 percent attack. These attacks are possible when an individual or group control a majority of the computational power (hashrate) on

the blockchain network. This majority gives them the ability to approve which transactions are processed into the blockchain. They gain financially by mining a disproportionate amount of blocks, commit blocks that contain fraudulent information or double-spend cryptocurrencies (DeSilva, 2019; Sims et al., 2018).

6.4.3 **Proof-of-Stake**

One solution to the problems posed by the use of PoW is proof-of-stake (PoS). This method for achieving consensus is based on proof of ownership, which uses the concept of 'coin-age'. This is defined as currency amount (coin) times holding period (age). For example, if a person receives 100 coins and holds them for 5 days, they will have accrued a coin-age value of 500. Spending coins on a cryptocurrency network using PoS consumes the coin-age that had been acquired (King & Nadal, 2012). Using PoS, a block generator must first win a contract in order to gain the ability to build a block. This is achieved by having miners deposit stake into a contract; the amount of chance they have is proportional to the amount of stake deposited. Should a participant misbehave in the process of building the block, the amount of stake they have wagered is taken from them as a penalty for their misbehaviour (Chu & Wang, 2018).

Unlike PoW, PoS cannot be easily forged because the system is only presumed secure when at least 51% of the network is controlled by good nodes (King & Nadal, 2012). What is uncertain is how cost basis for coins is determined, such as in first in, first out or are a user's coins given a weighted average? This method of consensus is used as an alternative to providing trust from outside of the blockchain network. One variation of PoS that can be used for accelerating the consensus protocol is Delegated-Proof-of-Stake (DPoS). With DPoS miners delegate their mining capabilities to another miner, thereby reducing the number of miners needed for achieving consensus; it is a move towards centralisation of the consensus protocol (Chu & Wang, 2018).

A private network could also use PoS to allocate trust ratings to specific users. One example would be a blockchain banking network that gives a central reserve bank full authority for transaction approval, whereas regional branches of the system must have a majority consensus to do the same. PoS presents a real alternative for blockchain to function in a manner that does not need to devote any more of its resources towards validation than is necessary.

6.4.4 **Other Consensus Mechanisms**

There are various other types of consensus protocol, such as: hashgraph, proof-of-burn, proof-of-activity, proof of elapsed time and proof-of-capacity. All have the same objective of maintaining a

single version of the truth whilst simultaneously thwarting fork attempts that allow the ledger to be inappropriately manipulated by cyber mercenaries (Tiwari & Batra, 2019).

In addition to the demarcation between public and private blockchain platforms there also exists a distinction between how and where validation occurs. Just as blockchain can exist in either a centralised or decentralised form, so too can the location of the consensus mechanism, see Table 6.1. (Rückeshäuser, 2017). As shown, a variety of methods and degrees of centralisation for transaction validation exist and the technology is constantly evolving. Depending on the business case, users will have different requirements for how consensus is achieved and the level of security required. From a business perspective, the ultimate goal is a blockchain system that provides the same or superior benefits as current systems with lower operational costs.

Table 6.1 Distributed Consensus Mechanisms

	Public Distributed Ledger	**Private Distributed Ledger**
Decentralised Validation	Proof-of-Work Proof-of-Stake Proof-of-Work Based Derivatives Federated Byzantine Agreement	Proof-of-Work Proof-of-Stake Delegated Proof-of-Stake Proof-of-Work Based Derivatives Federated Byzantine Agreement
Centralised Validation	Delegated Proof-of-Stake	Redundant Byzantine Fault Tolerance RAFT Consensus and Derivatives Paxos Ripple Consensus Bilateral Node-to-Node Consensus Delegated Proof-of-Stake

(Rückeshäuser, 2017)

6.4.5 Instances of Blockchain Fraud

Shortly after its 2016 launch, Ethereum's decentralized autonomous organization was victim of an attack that stole millions of dollars of assets and led to its collapse. The reason for this was not the Ethereum blockchain technology, but rather a programming loophole in the smart contracts within the system that allowed escrow accounts to accept withdrawals (Ganne, 2018). The solution to this hack was for the currency to be 'forked' – meaning it was divided into two new cryptocurrencies. Bitcoin Gold also suffered a 51% attack in May of 2018 (DeSilva, 2019).

Open blockchain systems are vulnerable to fraud if a single organisation or user controls more than 50% of the processing power (hashrate) of a blockchain. It is difficult to perpetrate, but as the cases of Ethereum and Bitcoin Gold show, not impossible. Once majority control is achieved, the user can determine the sequence of transaction processing so they can commit simple fraud, known as selfish mining, by earning rewards through committing their mined blocks to the chain, as well as being able to double-spend funds by means of altering the blockchain. One of the key indicators that someone is selfish mining is that the blocks they are committing to the chain are empty and contain no transactions (DeSilva, 2019; Fujii-Rajani, 2018). With this type of fraud it is the autonomous nature of public blockchains that makes it possible.

6.5 Blockchain Disadvantages

6.5.1 **Interoperability**

One of the biggest challenges facing blockchain is that there is at present absolutely no interoperability across the different ledgers. As of 2019, no turnkey software solution was available (Kesharwani et al., 2019). Chapter 7 will research how that is no longer the situation.

6.5.2 **Scalability**

In *The Curses of Blockchain Decentralization*, Chu and Wang define the problems with decentralization, as shown in Figure 6.6:

1. In the physical layer, the assumption of decentralization of mining power does not hold since the real-world mining power distribution is highly skewed.
2. In the platform software layer, decentralization causes inherent scalability problems of transaction throughput. They proved a low upper bound of transaction throughput of decentralized blockchains, which is independent of the choices of specific protocols.
3. In the smart contract layer, current decentralized blockchains do not allow for fully replicated execution and sequential programming models, which prevent scaling the smart contract execution

   (Chu & Wang, 2018).

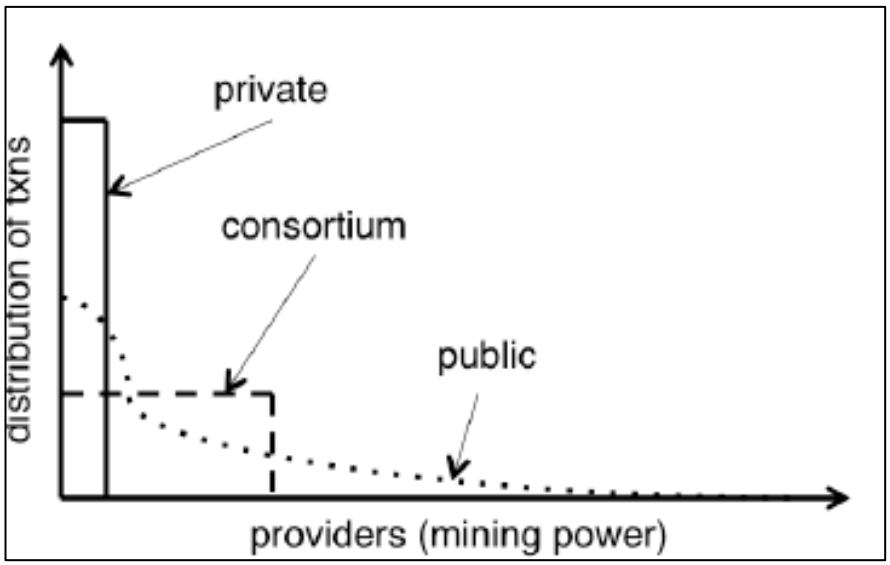


Figure 6.6 Cumulative Distributions of the Number of Transactions by Providers

(Chu & Wang, 2018)

Chu and Wang's conclusion in their assessment of decentralised blockchains was distribution of mining power is skewed. Decentralised blockchains have an inherent conflict between decentralisation and scalability (Chu & Wang, 2018).

6.5.3 **Analysis and Storage Capabilities**

Data stored on the blockchain is done based on transactions. This means that a blockchain database does not enable the querying of data, such as with RDBMS architectures like SQL Server or Oracle Database. Transaction IDs are needed instead for finding data on the blockchain (Marx, 2020). Blockchain is also limited in the amount of data any one block can hold. For Bitcoin, this limit is 1 megabyte. Ethereum has no restriction on block size but is instead bound by the miner determined 'block gas limit'. The average Ethereum block size as of 2018 was around 20-30 kilobytes (ETH Gas Station, 2019; Tarasenko, 2020).

There is a trade-off between block size and processing time – either a system uses smaller blocks that process more quickly or large blocks that take longer to process. Public blockchain systems also charge a fee for accessing information. A 2017 estimate placed a price of $2 on downloading 1 kilobyte of data; this would make the cost of downloading a 5 gigabyte file, such as a film, be more than $10 million (Tarasenko, 2020).

6.5.4 **Energy Consumption**

Due to the decentralised nature of blockchain, the cost of having trust provided by a non-hierarchical network comes in the form of electricity usage. Creation of one new Bitcoin requires around 5-7 kilowatts of energy (IBM, 2018). In relation to the Bitcoin network as a whole, the cost was calculated by de Vries to be a minimum of 2.55 gigawatts of electricity with a future potential to be as high as 7.67 gigawatts. Extrapolating this rate means as of 2018 the cost of processing Bitcoin financial transactions was on par with the electricity consumption of a country of between five to eight million people, or the respective populations of Ireland and Austria (de Vries, 2018).

As of March 2018, the Bitcoin network was estimated to perform around 26 quintillion hashing operations per second, but to process only two or three financial transactions in that same amount of time and around 200,000 transactions total per day. At that time Bitcoin had around 10,000 nodes. What was not known in those calculations was how many machines comprised a single node. A hashrate of 14 terahashes, per second could be computed by a single, mining specific machine like an Antminer S9, which consumes 1,372 watts of power, or a much more inefficient setup, like a cluster of gaming consoles, like the Sony Playstation 3, which could consume as much as 40 megawatts of power (de Vries, 2018).

6.5.5 **Mischief**

Blockchain systems can contain any type of data uploaded. Because the data is immutable, whatever is input to the blockchain remains there permanently, meaning inappropriate content is unable to be removed. An analysis of Bitcoin found the following:

> Although most data originates from benign extensions to Bitcoin's protocol, our analysis reveals more than 1600 files on the blockchain, over 99% of which are texts or images. Among these files there is clearly objectionable content such as links to child pornography, which is distributed to all Bitcoin participants (Matzutt et al., 2018).

This issue could cause organisations reputational damage or expose them to legal action if the data is personal or proprietary in nature. A solution would be the ability to amend the blockchain so that inappropriate content could be removed. As noted in Chapter 5, a permissioned, editable incarnation of the blockchain that relies on outside parties to provide trust is in development and would remedy this problem. This solution directly contradicts one of the core characteristics of blockchain - immutability (Lumb et al., 2016; Miranda, 2018).

6.5.6 **Blockchain and GDPR**

As covered in Chapter 4, GDPR is a binding EU and UK regulation giving individuals control over their personal data (Seventko, 2019). Under GDPR, an individual has the right to have their data erased. Regarding blockchain, this means organizations would need to maintain an off-chain system in parallel, thereby undermining the blockchain's role as a central ledger of information. One solution might be to have anonymous information stored on the blockchain with a link or key to the personal information in a second system. Should an individual request deletion of their data, the elimination of the key could be used as a means to erase data. This is a complication that makes implementation of a blockchain system cumbersome. Miranda concluded this would not be insufficient for GDPR compliance, as it would fall within the realm of pseudonymity and not anonymity (Miranda, 2018). Another solution could be the use of encryption, but that would then mean having to also store a record of the encryption keys or the storing of hashes of data on the blockchain and the use of a second off-chain database (Marx, 2020).

Recent patent applications indicate a solution to the use of blockchain in a GDPR compliant manner could be forthcoming, such as one for *Anonymous Consent and Data Sharing on a Blockchain* by IBM (Jayachandran et al., 2019) or the patent application in Chapter 5 by Accenture for a *Distributed Key Secret for Rewritable Blockchain* (Ateniese et al., 2018). What is certain is a problem exists regarding the immutability provided by blockchain and major organisations are working on a solution. However, those solutions will only be available to the users of that specific blockchain platform.

6.5.7 **Whose Version of the Truth?**

As introduced in Chapter 5, companies are looking to use blockchain for employment and education verification. One company is ResourceVerified, who have applied for a patent for similar technology. They state that they are providing a solution for the problem of candidates altering their resumes/CVs to meet the requirements of an advertised job so as to, "mask any deficiencies or inflate achievements " and their product will, "actually create a true record of events, past and present" (Randhawa, 2018). ResourceVerified's desire is to create a full profile of persons, as shown in Figure 6.7. According to their website, their business model for the financial services industry includes the collection of an individual's social media insights and a historical perspective thereof (ResourceVerified, 2020).

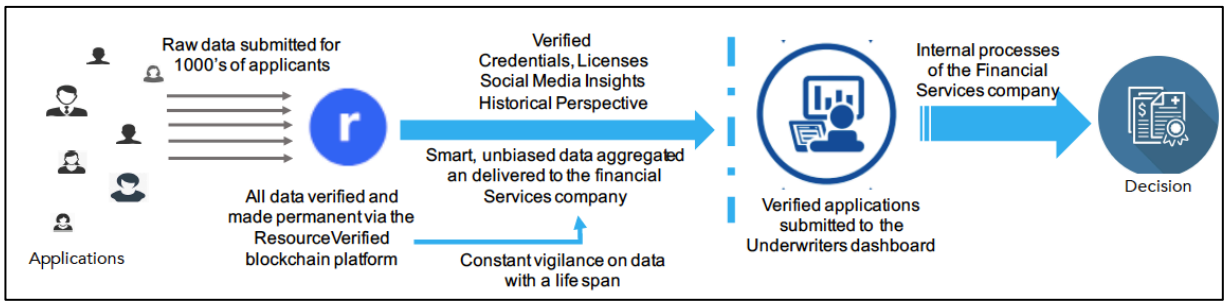


Figure 6.7 ResourceVerified's Business Model

(ResourceVerified, 2020)

The issue with ResourceVerified's business model is they want to create a central information hub of any information they can collect on a person. Their goal is a central register that will be superior to an individual's own record of their employment, education and experiences. It can be presumed that the more information they can collect on a person, the better. They want to use individuals' personal data for their own profit.

There are many legal activities - some innocuous, others more contentious - which a person might engage in on their own time that could be viewed with either admiration or derision depending on the opinions of the observer. Consider information about one's hobbies, opinions or demography that might be available via social media. These could be subjectively viewed as beholder chooses, which makes storing of a person's personal data in conjunction with their employment record controversial.

Modern recruitment is reliant on CVs being scanned for key words by an automated pre-screening process and is likely not even initially seen by an actual person. Thus, it is common for persons to tailor their CV so it will pass the initial rounds of automated assessment. This is not an alteration of the basic facts; it is an adjustment for the benefit of both the recruiter and prospective employee so that they are speaking using equal terms.

Language can be broad or narrow in scope. If an employer can have the levity to describe the requirements for an advertised position in general terms, then it is not unacceptable for candidates to also describe their background in a manner in a manner befitting the description given for the job on hand. Times change, language changes and terminology quickly falls out of favour. Buzz words, such as 'cyber' or 'solutions' are at first indicative something is fresh and new and then later on come to mean just the opposite. Jobs previously described as garbagemen and mailmen are now labelled as sanitation engineers and postal carriers. This is not only due to societal changes, but also

to the fact their responsibilities have also changed. Accountability, use of technology and continued professional development are now aspects of most roles.

Most of all, people change, as does their realisation of the previous duties they have performed. The job description any employee is formally assigned and the full scope of duties actually performed by them unbeknownst to the human resources department may also be very different. It is customary for junior persons to assume the role of their superiors in their absence. It is also common for employers to provide little information beyond employment dates of previous employees for good reason – it is their version of the past. Provision of additional information exposes them to litigation from former employees.

As with any ended relationship, former employers have no desire to keep devoting resources to the past. For these reasons even basic personal information could become disputable. People have a right to a certain level of privacy. A major conflict exists between the provisions of GDPR and any business model centred on consolidation of an individual's personal and professional information in an immutable blockchain.

6.6 Blockchain Advantages

6.6.1 **Transparency & Auditability**

With blockchain, all parties involved in a transaction stand to benefit due to the transparency, real-time tracking and security provided. It can also reduce human error and transaction completion cycles measured in minutes instead of days (Commbank, 2016). This means auditing can be a more expedient process.

6.6.2 **Storage Capabilities**

Blockchain systems are limited in the amount data they can hold in a particular block; for financial records this is generally not an impediment, as most transactions do not contain an excessive amount of data. If a transaction exceeds the block size limit, it can be fragmented across two blocks (Tarasenko, 2020). If blockchain size limit is an issue, there are other alternatives to data fragmentation, such as storing only the hash of a transaction and storing the actual data itself off-chain in a standard database or other filing system. The downside to this is the loss of a unified record and transparency. Another solution is to store a hash and a subset of the data on the blockchain and the full record off-chain (Marx, 2020).

6.6.3 **Immutability**

The inability for data in a blockchain to be modified is known as immutability; it is the defining attribute of blockchain (Tilooby, 2018). When there is a lack of confidence in performance reports, such as with asset administration, the process of maintaining a second, parallel ledger known as 'shadow bookkeeping' is used. The use of a centralised blockchain ledger renders this process redundant through the immutability it provides, as no party can go back and make nefarious amendments. ISAE 3402 (International Standard on Assurance Engagements) and SSAE-18 (Statement on Standards for Attestation Engagements) are in place as assurance that service organisations have adequate internal controls. With the use of blockchain, organisations are able to demonstrate they are in compliance with these regulations regarding accurate documentation of transactions and prevention of malfeasance (Miranda, 2018).

Use of blockchain also means shipment information can easily be tracked so distributors and manufacturers know accurate trade levels in regard to volume rebates. This is because the parties will have real-time access to information of how many units have been sold in a territory. Having the information stored in an immutable blockchain prevents a distributor from altering the data so as to include sales from outside the territory. Were a dispute to arise, sales information is immediately available, thereby potentially avoiding costs of litigation (Kesharwani et al., 2019).

6.7 Cryptocurrency

6.7.1 **Cryptocurrency Market Capitalisation**

Cryptocurrency receives much attention from being the first real world application of blockchain technology and the threat it poses to the concept of fiat currency and the authority of central banks to control the money supply. As shown in Table 6.2, as of December 2020, total market capitalisation for all cryptocurrencies was $719.69 billion; 80.67% of this was the top two, 69% was Bitcoin alone (CoinMarketCap, 2020).

Table 6.2 Cryptocurrency Market Capitalisation – December 2020

Cryptocurrency	Market Capitalisation	Percentage of Total
Bitcoin	$497,444,389,103	69.11%
Ethereum	$83,232,825,035	11.56%
TOTAL	$620,057,405,709	80.67%

(CoinMarketCap, 2020)

These figures need to be compared in relation to the total value of money and assets in the world economy. As of November 2020, the value of the global equity markets was $95 trillion. Its high at the beginning of 2020 was approximately $90 trillion, its low in April was around $62 trillion, due to the effects of the pandemic (DeCambre, 2020).

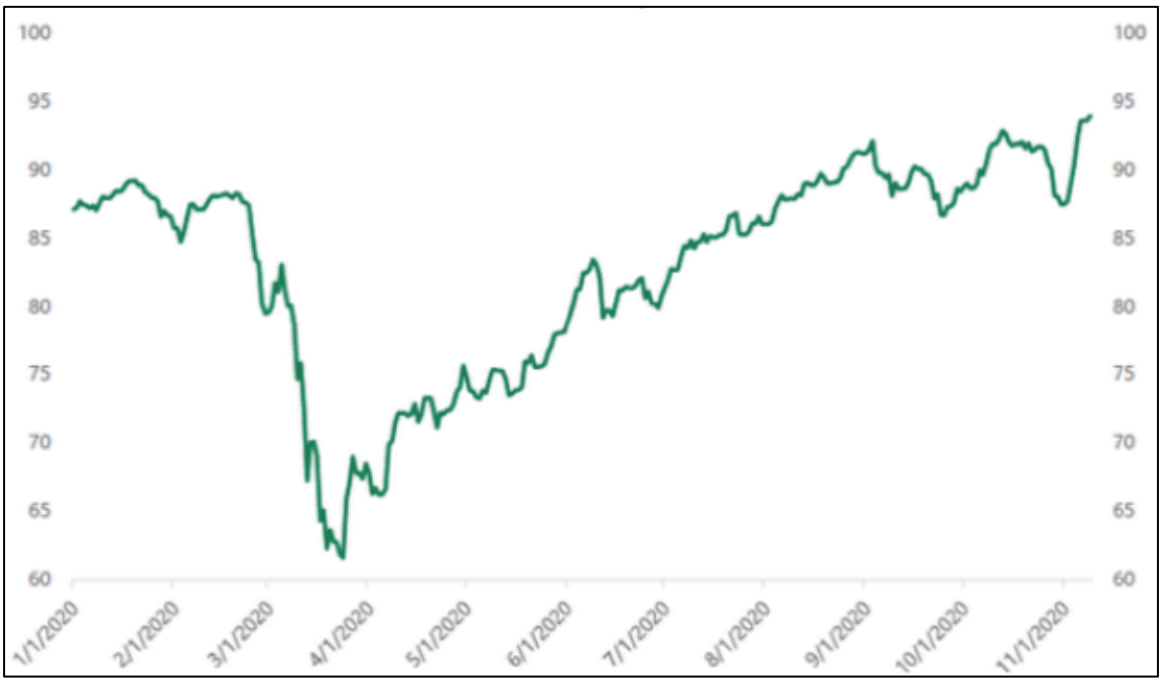


Figure 6.8 Global Stock Market Capitalisation to November 2020 ($ trillions)

(DeCambre, 2020)

In May, 2020, the cryptocurrency market was valued at $244 billion, which when compared to its November, 2020 value equated to a 195% growth of the market in just six months (CoinMarketCap, 2020). It experienced a surge of interest as a store of value in the financially uncertain times brought on by the pandemic. This must be considered in respect of the value of other asset classes versus its recent performance as a distinct asset class.

As of May, 2020 there were $6.6 trillion worth of coins and banknotes in circulation. Narrow money (M1) was valued at $35.2 trillion, broad money (M2, which includes M1) was $95.7 trillion. The values of the global markets were: equity of $89.5 trillion, debt of $253 trillion, real estate $280.6 trillion and wealth at $360.6 trillion. The gross value of the derivatives market was at $11.6 trillion with a notional value somewhere between $558.5 trillion to $1.0 quadrillion. The disparity for derivatives is the low end value is based on the BIS valuation for OTC derivatives and the high end valuation is an unofficial number including non-OTC derivatives which do not meet standard clearing

requirements (Desjardins, 2020). In regard to other asset classes, the cryptocurrency market's value is minimal.

As shown in Figure 6.9, the previous high for the cryptocurrency market was on January 6th, 2018, at $796 billion (CoinMarketCap, 2020). As shown in Table 6.3, at that time Bitcoin constituted 33.39% of the market. Comparing the graphs in Figure 6.9 and Figure 6.10 shows how the rise in the cryptocurrency market in 2020 was isolated to Bitcoin. With Bitcoin excluded the cryptocurrency market value was around $200 billion.

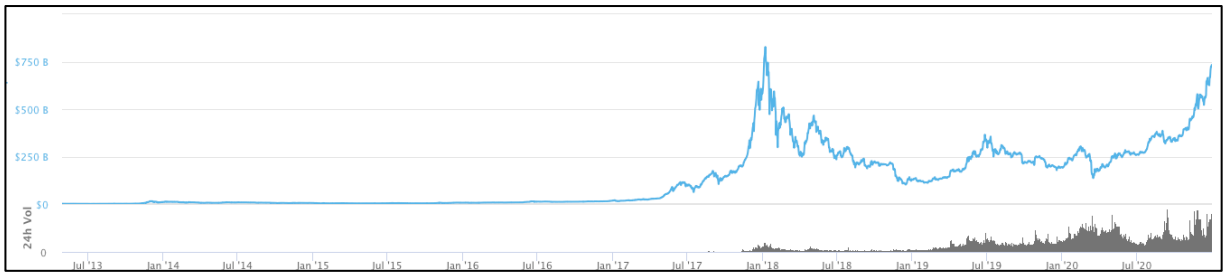


Figure 6.9 Cryptocurrency Total Market Capitalisation 29/04/2013 - 30/12/2020

(CoinMarketCap, 2020)

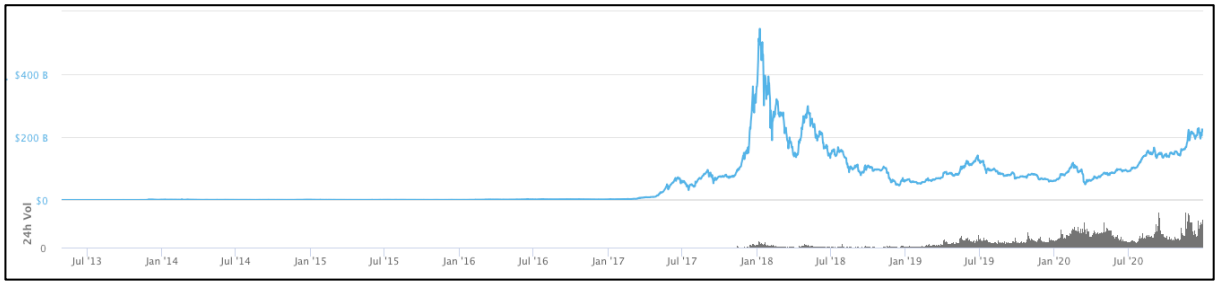


Figure 6.10 Cryptocurrency Total Market Capitalisation – Excluding Bitcoin 29/04/2013 – 30/12/2020

(CoinMarketCap, 2020)

Table 6.3 Cryptocurrency Market Share - January 8th, 2018

Cryptocurrency	Market Share
Bitcoin	33.39%
Others	26.19%
XRP	15.73%
Ethereum	13.54%
Bitcoin Cash	5.68%
Cardano	3.13%
Litecoin	1.9%
Binance Coin	0.22%
Tether	0.18%
Chainlink	0.05%
TOTAL	100%

(CoinMarketCap, 2020)

Figure 6.11 shows the long-term market dominance of Bitcoin (orange) versus all other cryptocurrencies. Aside from Ethereum's few surges, the market's growth all along has been based on just one cryptocurrency – Bitcoin, which saw its value almost quadruple in 2020. This was presumably due to institutional investors entering the market combined with a belief stimulus packages in the US would fuel inflation (CoinMarketCap, 2020).

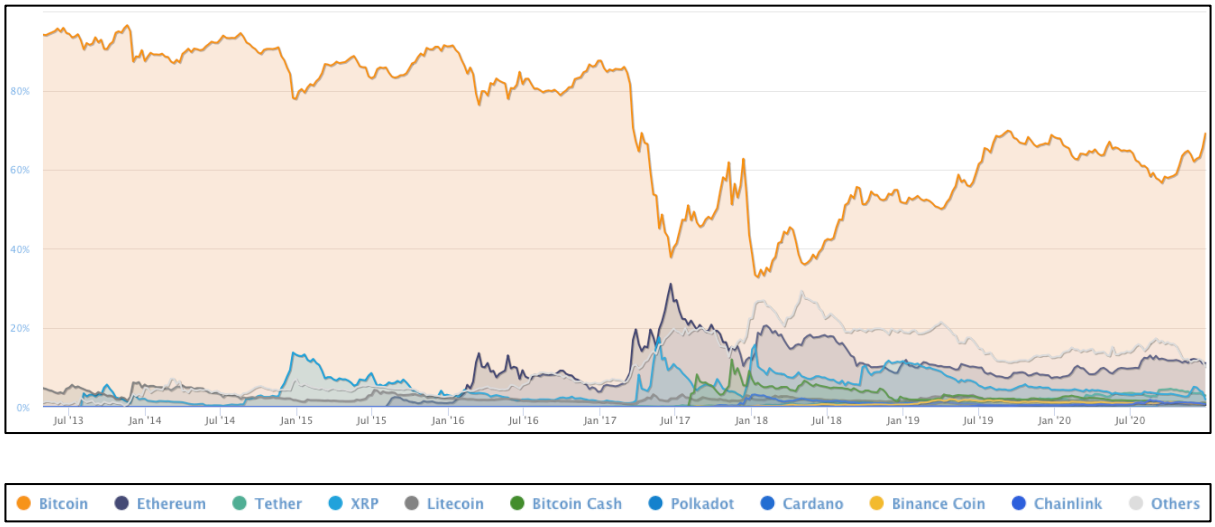


Figure 6.11 Percentage of Total Market Capitalisation (Dominance)

(CoinMarketCap, 2020)

6.7.2 Currency Versus Asset

Cryptocurrencies are monikered as a currency; two factors must be considered in determining whether or not this is true. A currency is generally considered to be a medium of exchange for goods and services accepted at face value (Frankenfeld, 2020; Kubát, 2015). Cryptocurrencies do not fit the first definition as they are not generally accepted as a form of payment. A few technology sector companies, like NordVPN, accept payment in cryptocurrency (see Figure 6.12) and Overstock.com allows payment in Bitcoin for international orders, but these are exceptions due to the companies' own interest in cryptocurrency (CoinPayments, 2021; Overstock.com, 2021).

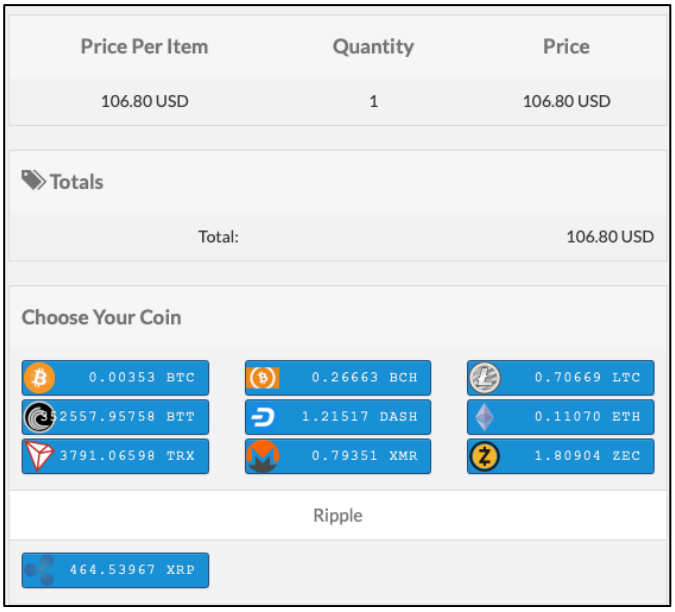


Figure 6.12 Nord VPN Cryptocurrency Payment

(CoinPayments, 2021)

There is apparently one unique financial service Bitcoin alone can perform. That is the supposed purchase of illegal goods, like drugs, offered on dark web sites such as Tom and Jerry or Brain Magic, see Figure 6.13 and Figure 6.14.

Figure 6.13 Tom and Jerry Dark Web Drug Store

(Unknown, 2021)

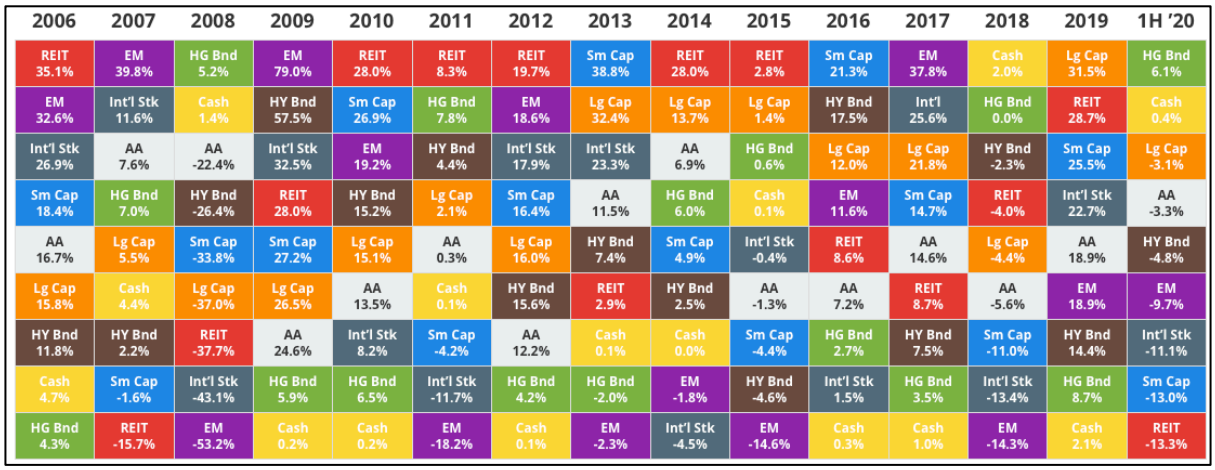
Figure 6.14 Tom and Jerry Bitcoin Checkout

(Unknown, 2021)

The second reason cryptocurrencies do not meet the definition of a currency is their volatility. With standard currencies, spending them now or in the future is the same. Inflation reduces their purchasing power over time, which is why central banks seek to prevent inflation. There is no TTP in the cryptocurrency market, whose investors desire short-term appreciation. However, long-term purchasing power is a concern. If a holder speculates the value of a currency is going to either drastically appreciate or depreciate over time, they are motivated to either hoard it or transfer its value to a more stable asset class, neither of which is the purpose of a currency.

Previous analysis found the average time for confirmation of a Bitcoin transaction is 10 minutes, but can be as high as 43 minutes (Decentralized Dog, 2020; Gilbert, 2016). Neither of those times are workable for a business with customers paying in cryptocurrency. Due to volatility and slow processing time, the amount of cryptocurrency initially contracted to spend versus its value upon completion payment will likely not be the same. Inflation happens; it is one of the inefficiencies in the market economy, but it does not happen in the time it takes to complete a purchase.

As previously illustrated, since 2017 the value of cryptocurrencies has fluctuated greatly, much like any other asset class. This is something that currencies by nature should not do. As Figure 6.15 shows, all asset classes rise and fall over the course of time, which is the rationale underlying modern portfolio theory (Gibson, 2013). Using cryptocurrency as a medium of exchange is akin to spending money in a period of hyperinflation. Currencies need to be stable to function as a medium of exchange; cryptocurrency values are not.



2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	1H '20
REIT 35.1%	EM 39.8%	HG Bnd 5.2%	EM 79.0%	REIT 28.0%	REIT 8.3%	REIT 19.7%	Sm Cap 38.8%	REIT 28.0%	REIT 2.8%	Sm Cap 21.3%	EM 37.8%	Cash 2.0%	Lg Cap 31.5%	HG Bnd 6.1%
EM 32.6%	Int'l Stk 11.6%	Cash 1.4%	HY Bnd 57.5%	Sm Cap 26.9%	HG Bnd 7.8%	EM 18.6%	Lg Cap 32.4%	Lg Cap 13.7%	Lg Cap 1.4%	HY Bnd 17.5%	Int'l 25.6%	HG Bnd 0.0%	REIT 28.7%	Cash 0.4%
Int'l Stk 26.9%	AA 7.6%	AA -22.4%	Int'l Stk 32.5%	EM 19.2%	HY Bnd 4.4%	Int'l Stk 17.9%	Int'l Stk 23.3%	AA 6.9%	HG Bnd 0.6%	Lg Cap 12.0%	Lg Cap 21.8%	HY Bnd -2.3%	Sm Cap 25.5%	Lg Cap -3.1%
Sm Cap 18.4%	HG Bnd 7.0%	HY Bnd -26.4%	REIT 28.0%	HY Bnd 15.2%	Lg Cap 2.1%	Sm Cap 16.4%	AA 11.5%	HG Bnd 6.0%	Cash 0.1%	EM 11.6%	Sm Cap 14.7%	REIT -4.0%	Int'l Stk 22.7%	AA -3.3%
AA 16.7%	Lg Cap 5.5%	Sm Cap -33.8%	Sm Cap 27.2%	Lg Cap 15.1%	AA 0.3%	Lg Cap 16.0%	HY Bnd 7.4%	Sm Cap 4.9%	Int'l Stk -0.4%	REIT 8.6%	AA 14.6%	Lg Cap -4.4%	AA 18.9%	HY Bnd -4.8%
Lg Cap 15.8%	Cash 4.4%	Lg Cap -37.0%	Lg Cap 26.5%	AA 13.5%	Cash 0.1%	HY Bnd 15.6%	REIT 2.9%	HY Bnd 2.5%	AA -1.3%	AA 7.2%	REIT 8.7%	AA -5.6%	EM 18.9%	EM -9.7%
HY Bnd 11.8%	HY Bnd 2.2%	REIT -37.7%	AA 24.6%	Int'l Stk 8.2%	Sm Cap -4.2%	AA 12.2%	Cash 0.1%	Cash 0.0%	Sm Cap -4.4%	HG Bnd 2.7%	HY Bnd 7.5%	Sm Cap -11.0%	HY Bnd 14.4%	Int'l Stk -11.1%
Cash 4.7%	Sm Cap -1.6%	Int'l Stk -43.1%	HG Bnd 5.9%	HG Bnd 6.5%	Int'l Stk -11.7%	HG Bnd 4.2%	HG Bnd -2.0%	EM -1.8%	HY Bnd -4.6%	Int'l Stk 1.5%	HG Bnd 3.5%	Int'l Stk -13.4%	HG Bnd 8.7%	Sm Cap -13.0%
HG Bnd 4.3%	REIT -15.7%	EM -53.2%	Cash 0.2%	Cash 0.2%	EM -18.2%	Cash 0.1%	EM -2.3%	Int'l Stk -4.5%	EM -14.6%	Cash 0.3%	Cash 1.0%	EM -14.3%	Cash 2.1%	REIT -13.3%

Figure 6.15 Asset Class Returns 2006 – June 2020

(Novel Investor, 2020)

For the reasons of being unstable in value and not easily exchangeable, cryptocurrency is not actually a currency – it is a speculative investment. A more befitting moniker would be cryptoasset.

6.7.3 Dot-Com Bubble

During the dot-com boom and bust at the turn of the century much emphasis was placed on unsound fundamentals like web clicks or page views based on a belief that being popular, but not yet profitable, was a sign of future success. This was due to general market hubris and a lack of certainty and experience regarding how to value web-based companies (McCullough, 2018). Even Amazon, shown in Figure 6.16, which went public in May 1997 did not report a profit ($5 million) until Q4 2001 and lost money for 17 quarters straight – totalling $2.8 billion (Griswold, 2019). In 2018, it posted $10 billion in profit, which was more than it had recorded in net income in the previous ten years combined (Griswold & Karaian, 2018).

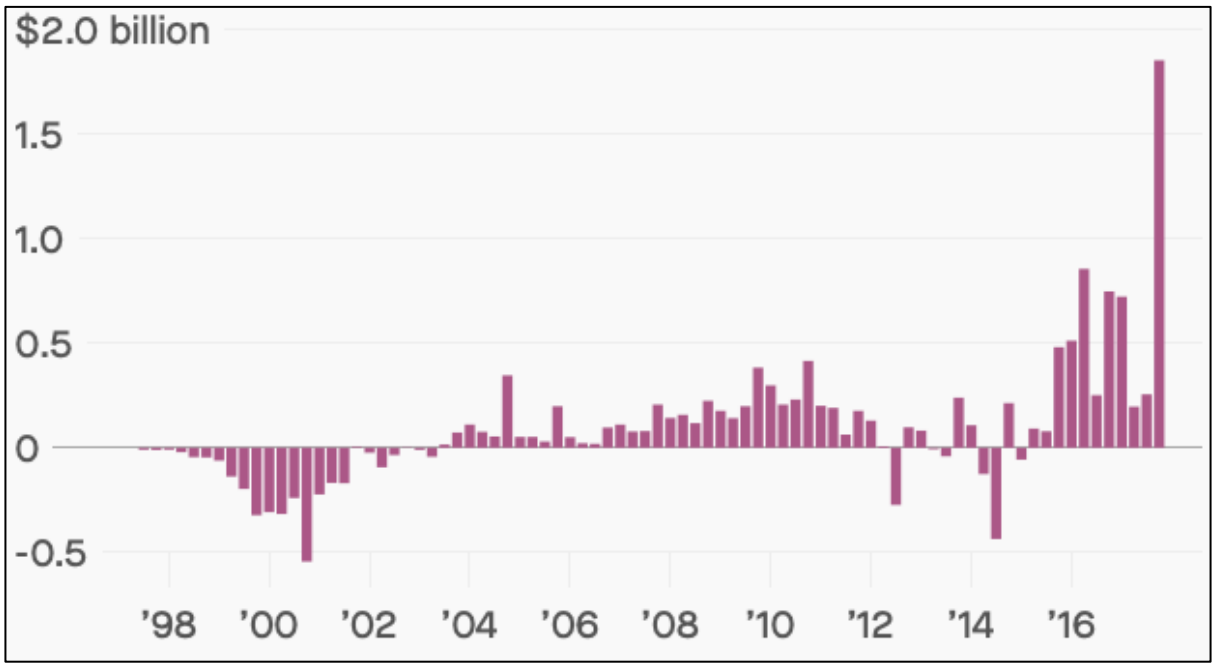


Figure 6.16 Amazon's Quarterly Net Profit 1997 – 2016

(Griswold & Karaian, 2018)

Nasdaq is the equity market synonymous with the dot-com bubble. It is where the majority of technology companies trade, Amazon included. Figure 6.17 illustrates its rise from 2,134 in February, 1997 to 7,200 in February, 2000 and subsequent fall to 1,685 in September 2002. It took until November, 2017, over 15 years, to surpass its former high. As of December, 2020 it was at 12,888 (Macrotrends, 2021a). Even a market as broad as the NASDAQ was susceptible to overvaluation and a long-term correction. Investor psychology and herd mentality are real and effect markets as a whole. The fundamentals of any investment eventually affect its valuation, because at some point its growth potential must be assessed against that of every other asset class. When this happens en masse, markets correct.

Figure 6.17 NASDAQ Composite – February, 1971 – December, 2020

(Macrotrends, 2021a)

What is transpiring with the cryptocurrency market, Bitcoin especially, is another speculative bubble. Its value is supported by aggregate investor belief in it as a means to substantial short-term gains driven by new entrants late to the market. Unlike regulated exchange traded equities, commodities or derivatives, ownership does not denote rights to any specific underlying assets. There is no revenue stream or investor information available for analysis. The cryptocurrency market at present is like any other speculative endeavour; those who stand to gain were already invested prior to its current growth. Whether or not it will continue its rise or repeat what transpired with the Nasdaq dot-com bubble is an issue for further research.

The cryptocurrency market already suffered a correction in 2018. Prospective investors should remember sustainable long-term gains, like with Amazon over 24 plus years since it went public, do not happen quickly or by chance. Volatility in the cryptocurrency market is due to short-term traders and a lack of fundamental valuation metrics. Like any fiat currency, it is inherently only as sound as the entity backing it. Unlike national currencies, cryptocurrencies have no backing institution to trust. Additionally, fees to convert from an actual currency to a cryptocurrency and back through a service provider like Coinbase are 1.49-3.99% each way (Coinbase, 2021). That is 2.98-7.98% just to enter and exit the market. It is exorbitant, unavoidable and akin to the 19th century gold rushes in

California and the Yukon where the persons who financially benefitted the most were not the prospectors, but the merchants who equipped them.

Several national banks are developing creating digital currencies, which will be analysed in Chapter 9, meaning the cryptocurrency market might soon have competition from sovereign national banks. However Mastercard announced in February 2021 it will begin supporting certain cryptocurrencies on its network later in the year and enable conversion between crypto and standard currencies (Dhamodharan, 2021). This is a major change and could resolve the transaction processing time issues. Based on the other assessments regarding cryptocurrency, the most sound advice at present is caveat emptor.

6.8 Blockchain Proofs of Concept

Various industries have been exploring the feasibility of blockchain for business use. What these proofs of concept have in common is a desire to automate conventional processes and thereby reduce the time and manual effort required to complete financial transactions.

6.8.1 **Securities Issuance**

In December, 2015 the Nasdaq Linq blockchain ledger was used to record a private securities transaction. It used a blockchain ledger for documenting sale of an equity holding versus issuance of a paper certificate or electronic documentation. Completion of the transaction proved clearing and settlement can be reduced from the US standard T+2 days settlement time to around 10 minutes. This can reduce settlement risk exposure, systemic risk and capital costs. Nasdaq CEO, Bob Greifeld, stated:

> Through this initial application of blockchain technology, we begin a process that could revolutionize the core of capital markets infrastructure systems. The implications for settlement and outdated administrative functions are profound (Nasdaq, 2015).

6.8.2 **Trade Finance**

As shown in Figure 6.18, trade in goods is a paper intensive endeavour involving many actors. Blockchain can be used as a tool for improving the efficiency of these processes and movement towards paperless trade.

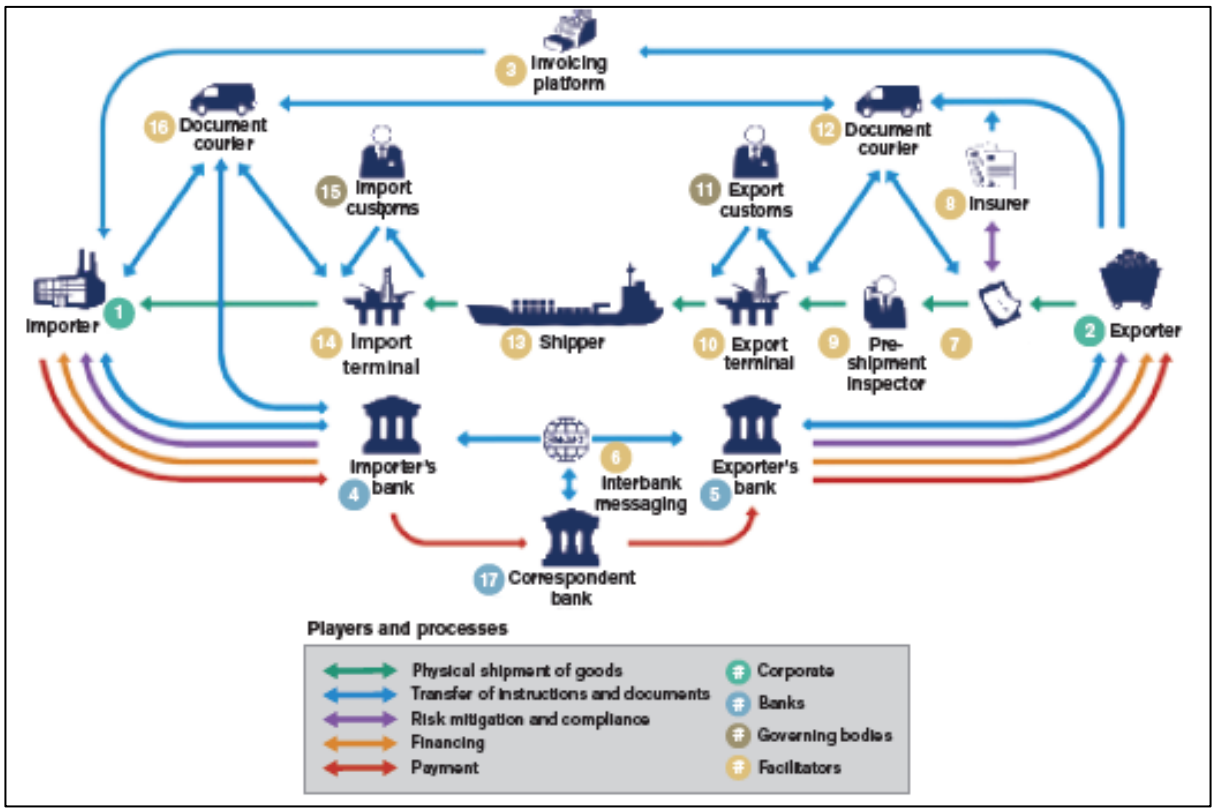


Figure 6.18 The Traditional Trade Finance Process

(Ramachandran et al., 2017)

An example of how blockchain can simplify the credit process for international trade is in Figure 6.19. Trade finance, like letter of credit transactions, can involve up to 20 participants per transaction. Data exists in 10 to 20 different documents, with up to 5,000 fields total. Only one percent of interactions create any value, as most (85-90%) are a throughput of data from one party in the communication chain to another. Modernisation of the process has involved digitisation of information and payments (Ramachandran et al., 2017). This has been achieved primarily via the implementation of scanned PDF documents, such as invoices. It is not digitalisation of the transaction itself, which could be achieved with blockchain (Ganne, 2018).

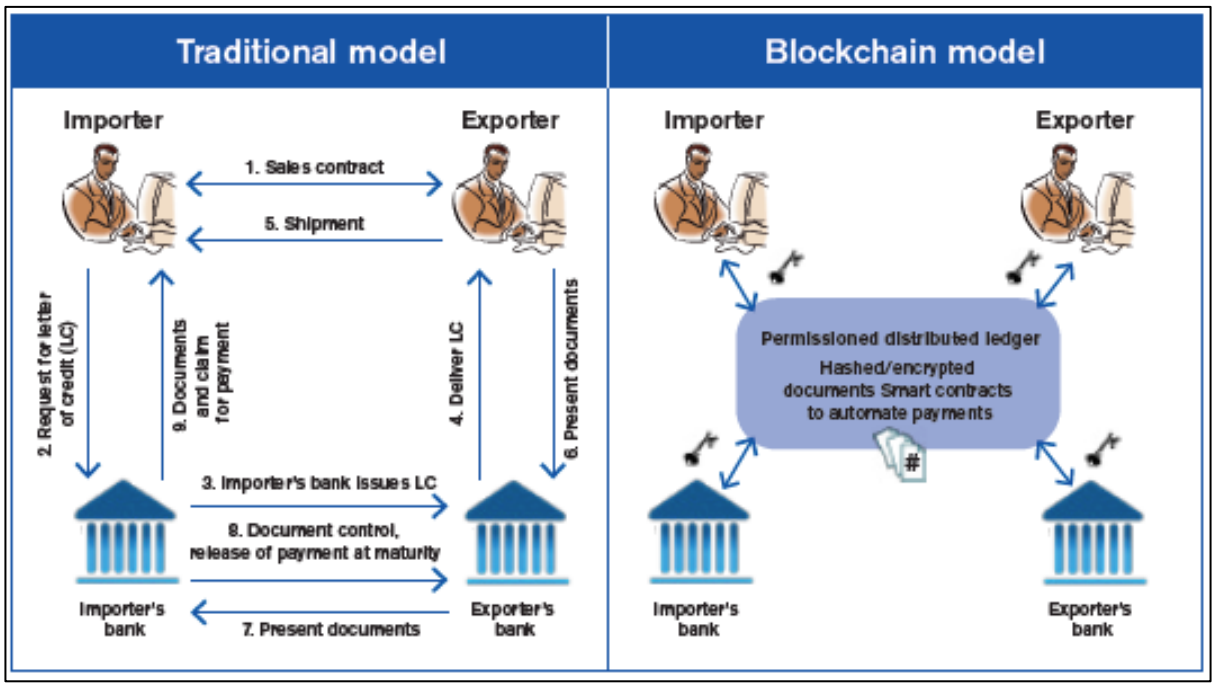


Figure 6.19 The Letter of Credit Process

(Ganne, 2018)

In September 2016, fintech startup Wave and Barclays completed the first trade finance transaction using blockchain. It used a permissioned ledger and involved export of approximately $100,000 of dairy goods from Ireland to the Seychelles. Process completion time was reduced from seven to ten days to under four hours (Ganne, 2018). That year the Commonwealth Bank of Australia and Wells Fargo also used a permissioned ledger to complete the first open account blockchain based transaction involving a smart contract and IoT technology to ship cotton from Texas, USA to Qingdao, China.

> The trade introduced a physical supply chain trigger to the terms of the transaction to confirm the geographic location of goods in transit before a notification is sent to allow for release of payment. The tracking feature adds a new dimension, providing all parties with greater certainty compared with traditional open account and trade instruments like Letters of Credit, which focus on documents and data (Commbank, 2016).

As of October 2019, IBM had launched a blockchain based supply chain service, marketed as the Sterling Supply Chain Suite. It is built upon IBM's own blockchain platform and open-source software. These developments are cloud-based and operate on the Hyperledger Fabric blockchain platform. They are able to integrate IBM's other products, like its artificial intelligence engine, Watson, for tasks like producing real-time alerts (IBM, 2019). IBM has also already launched supply chain network product tracking pilot programs for diamond trading, cargo shipping and food (Mearian, 2019).

IBM's systems are built upon a permissioned blockchain. They claim it can pass audits and comply with KYC requirements (Forrester Consulting, 2018). What is unique about IBM's platform is it allows third-party applications and developers the ability to integrate legacy systems into a distributed ledger platform. This means existing enterprise resource planning, warehouse management and order management systems in use by customers can still be utilised and do not need to be fully replicated on the blockchain. It is also able to extract data from new sources, like IoT sensors providing real-time data, that can be integrated with information already held in their existing systems (IBM, 2019).

6.8.3 Reconciliation & Back Office Operations

Banks use computer systems to track and cross-check financial transactions against the record of those transactions held by their counterparties. Current protocol involves each bank maintaining their own record of events. Blockchain has the potential to remove much of this duplication of effort and associated costs, particularly in regard to paper-based verification, by use of a centralised database (Fujii-Rajani, 2018). Tapscott and Tapscott wrote in 2016 there is currently no system available for banks to begin harnessing the efficiencies provided by blockchain. They estimated were this available, around $20 billion in back-office expenses could be eliminated (Tapscott & Tapscott, 2016). IBM's blockchain product states it can integrate with existing systems; this no longer appears valid.

Blockchain also has potential use in the payment, clearing and settlement processes. It can possibly reduce transaction times while also improving, resilience, transparency and efficiency (BIS, 2017). As of 2017, real-time gross settlement (RTGS) systems were being researched by central banks in Japan, Singapore and the UK. The Bank of England had indicated its future RTGS system will be blockchain compatible and has tested this with the Ripple cryptocurrency, which is specifically designed for performing cross-border bank to bank transfers. This system uses conditionally locked transfers, known as escrow transfers, to connect disparate ledgers. Funds are placed on hold on both ends until the protocol validates the transfer, at which time the funds are released on both ends (Fujii-Rajani, 2018).

The Society for Worldwide Interbank Financial Telecommunications has also been performing a blockchain based proof of concept for real-time reconciliation of international nostro accounts in conjunction with 22 global banks. This comprises phase three of its plan for updating its global payments system for more than 110 banks. The Sydney Stock Exchange and the Australian Securities Exchange were developing permissioned blockchain systems for replacing their Clearing House Electronic Subregister System and settlement platforms (Fujii-Rajani, 2018). These examples are

testing the operability of permissioned blockchain technology and have not yet migrated to such a system. The multiple examples given repeatedly show further automation of already somewhat electronic systems is happening; permissioned blockchain systems are the unanimous choice.

6.8.4 **Blockchain Implementation**

The digital revolution in financial services has been occurring since widespread use of networked computers became commonplace in the mid 1990s and has been marked by a gradual creep of efficiencies. Much of this has involved a move towards digital copies of documents and a move away from paper-based transactions. As stated by previously by Ganne, this is not a digitisation of the transactions themselves. What has happened thus far is just a digitalisation of the transaction transmission. In November 2018, the Reserve Bank of New Zealand defined the advantage blockchain/DLT in the banking sector:

> The use of DLT in banking has the potential to reduce banks' reconciliation costs. Reconciliation involves banks using systems to track financial transactions and checking those transactions with their counterparts in other banks. Transactions are currently recorded in a centralised ledger that is shared by all participants, which must be integrated with each participant's own systems. DLT has the scope to remove some of the duplication and costs associated with these processes, including paper-based verification, by allowing all banks' systems to be synchronised and updated (Fujii-Rajani, 2018).

They also defined the greatest obstacle to implementation of a blockchain based system:

> In theory, a distributed ledger can be used by banks as a single, true record that replaces physical documents. In practice, it is likely that the changes required are so pervasive and fundamental that they would require collaboration between competitors, regulators, consumers, technology experts, and the legal community (Fujii-Rajani, 2018).

The solution and problem presented above is in order to have organisations migrate to a blockchain solution so they automatically cooperate with one another by means of the system itself, they must first achieve a higher level of cooperation without the use of a shared database so the system can be implemented. This is not impossible, but is a situation that might best solved by reliance on a third-party system, such as a turnkey software provider.

6.9 Software Life Cycle

All IT systems eventually become outdated, even though the data they contain might still be of relevance. The standard software lifecycle involves the release of subsequent versions of a software product with each previous version going through phases of beta release, general release, end of

sales, end of support, end of extended support and then end of life. Once a software product reaches its end of life it is no longer eligible for upgrades, like service packs for security or functional purposes, or technical support (Flexera, 2017; Rajlich & Bennett, 2000).

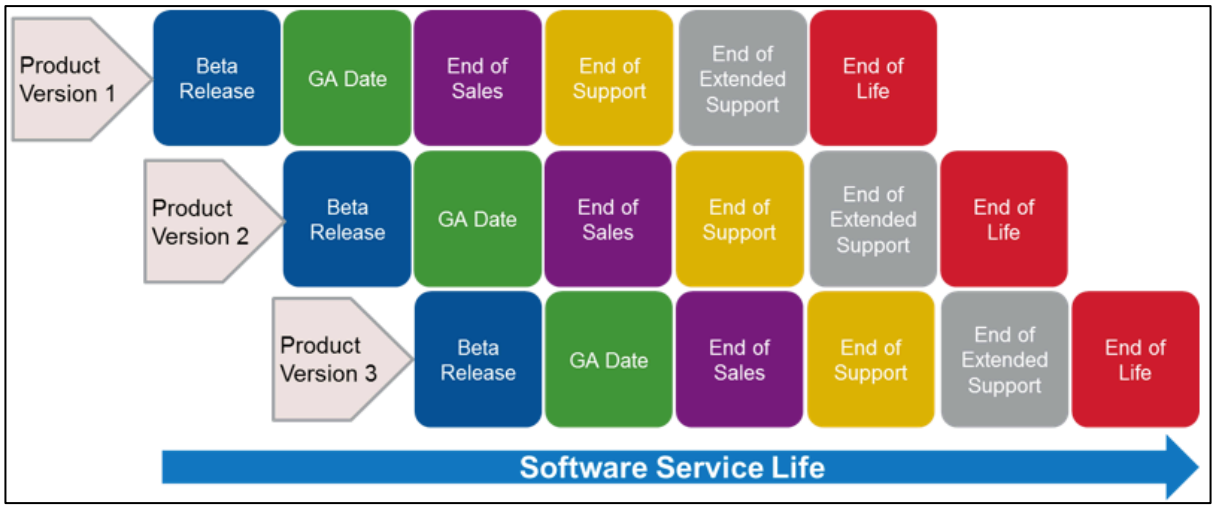


Figure 6.20 Software Release Service Lifecycle

(Flexera, 2017)

The continuous integration of newer software versions has followed a general path over the past 30 years. Businesses reliant on legacy systems first appended graphical user interfaces (GUI) to their legacy software systems and later expanded into web delivered versions the software (Campbell-Kelly & Garcia-Swartz, 2015). GUI and web-based interfaces are more visually appealing and user-friendly than the original 'green screen' type of system replaced, but often result in a delayed data input experience. This is because they are actually still the same system, there have just been additional layers of software added. These equate to slower functionality, as multiple layers of software must operate in conjunction.

Throughout this period of development, long-term employment with a company became less certain. It was also once common for companies to invest heavily in training, which in the case of complicated large scale software suites is necessary. Prior to the current wave of financial technology, this century was also dominated by migration from the business model of companies maintaining their own databases and servers towards cloud computing and the use of subscription based software, known as software as a service (SaaS) (Campbell-Kelly & Garcia-Swartz, 2015).

The sum of these changes created an environment where businesses now lower costs and improve IT systems through outsourcing. Amazon Web Services has become the frontrunner in the provision of on demand cloud storage and computing; as of Q3 2017 it had 34% of the market share (Detrixhe,

2017). One impetus for the move towards outsourcing is companies no longer need to invest in training rotating members of staff. What legacy software has as an advantage is companies can migrate existing databases to different software package. With blockchain, there is not presently an adequate solution.

6.9.1 A Good Ending

Ending the storage of long-term data, is defined as 'the shutdown problem'. A storage system should have the following characteristics at the end of its useful life:

1. The information is in a stable form and should not be subject to continued changes.
2. There is no ongoing commitment to the support of the outdated system. Maintenance costs for the stored information should be greatly reduced
   (Day, 2019)

6.9.2 Stable Versus Unstable Consensus

Stable blockchain consensus is characterised by blocks within the chain never being revised at the node level. Unstable consensus means any block is subject to revision. The closer a block is to the beginning of the chain, the more difficult it is to modify (Day, 2019).

The end of a blockchain system should possess the following characteristics:

- Stable consensus.
- More honest nodes than dishonest.
- Honest operation of the system at the time of shutdown.
- Existence of a terminus block that identifies itself as being the end of the blockchain.

  (Day, 2019)

The problem with shutdown of a blockchain system with unstable consensus is there is no explicit indication whether or not a terminus block is in fact the last in the chain. Because of this uncertainty, there exists a risk blocks in the chain could still be subject to further modification, meaning no block in the chain possesses absolute validity. It also means no one party holds a superior status on the chain for supervision of the shutdown (Day, 2019).

Presently no simple method exists for public blockchains to be archived in a manner that reduces maintenance overhead whilst providing stability. One solution is for unstable consensus to be replaced by a means of stable consensus. This is not a minor task. Another possibility is for one or more nodes or parties to be appointed as archivist of the blockchain. This solution is contrary to the

decentralised nature of blockchain and means at some point trust must be provided by an outside mechanism (Day, 2019).

The closer the data in the chain is to the genesis block, the more reliable its information. It is also the oldest data and likely the most irrelevant. Regarding financial records, after accounts are finalised, they are no longer subject to amendment and at some point need to be removed. Dr. Mark Stuart Day, an alumnus of and visiting lecturer at the Massachusetts Institute of Technology, believes there is not presently a solution to the problem of how to gracefully end a public blockchain. His analysis finds the issue of shutdown is yet another problem with their use.

6.10 Blockchain – Summary

Of all the financial technologies that evolved in the wake of the GFC, blockchain is the most revolutionary. There are three types: public, permissioned and private. Of these, public blockchain has received the most notice due to being the first live implementation and the novel way in which it functions. Public blockchains are also the most problematic due to their decentralised nature.

The issues of transaction processing time, energy consumption, lack of a central authority, a conflict between decentralisation and scalability, immutable storage of inappropriate data and no clear means for end of lifecycle render public blockchains too experimental and unwieldly at present to be of use in a business situation. Although public blockchain is limited in its potential for business applications, what holds most promise is the use of private or permissioned blockchain systems. The greatest potential advantages the implementation of these systems is have to offer is reduced staff headcount and processing times and reallocation of effort from mundane reconciliations and record keeping to higher level tasks that are not as easily automated.

This chapter has only analysed the blockchain infrastructure. Chapter 7 will examine the other most interesting aspect of the fintech revolution - the smart contract. These two technologies operate in tandem; blockchain is the framework for using shared databases and smart contracts provide the intelligence for the automation of complex processes.

Chapter 7 Smart Contracts

7.1 What is a Smart Contract?

The concept of the smart contract was first conceived in 1996 by Nick Szabo. He likened a standard contract to be, "the basic building block of the free market economy" and coined the term, "smart contract" (Szabo, 1996: 1) in the following passage:

> New institutions, and new ways to formalize the relationships that make up these institutions, are now made possible by the digital revolution. I call these new contracts 'smart', because they are far more functional than their inanimate paper-based ancestors. No use of artificial intelligence is implied. A smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises (Szabo, 1996: 1).

Bhattacharya provides a more modern and accurate definition and redefines them as:

> Programmable codes that contain all the rules and regulations encoded by the developers that concern the contract details. They work on the IFTTT logic (If-This-Then-That logic), in which the instructions are listed in order and are executed in an automated way, enforcing all the commitments (Bhattacharya, 2018).

Macrinici, Cartofeanu and Gao contend a smart contract is like a real world contract. It is a value flow based on specific terms and conditions, the only difference being it is in digital form. It is a container of code designed to replicate a standard contract, but takes the place of intermediaries. It allows two parties who do not trust one another to transact without the need for direct interaction, dependence on a third party for contract enforcement or the need for payment to an intermediary for provision of the service of managing the contract (Macrinici et al., 2018; Swan, 2015). Rivas and Tsyganova see the term smart contract to be a misnomer, as this is the phrasing first used by Szabo. Due to his concept being regarded as the first on the subject, use of the term has persisted (Rivas & Tsyganova, 2018). Szabo holds degrees in computer science and law; when devising the concept of a smart contract, he had to call it something (Szabo, 1996).

7.1.1 **Smart Contracts Versus Legal Contracts**

The lifecycle of a legal contract has four independent stages: formation, execution, performance and enforcement; a smart contract's lifecycle has just two. They are formation and a second stage which amalgamates creation, performance and self-enforcement. The formation stage of the smart contract is different from a legal contract in regard to trust because formation requires coding the contract details into a blockchain. With a standard contract, trust is placed in the lawyers responsible for drafting it (Rivas & Tsyganova, 2018). With smart contracts trust is placed in the

persons who coded the smart contract into the blockchain to facilitate transactions without the interference of any middle entity (Bhattacharya, 2018).

Enforcement of a legal contract relies on some authority, like a court of law or arbitrator, to intervene when parties to a contract fail to perform their duties. For smart contracts there is no non-digital mechanism of enforcement, so there is still a reliance on some external legal agreement (Rivas & Tsyganova, 2018). Although a smart contract has the ability to automate aspects of the contract life cycle, it still relies on the existence of a legal contract.

Other risks with smart contracts are the lack of an overseeing authority in case a smart contract malfunctions and the inherent anonymity characteristic of the blockchain (Savelyev, 2017). Anonymity is a barrier to legal enforcement due to the need for the identity of parties to be known. The majority of smart contracts are not contracts at all in a legal sense; there is no facilitation or embodiment of exchange, which is a legal contract's defining feature. A smart contract is essentially a programming tool presently too limited in its abilities to be a true threat to actual legal contracts. The legal system will still be required in the case of a dispute (Rivas & Tsyganova, 2018).

Rohr assessed smart contracts from the viewpoint of comparing how they should be seen in the context of simple contract law, like with a vending machine. Rohr also sees the term smart contract as incorrect, for they are not necessarily smart, nor a contract. There is no steadfast definition of what a smart contract is; all that is agreed on is they involve computer code which self-executes based on predefined conditions (Rohr, 2019).

Smart contracts have the ability to provide novel ways for formalising and securing digital relationships via modernisation and automation of paper-based contracts. Rohr contends Szabo's definition of what constitutes a smart contract is broad enough to encompass smart contracts which are actual digitized versions of a legal contract as well as those that are not. The defining characteristic is whether or not the smart contract has features that prevent breach of contract by making it expensive for the party at fault (Rohr, 2019).

Both Savelyev and Rohr view smart contracts as presently too limited in capability and will probably constitute a part of a larger contract. This is because traditional contract law is required as a means of resolution for disputes and the pseudo-anonymity of the blockchain creates jurisdictional issues (Rohr, 2019; Savelyev, 2017). The legal issues of immutability, inaccessibility to the terms of the contract, potential mismatching of the terms presented to the offeree and memorialization of the terms presented by the use of smart contracts are issues traditional contract law has already confronted (Rohr, 2019).

The assumption parties negotiate and sign paper contracts after the exchange of offer and acceptance is the basis of traditional contract law. Other instances where innovation has confronted the way contracts are formed and performed would be 'shrinkwrap' software licenses, contracts of adhesion and internet contracting, which contract law has successfully handled. Should disputes arise, the concepts of offer, acceptance and ascent are flexible in the hands of judges. Their generality gives judges sufficient ability to determine exactly how they apply to new methods of contracting and technology (Moringiello & Reynolds, 2013).

Unlike Savelyev, Rohr sees the vending machine to be the prototype of how contract law can be applied to smart contracts. This is based specifically on merchantability being enforceable for a supermarket that sells a contaminated soft drink from a vending machine on its premises implying warranty via the terms of a contract, as in the case of *Chaffin v. Atlanta Coca Cola Bottling Co.* (Rohr, 2019:74).

Just as with a vending machine, smart contracts represent an automated process (Savelyev, 2017). Both require mutual assent; a parallel exists. Aspects that prevent a party from understanding the terms of the contract can prevent a contract from forming. Understanding how smart contracts function is the main challenge for decision-makers, like judges, so existing law can be correctly applied. Rohr concludes traditional contract law has been flexible enough to handle all other technological innovations up to present; there is no reason to believe new legislation would be required. However, smart contracts are considered part of a larger contractual agreement and not a complete substitute for a legal contract per se (Rohr, 2019).

This is similar to the solution of 'split contracts'; that is, contracts designed to have a delineation between machine and human interpreted sections. These are considered by Stiegler and Miller to be the most efficient way for adjudication of conflicts in contract interpretation (Stiegler & Miller, 2013). Another possible solution is the use of Ricardian contracts, which are legally binding contracts existing in both paper and machine format (Grigg, 2004; van Rijmenam, 2019).

van Rijn sees the use of smart contracts on public blockchain systems having the advantage of transparency. Contents can be verified by anyone as the contract exists on all nodes. By grouping like contracts together, any legal updates required could be implemented to individual contracts en masse (van Rijn, 2017). Because programming for smart contracts relies on object-oriented code, it lends itself to these widespread automatic amendments (Zakhary et al., 2019).

The risklessness smart contracts on decentralised platforms offer is undesirable in many business situations because they do not have the ability to manage the different requirements of various

stakeholders; it is a barrier to their implementation (Rivas & Tsyganova, 2018). This is another reason why permissioned blockchain systems are superior to open systems. Permissioned systems provide the advantage only concerned parties are able to view the terms of the contract.

Zakhary et al. see the two major obstacles in the implementation of smart contracts being physical asset authentication and legality. For authentication, just because a physical asset exists in a smart contract, a third party still needs to attest to its actual existence. Legality requires knowledge by the parties involved that transfer of the asset is allowed in a particular jurisdiction, which is something that should be possible to integrate into a smart contract. Regarding the use of smart contract enabled blockchain systems for global asset management, they conclude permissionless systems are not scalable and thus not feasible for use, but a hybrid system of both public and closed or permissioned blockchain systems might be what is required (Zakhary et al., 2019).

7.1.2 Smart Contract Regulation

The greatest potential for smart contracts within financial services could be the automation of repetitive manual processes. Based on the search for sources relevant to this potential, the guidance on smart contracts published by the US Commodities and Futures Trading Commission (CFTC) was the only publication by a US/UK/EU regulator found specific to smart contracts that definitively states first-hand how they can be regulated and implemented into the current financial infrastructure. Note the CFTC is a member level organisation participating in the FCA initiated Global Financial Innovation Network (GFIN, 2020c).

The CFTC defines the key attributes of a smart contract as:

- A set of functions expressed in software code embedded in a distributed ledger.
- Authentication provided by digital signature.
- Ability to access outside data for triggering actions from mutually agreed upon, network authenticated data, like asset price, providers.
- Automated execution/self-execution requiring no counterparty action.
- If it does not conform to law, it is non-binding and unenforceable.

(CFTC, 2018)

Rohr surmised the legal framework of smart contracts as that of vending machines. The CFTC considers the logic behind smart contracts to be like a vending machine. The use of smart contracts will expand over time as else-if clauses are further developed into standalone subroutines for future

smart contract authors to reuse. The form a contract takes is not relevant as existing laws and regulations apply (CFTC, 2018).

7.1.3 Benefits, Risks, Uses and Lifecycle of Smart Contracts

7.1.3.1 Benefits

- Reduction of duplicative information.
- Risk reduction relating to trading, capital and margin requirements.
- Automated contract fulfilment.
- Enhanced compliance with written policies and procedures, legal obligations and regulatory requirements.
- Streamlining of the pre to post-trade lifecycle (price discovery, execution, clearing and settlement) for options, futures and swaps.
- Greater market activity and efficiency.
- Customer and counterparty verification.
- Accurate recordkeeping.
- Quicker regulatory reporting.

(CFTC, 2018)

7.1.3.2 Risks

- Circumvention of rules.
- Impairment of market integrity.
- Diminishment of transparency and accountability.
- Fraud/Manipulation.
- Introduction of operational, technical and cybersecurity risks.

(CFTC, 2018)

7.1.3.3 Uses

- Data Reporting and Recordkeeping – Greater standardization and accuracy, real-time risk analysis, automated data retention and destruction.
- Derivatives – Real-time valuations, margin calls and post-trade process automation.
- Insurance – Claims processing could be automated based on specified, predetermined events.
- Securities – Simplification of capitalization table maintenance, such as automating the processes behind stock splits and dividends.

- Supply Chain/Trade Finance – Product movement, streamlining of payments and finance liquidity.
- Trade Clearing and Settlement – Improving the efficiency and speed of trade settlement. (CFTC, 2018)

7.1.3.4 **Smart Contract Transaction Lifecycle**

Provision of a financial service and the hardware and software it requires has a defined number of demands. An illustrated example of how blockchain can potentially streamline the trade lifecycle process is in Figure 7.1. Whether or not human intervention is required, existing processes require transfers of data from one database to another at multiple points. This is the process bottleneck blockchain and smart contracts can automate. By using a shared database, all information can be in a centralised register, copies of which are maintained by multiple nodes on the network for security and continuity purposes. Various users receive access to only the information pertinent to their needs.

Benefits to the use of smart contracts in the lifecycle of economic transactions:

- Standardisation – Reduced negotiation and agreement costs.
- Security – Embedding of smart contracts in a blockchain renders them immutable.
- Economy and Speed – Automation reduces the use of manual processes.
- Certainty – Auto-execution could reduce counterparty and settlement risk.
- Business Innovation – 'Technology creep' – automation of assets and payments can lead to new business models and products.
- Regulatory Innovation – Regulatory compliance could be built into the system, such as customer suitability or having smart contracts automatically report data, like for stress testing purposes or hypothetical pay-out levels based on varying scenarios. (CFTC, 2018)

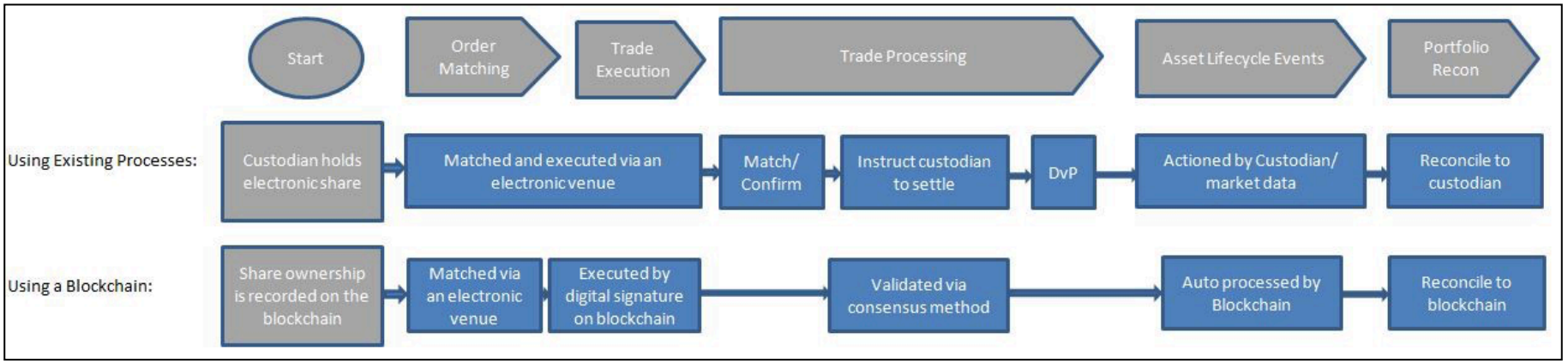


Figure 7.1 Conventional Trade Processing Lifecycle Versus Blockchain

(Mahajan, 2018)

7.1.3.5 Limitations of Smart Contracts

The probable advantages provided by smart contract systems outnumber the risks. Fraud was the issue with multiple financial scandals prior to and after greater implementation of automation in the financial system. These uses show further automation of the network is focused on streamlining roles that were not complicit in perpetrating fraud. Management risk could still be a threat as control of the system will still be held by those who have the ability to direct how it is used.

7.1.4 Role of US Regulators and Smart Contracts

The CFTC regulates risk transfer and hedging markets, particularly in relation to futures and derivatives. The primary markets they regulate are: agriculture, energy, metals and financial instruments (interest rates, foreign currency). They are the US regulator with authority for governing digital assets, such as cryptocurrency (CFTC, 2018). The CFTC is a separate entity from the Securities and Exchange Commission (SEC), the US regulator for securities.

In 2009, the Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues was established to foster harmonization between the two. Its primary task is assessment and quantification of emerging regulatory risks and their impact on markets and their participants (CFTC, 2020). This indicates any opinions of the CFTC regarding fintech regulation can also be presumed to be in accord with those of the SEC. As mentioned in Chapter 4, US markets hold 38% of global capital; these two are the dominant regulators based on the capitalisation of the markets they oversee.

The CFTC define their role and actions on smart contracts as being:

- Deterrence and prevention of price manipulation or any other disruptions to market integrity.
- Ensuring the financial integrity of all transactions covered by the CEA; avoidance of systemic risk.
- Protection of all market participants from abusive or fraudulent sales practices, the misuse of customer assets.
- Promotion of responsible innovation, fair competition amongst boards of trade. In relation to innovation, they see this as being market enhancing.

  (CFTC, 2018)

The CFTC sees smart contracts being used for the following types of financial products within their jurisdiction:

- Futures Contracts

- Forward Contracts
- Commodities
- Swaps
- Options on Futures Contracts

  (CFTC, 2018)

The following legal frameworks apply to the use of smart contracts in the US:

- Commodity Exchange Act
- Federal and state securities laws/regulations
- Federal, state, local tax laws/regulations
- Uniform Commercial Code, Uniform Electronic Transactions Act, Electronic Signatures in Global and National Commerce Act (ESIGN Act)
- The Banks Secrecy Act
- The USA Patriot Act
- Other Anti-Money Laundering laws
- State and federal money transmission laws

  (CFTC, 2018)

This role of the CFTC is in accord with the conclusion of Rohr in relation to smart contracts and the opinions of the US and EU on fintech regulation at large. The consensus is there is already enough financial regulation, it just needs to be applied in a manner befitting blockchain and smart contracts.

7.1.5 **Resources Available for Smart Contract Regulation Development**

The software developer community has created its own standards for the purpose of facilitating quality coding practices so applications associated with smart contracts can be included in a repository for reuse. An example of these on the Ethereum platform are the Ethereum Requests for Comment (ERC) (Sheth & Subramanian, 2018). An example of the format these object-oriented code type of standards take is the most popular token standard, ERC-20, as seen in Figure 7.2. It is a standard that:

> Allows for the implementation of a standard API for tokens within smart contracts. This standard provides basic functionality to transfer tokens, as well as allow tokens to be approved so they can be spent by another on-chain third party. This standard ensures that tokens on the Ethereum platform can be reused by other applications: from wallets to decentralized exchanges (Vogelsteller & Buterin, 2015).

```
contract TokenContractFragment {
// Balances for each account
mapping(address=>uint256) balances;
// Get the token balance for account `tokenOwner`x
function balanceOf(address tokenOwner)
         public constant returns (uint balance) {
  return balances[tokenOwner];
}
// Transfer the balance from owner's account
// to another account
function transfer(address to, uint tokens)
         public returns (bool success) {
```

Figure 7.2 Sample Ethereum Request for Comment (ERC-20) Token Contract

(Chu & Wang, 2018)

From a regulatory perspective this means there is already a wealth of documentation available for development of regulatory standards. Like any computer system, a blockchain based smart contract platform is the product of many persons, all of whom are working in accordance with prescriptive guidelines to ensure the creation of stable, extensible code.

In regard to the Malta's defined roles of systems auditor and technical administrator, execution of those roles requires familiarity and reliance on industry own standards. Although those roles are newly created, they already have these developer standards to rely on (ITAS Act, 2018). Malta did not create the roles without guidance; they had a technical expert, Dr. Kablan, oversee the project.

To adequately regulate technology that will form the backbone of the move to blockchain and smart contract based markets, someone with expertise beyond that of the standard participants in the execution of law is required. Other jurisdictions might look to Malta as an example for developing their own regulations. For the fintech revolution to be successful in bringing about a deeper level of collaboration and synergy between the standard qualified professionals with advanced technology and its developers, reliance on the role of a liaison who can bridge the gap between the two parties will be essential. This was also experienced with the cross-border testing trialled by the GFIN (GFIN, 2020a).

7.2 Business Use of Smart Contracts

Ethereum was launched in 2015 as the first Turing complete smart contract system on a decentralised platform (Ramezan & Leung, 2018; Tilooby, 2018). Since then, business use of smart contracts on blockchain platforms for providing financial services has moved beyond the proof-of-concept stage. This section reviews two such companies. They were chosen based on their

attendance at the Delta Summit in Malta in October 2019. Each has developed a product with disruptive potential in two different industries - insurance and energy efficiency.

7.2.1 **Insurance**

Almost everyone requires insurance at some time. The annual revenue of global insurance industry is more than $4.5 trillion, or approximately 6% of the global economy (III, 2020). It is an industry dominated by big companies with large customer bases. Customers have little leverage in relation to the power held by the providers; this results in reliance on regulation for consumer protection. From the insurance companies' perspective, compliance with regulatory oversight is an overhead to pass on to consumers in the form of increased insurance premiums (Etherisc, 2020a). Sheth and Subramanian see the use of smart contracts in the insurance market as a positive impact on social welfare through a shift of the economic supply curve, as seen in Figure 7.3. The reduction of transaction costs is a benefit to the principal and agent (Sheth & Subramanian, 2018).

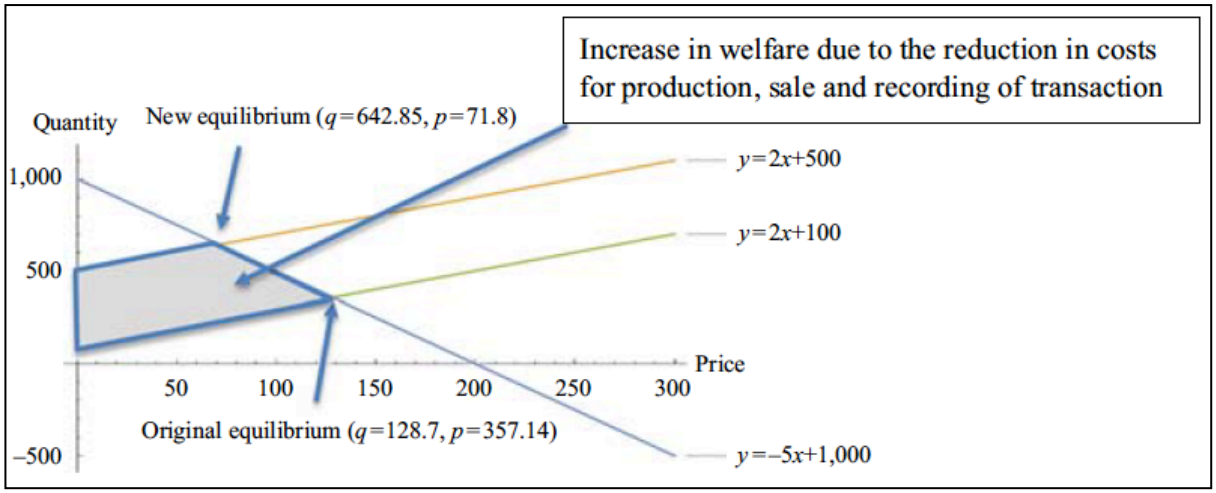


Figure 7.3 Shift in Supply Due to Transaction Cost Reduction

(Sheth & Subramanian, 2018)

The impact on social welfare through the use of smart contract systems also extends to the demand curve through lowered transaction validation, claim and reporting costs, as seen in Figure 7.4 (Sheth & Subramanian, 2018). These dual upward shifts could equate to a new market equilibrium, and the provision of more insurance at a lower cost. This would be a benefit to both providers and consumers; it is the disruptive potential of integration of blockchain based insurance products.

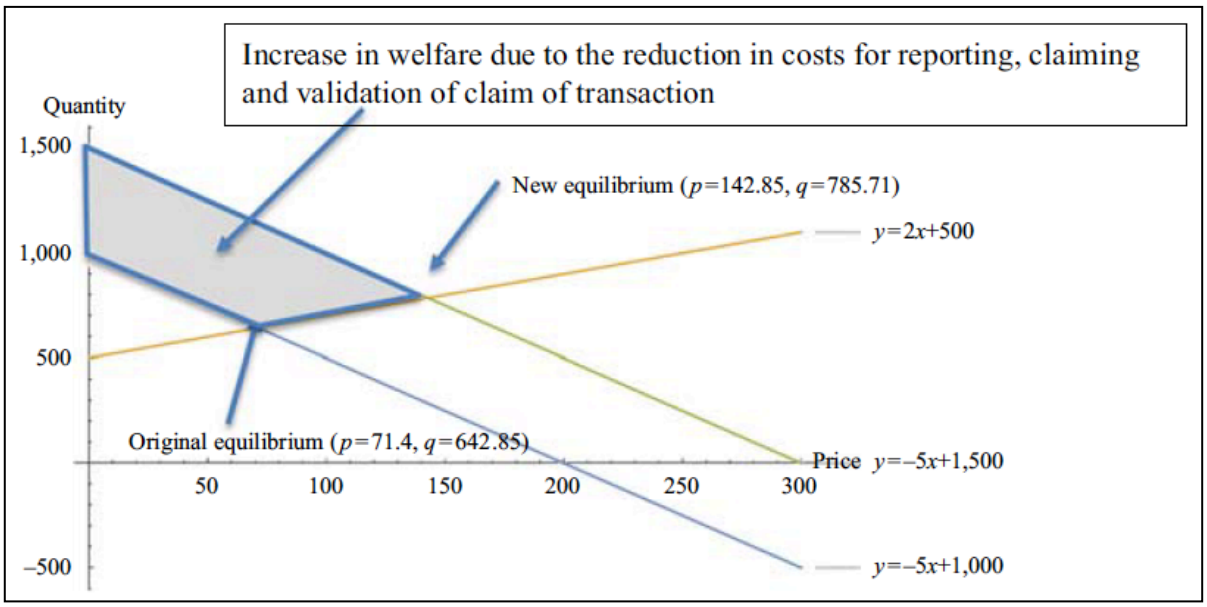


Figure 7.4 Shift in Demand Due to Transaction Cost Reduction

(Sheth & Subramanian, 2018)

Smart contracts have the potential to automate and reduce the costs associated with the creation, storage and retrieval of insurance contracts through the use of standardised templates and the creation of contract repositories (Sheth & Subramanian, 2018). Recycling of computer code is common practice in the software industry to avoid duplication of effort.

A real world example of long-term integration of technology in the UK insurance market is the company Quotemehappy.com, a subsidiary of Aviva plc. It has been in operation since 2015. They automated the application process and provide no means of human interaction. They do not maintain a call centre; all requests are handled via email (Aviva, 2020). Central to their business model is limiting their customer base to a tranche of low-risk customers (Over50Choices, 2021), for whom there are fewer exceptions requiring codification. Thus, call centre jobs previously common for compliance with multiple minor mandatory regulatory requirements have been completely eliminated. It is evidence of the slow creep technology has already had on financial services in the UK.

Direct Line was the first British insurance company to offer car insurance via contact centre without the need for an intermediary broker beginning in 1985 (Direct Line, 2021). It took just 30 years to go from the previous paradigm of insurance sold by independent agents to a fully automated and vertically integrated application process. This is what financial services are becoming – products purchased from an internet based application that eliminates both front line workers and trusted

intermediaries. Due to blockchain and smart contracts, this disruptive change is becoming even more automated.

7.2.2 **Etherisc**

Etherisc has made the use of smart contracts on the blockchain a reality. Their flight delay insurance on the Ethereum platform was the first ever insurance product to go live on blockchain (Etherisc, 2017). Etherisc is that it is not just a company per se. It defines its mission as:

> A protocol to collectively build insurance products. Common infrastructure, product templates and insurance license-as-a-service make a platform that allows anyone to create their own insurance products (Etherisc, 2020c).

Etherisc has a split corporate structure. One half is a not-for-profit organization known as the Decentralized Insurance Foundation. The other consists of jurisdiction specific insurance companies bundled within a for-profit commercial entity. They state that these entities are: Etherisc Holding AG (Germany), Etherisc MT (Malta), Etherisc DE (Germany) and Etherisc US (United States). The documentation does not explicitly state whether at present if these companies actually exist or are only a concept (Etherisc, 2020a).

As of 15/06/2020, a search of the Maltese Business Registry (MBR) for a company named 'Etherisc' yielded no results. A search of the company registry for Germany for 'Etherisc' did; this was for Etherisc GmbH. The difference between the company designations AG (publicly limited company) and GmbH (private limited liability company) is considerable. An AG is listed on a public stock exchange; a GmbH is any private company. The directors listed at the company register for Etherisc GmbH are the same as listed on their website. Initial share capital was listed at €25,000.00 (Unternehmensregister, 2020). As Etherisc is a private company, no other information was publicly available.

Etherisc have several parametric insurance products in various stages of development. They use automated data feeds and algorithms for underwriting and determining whether payment is due. If the conditions stipulated in a contract occur, payment is made by means of a self-executing smart contract (Etherisc, 2020a). Etherisc have designed products for hurricane protection, crypto wallet insurance and collateral protection for crypto-backed loans and are prototyping products for crop insurance and social insurance. As of June 2020, flight delay insurance was the only product available to consumers (Etherisc, 2020b).

Flight insurance can be purchased up to one month in advance for flights between approximately 104 international airports only. The underwriter is Atlas Insurance PCC Limited, a cell company

registered in Malta, registration number C5601 under the jurisdiction of the Malta Financial Services Authority. The contract is deemed to be Maltese and governed by Maltese law. Flight times are provided by www.flightstats.com, which is owned by US company Flightstats Inc. Contracts exclude delays less than 45 minutes, reckless or fraudulent behaviour on the part of the insured, war, terrorism, airline insolvencies and as of 2020 - pandemics (Etherisc, 2020d).

The most novel aspect about the flight delay insurance is its claims process - there is not one. It is exactly the type of insurance use the CFTC forecast would be possible (CFTC, 2018). Insurance claims generally require the insured to provide a large amount of documentation and can become an administrative battle between the insured and insurer. Compensation paid equates to reduced profit. Because the contract with Etherisc is based on outside information and functions by means of smart contracts, should a recognised flight delay occur, compensation is automatically initiated by Etherisc (Etherisc, 2020d).

No other information was available to gauge uptake of the flight insurance. This is not particularly important. Like a vending machine, the system is designed to run with little or no dedicated labour other than IT support. The system can by design lie idle until approached by a customer.

This is the future of financial services - automated systems providing services without the need or expense of customer support or claims agents. What this means is Rohr considers the legal framework of smart contracts being akin to a vending machine, the CFTC sees the logic of smart contracts being that of a vending machine and from Etherisc we see that from the business staffing and customer viewpoints the product functions like a vending machine (CFTC, 2018; Etherisc, 2020b; Rohr, 2019) Based on these multiple perspectives, what blockchain based smart contract systems appear to be is a 21st century iteration of the vending machine.

7.2.3 Energy Efficiency

The energy efficiency market involves the financing of large-scale efficiency measures, like converting bus fleets to be electric, retro-fitting public buildings with high-efficiency HVAC systems or widespread implementation of smart meters (IEA, 2019). The International Energy Agency valued it between $310-360 billion in 2011 (Thorpe, 2017). The move towards a more energy efficient future not dependent on resource depletion and more conservative means of consumption is bringing entrants to the market who are looking to capitalise on the opportunity.

7.2.4 EFFORCE

EFFORCE is a company billing itself as:

> The first blockchain-based energy-saving platform. Efforce is the first platform that allows contributors to benefit from the energy savings generated by energy efficiency projects worldwide (EFFORCE, 2019b).

It is also Maltese based. A search of the MBR shows the company is listed under registration number C86901, dated June 20, 2018; their registered office is 171 Old Bakery Street in Valetta (Malta Business Registry, 2020). Their annual return for 2019 shows only that they have 1,200 ordinary shares of issued capital at a value of €1 each (EFFORCE, 2019a). Apple co-founder Steve Wozniak (Woz) had taken an 11% investment in the company; this stake was worth only €132 (Kelly, 2019; Malta Business Registry, 2020).

EFFORCE describes its business model as:

- Investors can participate in energy efficiency projects by acquiring tokenized future savings.
- Companies benefit from energy efficiency improvements at no cost and the resulting savings are written in real-time on the blockchain.
- A blockchain based smart contract redistributes the resulting savings to token holders and the companies without intermediaries based on exact consumption and savings data.

(EFFORCE, 2019b)

Like Etherisc's flight delay insurance, the EFFORCE model is built upon using the records of measurements stored in the blockchain. The savings are redistributed to token holders by means of smart contracts without any intermediaries (EFFORCE, 2019d). Per the Financial Times, the white paper on offer in 2018 was deleted from their website (Kelly, 2019); as of 2020 another was available. It stated it was being delivered only to selected persons, no one could disclose its contents and the sale of its tokens was not directed at a wide range of persons including Americans (EFFORCE, 2019c). Exclusion of US persons is standard procedure so as not to ire the wrath of US regulators. The document defines itself as confidential and not constituting a prospectus, but is the only substantial piece of information available for prospective investors.

Due to his legendary status in the technology sector, Mr. Wozniak's involvement appears to be primarily as spokesman. As shown in Figure 7.5, in 2019, he was scheduled to be the opening speaker at Malta's Delta Summit. Mr. Wozniak did not appear at the conference, nor was there any mention of his absence.

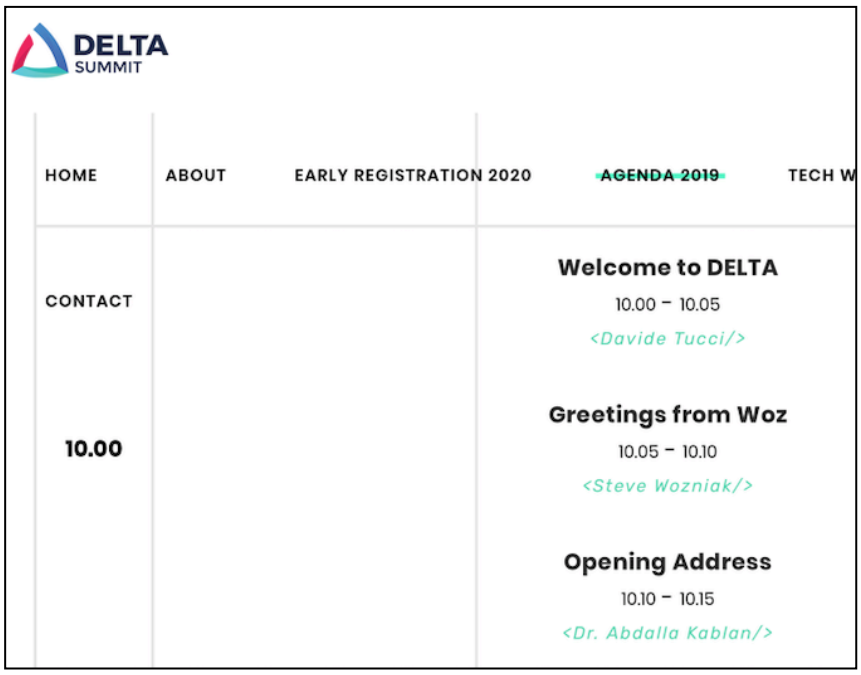


Figure 7.5 Delta Summit Agenda

(Delta Summit, 2020)

As seen in Figure 7.6, Woz's Twitter feed shows on the day he was set to speak in Malta - October 3rd ,2019 - he was actually travelling from Lima, Peru to Mexico City, Mexico (Wozniak, 2019).

Figure 7.6 Steve Wozniak's Twitter Feed

(Wozniak, 2019)

Despite not attending the event, the screenshot in Figure 7.7 shows he is listed a past speaker at the Delta Summit (Delta Summit, 2020). Due to his celebrity status, if Woz had spoken at any Delta Summit event it can be presumed this would have been publicized. Other than what has been presented here, this research has found no evidence of it actually happening. This is circumstantial, but does not instil investor trust.

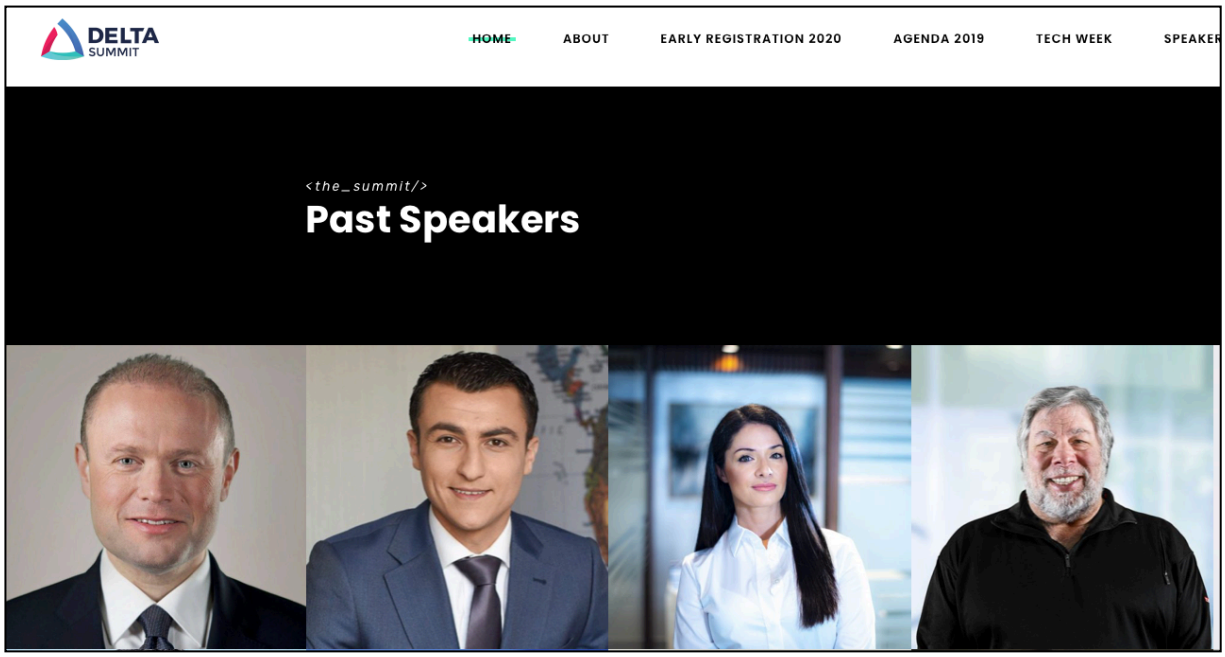


Figure 7.7 Delta Summit Website

(Delta Summit, 2020)

In 2018 EFFORCE was planning to raise $15-53 million in an Initial Coin Offering; the project never transpired (Kelly, 2019). Its website stated 45% of tokens (shares), would be offered through private placement (EFFORCE, 2020). On December 3rd, 2020 EFFORCE began trading on the cryptocurrency exchanges with the symbol WOZX. Its own press release states it reached a high of $950 million - approximately 10 times its list price in 13 minutes and closed around $1.48 (Ross, 2020). WOZX reached a peak value of $3.19 on the 9th of December; as of June 2021, the price had fallen as low as $0.58 (CoinMarketCap, 2021).

(CoinMarketCap, 2021)

It is not possible to assess the financial status of EFFORCE. It states at least 1% of all energy savings obtained will be redistributed amongst their token holders (EFFORCE, 2019c); this amounts to a dividend. It is an uncompetitive rate of return and not an enticement to invest. As of June 2021, no information was publicly available documenting exactly how and when these savings are realised and then distributed to token holders. The only apparent means for financial gain would be through share appreciation. Within EFFORCE's various press releases was one stating Mr. Wozniak's role is beyond publicity, yet they named their cryptocurrency after him – WOZX. This is mixed messaging.

Having reviewed EFFORCE's documentation, it still is not apparent how a company contracted with EFFORCE to receive investment that completes the project is then obligated to provide payment for the savings achieved back to EFFORCE for redistribution to its token holders "forever" (EFFORCE, 2019c). It is reminiscent of how prior to Enron's downfall in a conference call with investors their CEO could not explain to hedge fund manager Richard Grubman how they were so successful when they were the, "only financial institution that cannot produce a balance sheet or cash flow statement with their earnings" (Comas, 2012). Mr. Skilling responded by calling him an offensive name. EFFORCE were planning to make more information available later in 2021. When that happens, further assessment will be required.

7.2.5 **Business Use of Smart Contracts - Summary**

Legendary chairman and chief executive of Berkshire Hathaway Warren Buffett said, "never invest in a business you cannot understand" (Fox, 2019). Regarding certain fintech companies, it currently is not possible to adequately assess their financial performance or the validity of their business model if they do not publish audited financial statements. This gives rise to suspicion whether what is transpiring is another incarnation of the dot-com boom and bust and brings into question the

subject of trust. How can one be expected to place trust in any technology that is ultimately in the control of companies not forthcoming with their own financial status?

7.3 Hyperledger Fabric

Smart contract enabled blockchain technology is the platform many companies are looking to utilise for the potential efficiencies they can provide. As shown in Chapter 6, public blockchains are not able to scale and suffer from very slow transaction processing times (Chu & Wang, 2018). Hyperledger Fabric (HF) is the most widely used private blockchain platform for business solutions; it is scalable and able to support private transactions and confidential contracts. Trust is provided by the architecture of the system because it provides users only the information relevant to their needs (Blockgeeks, 2018; Hyperledger, 2017).

7.3.1 **Hyperledger Fabric Functionality**

The following section explains why HF is suitable for business use. Nodes on the HF network are separated into two distinct groups (runtimes), known as peers and consenters; consenters are also known as ordering nodes. Peers can either endorse or commit transactions to the ledger, whereas consenters are only able to provide authorisation for a transaction. This differentiation in abilities is the hierarchy that provides trust. In HF, an asset is anything that possesses monetary value. Asset types and values are created by businesses on the chain and represented by a collection of 'key-value' pairs, such as asset type and value; changes in their status become transactions recorded on the ledger. Software that defines the assets and the instructions for modifying assets are known as chaincode (Blockgeeks, 2018).

Scalability is achieved by businesses sharing chaincode; not every node is required to process all transactions. Peer nodes simultaneously batch and process transactions. Ordering nodes manage transactions and verify they are propagated through the network chronologically. The HF ledger has two components: the blockchain based record of transactions and the state database, which is a record of the blockchain's current state. The structure differs from open blockchains, which have no state database and require all nodes to process all transactions. It is the characteristic of the HF system providing processing speed and scalability and takes the place of the consensus mechanism in public blockchains for providing trust (Blockgeeks, 2018; Sukhwani, 2018).

HF chaincode is written in general purpose programming languages, like Go, Java and Node. This makes it more accessible to programmers who do not need to learn system specific languages. The difference between a smart contract and chaincode is a smart contract is executable code that adds information to the blockchain; chaincode is an administrative level grouping of smart contracts used

for low level programming in the system (HF, 2020). HF chaincode is further segregated into application chaincode and system chaincode.

System chaincode handles the tasks of:

- Lifecycle – Installation/implementing/updating of chaincode.
- Endorsement – Transaction endorsement.
- Validation – Transaction endorsement versus set endorsement requirements.
- Configuration – Channel configuration management.

(Sukhwani, 2018).

7.3.2 Advantages of Hyperledger Fabric

The HF database model is not only different from public blockchain architecture, it is also different than the traditional RDBMS model. With RDBMS, any one entity possesses an incomplete version of an asset's history and only knows information that has been provided directly to them. Manual recording of this information is susceptible to error.

The rationale behind incomplete knowledge is privacy. Information is proprietary; no one is willing to share sensitive information, like purchase price, with their competitors. HF does away with this by having the system itself provide privacy. The partial sharing of information between vendors makes HF's use appealing because rival businesses can exist on the same network (Blockgeeks, 2018). A unified version of the truth can be shared amongst participants.

As an example, imagine a business purchases goods from a foreign supplier. As illustrated in the traditional trade finance process in Chapter 6, many different parties are involved; not everyone needs to know everything. HF enables parties to receive only the information they require. Rather than have information passed along with a shipment or have either the sender or recipient of a shipment provide segmented information to each party involved in the transaction, the HF database model provides the information automatically. It also creates a chain of provenance and a means to trace a good's origin and history (Hyperledger, 2017).

The five core functionalities that comprise the modular design of the HF system are:

1. Two node types – peer and ordering.
2. Definition of asset types and consensus protocol for transaction ordering defined by businesses themselves.

3. Businesses set access permissions for whom can join their private channel on the network and what information they may receive.
4. The blockchain ledger contains a transaction log and current state of the chain.
5. Chaincode is the means by which assets are added, updated and transferred – it is a system of smart contracts.

(Blockgeeks, 2018)

7.4 Turnkey Smart Contract System Cost Benefit Analysis

International Business Machines (IBM) is a NYSE listed stalwart of the technology industry; it has been a component of the Dow 30 since 1979 (Schaefer, 2011). As of February 2021, its market capitalisation was $107.64 billion with annual revenue in 2020 of $73.62 billion (MarketWatch, 2021a). IBM recently brought to market an enterprise level blockchain platform built on HF. The potential costs and benefits of this new system will be further analysed. Due to the novel status of their product, "none of the organisations interviewed have deployed their full solution using IBM Blockchain Platform and Services" and, "none of the organisations interviewed could report the financial results of running a fully commercialized blockchain" (Forrester Consulting, 2018).

The interviewees provided costs incurred through their current phase of implementation, which enabled estimation of projected ongoing costs. Analysis of the projections follows. The original values are from, *Emerging Technology Projection: The Total Economic Impact™ Of IBM Blockchain – Projected Cost Savings And Business Benefits Enabled By IBM Blockchain* (Forrester Consulting, 2018). Due to uncertainties and inconsistencies, the values were fully replicated in spreadsheet format so that they could be cross-checked and audited.

Total Economic Impact™ is a methodology developed by Forrester Consulting consisting of a cost and benefit analysis framework. The four elements of the TEI approach are:

1. Impact on project cost
2. Impact on a business or business benefits
3. Creation of future options or flexibility
4. Risks or uncertainties

(CioIndex, 2018)

The following analysis uses the base values in the report for determining the range of outcomes and financial benefits transitioning to a blockchain system could offer. The issue being researched was

stated by EY in their 2018 report on global banking regarding IT investment. It may be better to be a fast follower than a first mover; investing in the wrong type of technology can be both a major financial and opportunity cost (EY, 2018). PwC also stated in their 2019 report on retail banking that banks are currently in a position of deciding whether they will lead on technological change or be a fast follower (PwC, 2019). This philosophy is known as, "The early bird gets the worm, but the second mouse gets the cheese". The six companies involved in the case study chose to be first movers. They are:

Alectra Utilities – A Canadian utilities company with net income in 2019 of $CAD 109 million and assets and liabilities totalling $CAD 4.65 billion (Alectra Utilities, 2020).

Chainyard - A US based blockchain consulting firm.

Interac Corporation – A Canadian financial services provider specialising in payment services and fraud detection privately held by 41 shareholders. Their 13 person hybrid board of directors is comprised of individuals who also hold positions such as Executive Vice President of Payments at Royal Bank of Canada, Senior Vice President Every Day Banking at Toronto-Dominion Bank and Executive Vice President at Scotiabank (Interac Corporation, 2020). No public financial records were available.

SecureKey – A Canadian identity and authentication provider. Its investors include Intel, Mastercard, Visa, Scotiabank, Toronto-Dominion Bank, Royal Bank of Canada and Discover (SecureKey, 2020).

We.trade – A joint blockchain based banking venture. Shareholders include Caixabank, Deutsche Bank, Erste Group, HSBC, KBC, Nordea, Rabobank, Santander, Société Générale, UBS, Unicredit and IBM (Anzalone, 2020). We.trade began using the IBM blockchain system for full operations in July 2018; as of October 2018 three additional banks joined the platform, which spans 13 countries (IBM, 2021).

The sixth participant, a global transport and logistics company, chose to remain anonymous.

These organisations have interdependencies amongst themselves, are invested in the success of blockchain at large and have close relations with IBM. This brings impartiality of the results of the case study into question, but this type of type of novel proprietary information usually is not available. The most robust values within the analysis were the costs associated with blockchain implementation, as they are the same for all revenue scenarios. The sum of these costs coupled with a 20% risk-adjusted increase provides a range of the total cost for transitioning to blockchain.

This analysis is a foundation for continued research on the quantifiable costs and benefits of transitioning to blockchain. It critically assesses the ability for savings generated by the blockchain system to cover transition costs and the range of scenarios of the financial benefits of using a market provided blockchain product. Until enough companies have fully implemented a blockchain solution for market averages to exist, knowing how much a transition to blockchain actually costs, the full value of its benefits to all stakeholders and whether turnkey blockchain solutions truly are advantageous, will require ongoing analysis.

7.4.1 Present Versus Future Value

The use of present and future value calculations is standard accounting practice to assess the future value of current assets should they have been invested by applying a discount or interest rate. This is usually the risk free rate of return based on a secure investment, like the three month US treasury bill (Downes & Goodman, 2003). The original study used a present value discount of 10%, yet reported the same values for all years (Forrester Consulting, 2018). The January 2021 US inflation and base interest rates are in Figure 7.8 and Figure 7.9; they were very low. Inflation was 1.4% (US BLS, 2021) and the federal funds rate was 25 basis points (NY Federal Reserve, 2021). Based on these factors, no discount has been applied.

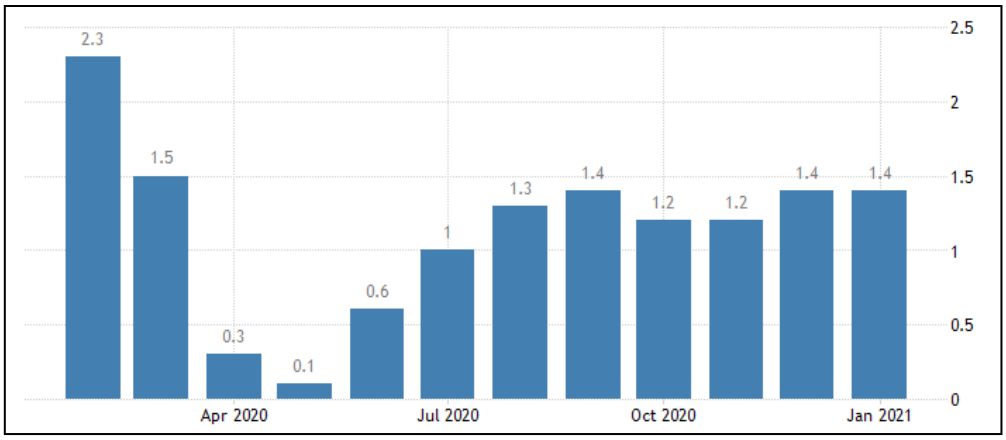


Figure 7.8 US Inflation Rate April 2020 – January 2021

(US BLS, 2021)

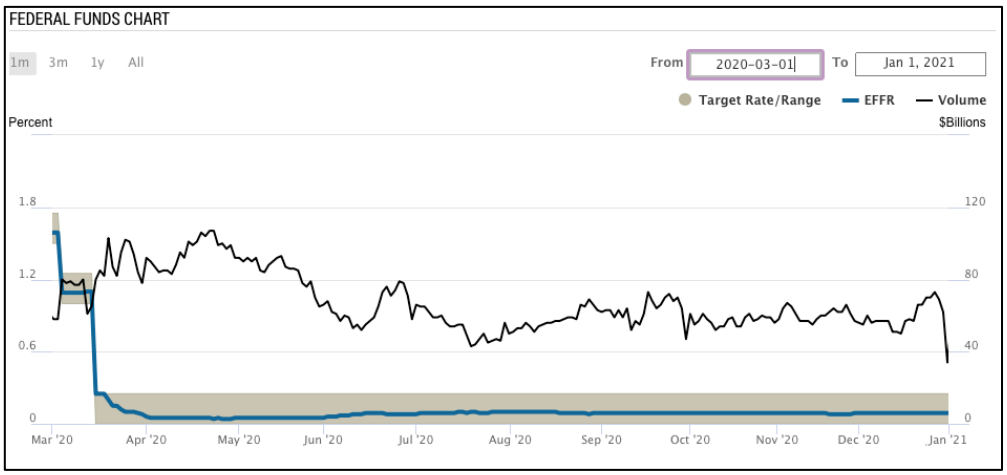


Figure 7.9 US Federal Funds Rate March 2020 – January 2021

(NY Federal Reserve, 2021)

7.4.2 Blockchain Costs

As detailed in Table A 1, (see appendices) the commercialisation phase costs for implementing a turnkey blockchain solution were estimated as was a 20% risk-adjusted increase in costs; these equated to $1,831,502-$2,197,803. Annual management costs of $770,000-$924,000 are listed in Table A 2. Initial pilot phase costs are $470,707-$564,848, see Table A 3. The estimate for total blockchain implementation costs in year one is $3,072,209-$3,686,651, as shown in Table A 4. This equates to a five year total cost in the range of $6,152,209-$7,382,651, also in Table A 4.

7.4.3 Capital Expenditure

Capital expenditure is usually depreciated over the useful life of a product and was not calculated in the original case study. It equates to an annual expense of $1,230,442-$1,476,530, which again totals to be $6,152,209-$7,382,651 for the five year period, see Table A 5. The projections are based on the use of a straight-line five year depreciation for the commercialized development and pilot costs and is a sum of $2,302,209, or $460,441.48 per annum. The risk-adjusted amount, is $2,762,651, or $552,530.26 per annum. These figures are also detailed in Table A 5.

7.4.4 Cost Benefits

These benefits are focused only on costs and do not include other potential advantages, like fraud avoidance, reduced shrinkage, increased market share or acceleration of revenue as forecasting these would be too speculative to be reliable. The benefits quantified are: membership and transaction revenue, streamlined documentation, reduced legacy systems, labour cost reduction and avoidance of capital and operating expenses. They have been estimated for low, mid-range and high-level revenue projections in order to present a wide range of financial scenarios. What is

unique about this blockchain system versus traditional IT systems is it is expected to generate revenue through the host company charging other companies for usage. This is possible through the generation of membership dues for access to the system and transaction fees for transactions completed on the platform. It is a paradigm shift as IT systems are expected to bring efficiencies to a business and reduce costs, but they are not considered a revenue generator. Because of the shared database capabilities blockchain offers, this is now possible.

7.4.5 Revenue Benefits

Membership Revenue – The total five year projections for membership revenue are $1,400,000 (low), $2,250,000 (mid-range) and $4,200,000 (high-level), see Table A 6. The original study used two different sets of values for membership revenue; the difference was unclear, see Table A 7. To provide the most prudent assessment, the lower values were used.

Transaction Revenue – The five year total transaction revenue projections are $10,174,500 (low), $31,464,000 (mid-range) and $56,592,000 (high-level), as shown in Table A 8.

Total Revenue – The sum of membership and transaction revenue is $11,574,000 (low), $33,984,000 (mid-range) and $60,792,000 (high-level), see Table A 9.

7.4.6 Revenue Versus Profit

Research by University of Michigan Professor Mark Perry found perception of how much net profit a company earns is overestimated. The general public assumes the average company earns around 36% net profit. Market average net profit from operating activities for the 6,000 US companies he reviewed was actually 6.9% (Perry, 2018). Certain sectors have much higher profit margins, such as tobacco at 43.3% and financial services at 26.4%. These are balanced out on the low end; over 72% of industry sector profit margins are less than 10%. High volume retailer margins are much lower; Walmart's is just 2.1% (Perry, 2018).

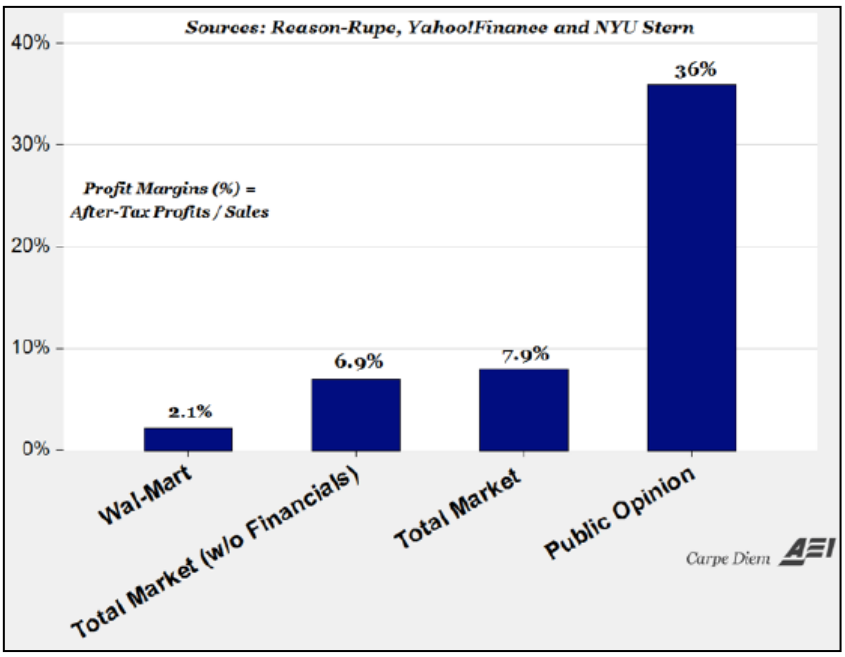


Figure 7.10 Profit Margins: Public Opinion, Actuals and Walmart

(Perry, 2018)

Net profit and total revenue are not the same, but if a business is able to keep its input costs or liabilities from rising, any gain in revenue should equate to a gain in net profit. When compared with Perry's analysis of market average profit margins, the values within the case study appear high, see Table A 10. The reason for the inflated revenue gains is projected gains in the underlying customer numbers, see Table A 11. In order to provide a more prudent forecast, revenue gains of 5, 10 and 15% have been used in comparison with the original figures.

7.4.7 Costs Versus Revenue Projections

7.4.7.1 Low Revenue

The low revenue projections in Figure 7.11 show the total blockchain costs of $1,230,442 will be fully covered by year two if a 15% annual gain is realised and by year three with a 10% gain. A 5% gain in revenue will cover blockchain costs by year five. Should costs be at the high range, as represented by the 20% increase, they will only be covered by a 15% annual gain by year four and with a 10% gain by year five. The risk-adjusted value will not be covered by a 5% p.a. gain by year five. Values are in Table A 12.

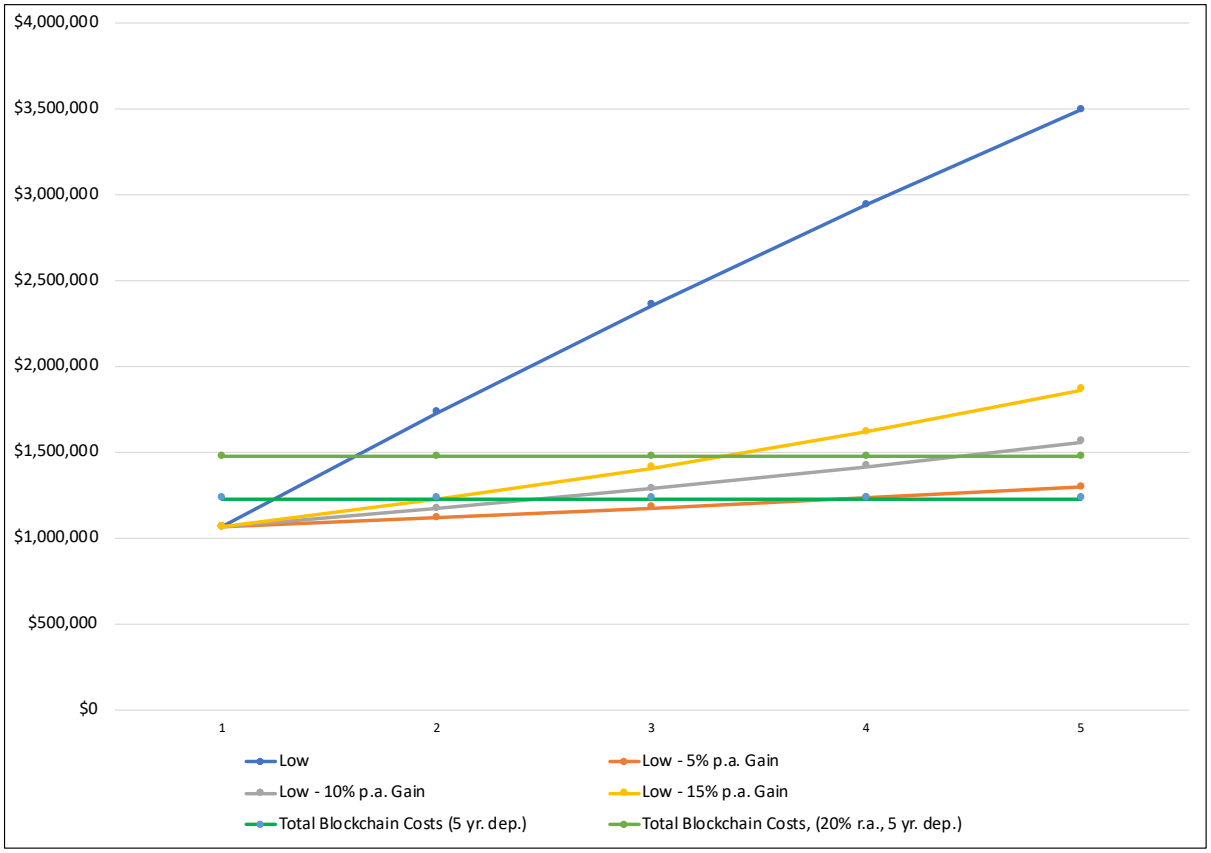


Figure 7.11 Projected Low Revenue Versus Total Blockchain Costs

7.4.7.2 **Mid-Range Revenue**

The mid-range revenue projections shown in Figure 7.12 will cover the cost of a blockchain system implementation at all points in all years, even for the upper risk-adjusted cost projections. Values are in Table A 13.

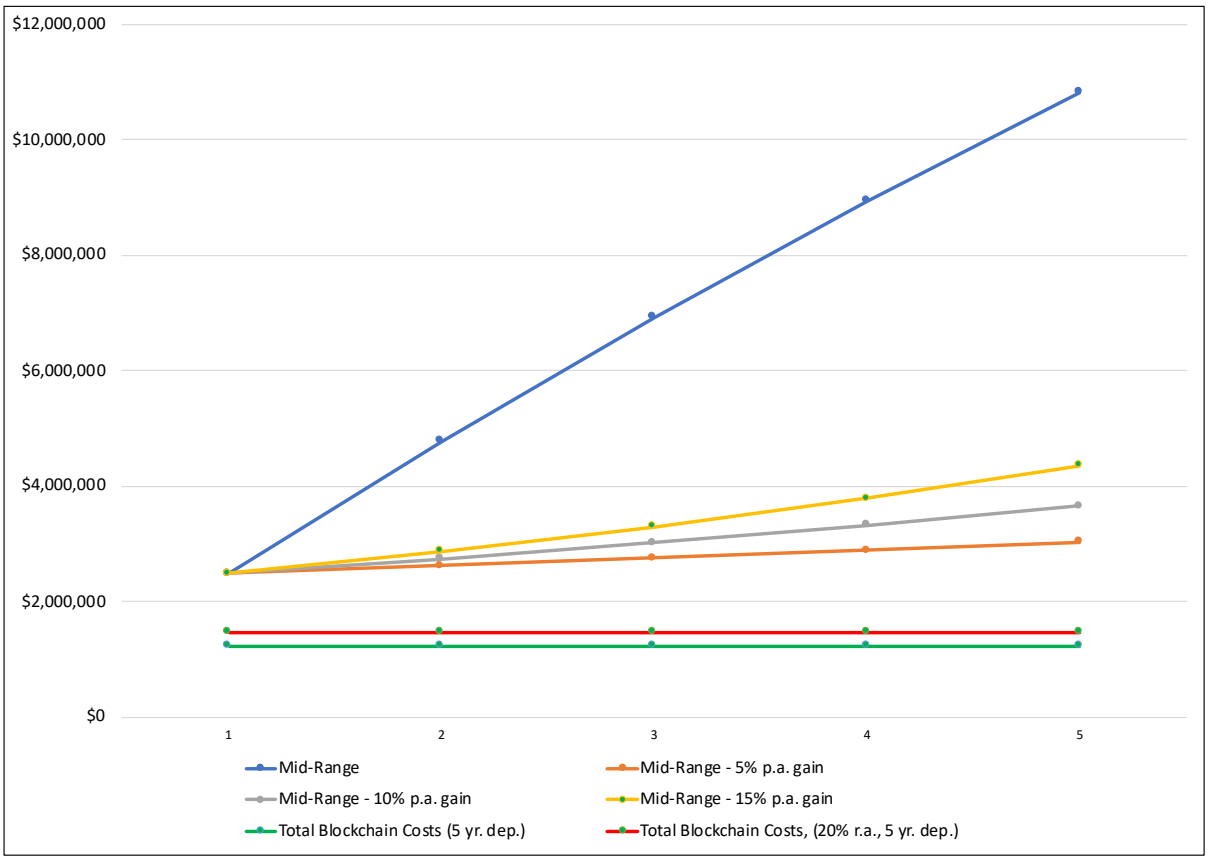


Figure 7.12 Projected Mid-Range Revenue Versus Total Blockchain Costs

7.4.7.3 **High-Level Revenue**

As illustrated in Figure 7.13, the high-level revenue projections will cover blockchain costs in all years in all revenue forecast scenarios. Values are in Table A 14.

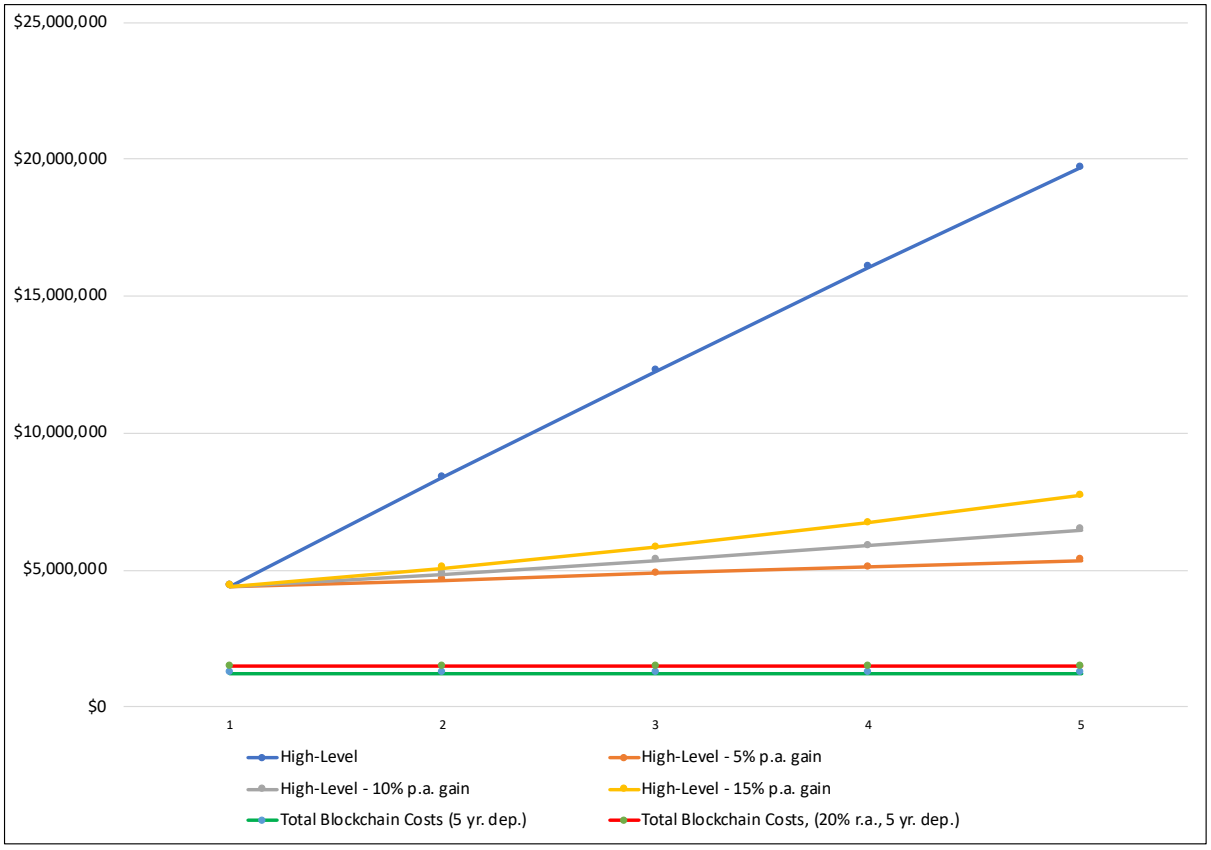


Figure 7.13 Projected High-Level Revenue versus Total Blockchain Costs

7.4.8 **Costs Versus Revenue - Conclusion**

What has been projected is the ability for a blockchain system to generate revenue. If the year one revenue values are correct, the other projections show for the most prudent projection calculated of 5% for the low revenue scenario, by year five it should be able to cover the low range cost estimate for a blockchain system, a 10% annual gain will achieve this in year three and for a 15% gain this will be in year two. The higher risk-adjusted costs will take longer to be covered, but any IT system that can be a source of revenue would be superior to one that cannot. This analysis also shows the original assessment for all three scenarios was too high to be reliable. As an example, for the high-revenue scenario, a 15% annual. gain equates to a total percentage gain in revenue of 74.9% from year one to year four. For the stated high-level gain in the case study, this would be 346.5%, which is optimistic.

7.4.9 Savings Benefits

Capital and Operating Expenditure - For the five year period, capital and operating expenditure savings are projected to be $8,840,000 (low), $22,100,000 (mid-range) and $35,360,000 (high-level). Full details are in Table A 15.

Streamlined Documentation - The annual benefit of streamlining documentation is estimated to be $300,000 (low), $1,205,000 (mid-range) and $2,860,000 (high-level). Five year totals for these three are $1,500,000, $6,025,000 and $14,300,000 respectively. See Table A 16, Table A 17 and Table A 18 for details.

Reduced Legacy Systems - The five year benefit of reducing reliance on legacy systems is projected to be $510,000 (low), $680,000 (mid-range) and $850,000 (high-level). Details are in Table A 19.

Labour Cost - Projected labour cost reductions for the five year period are $2,160,000 (low), $2,370,000, (mid-range) and $3,100,000 (high-level). Details are in Table A 20, Table A 21 and Table A 22.

Total Cost Reductions - Total five year projected cost reductions from transitioning to a blockchain based system are estimated to be $13,010,000 (low), $31,175,000 (mid-range) and $53,610,000 (high-level). Details are in Table A 23.

7.4.10 Total Blockchain Benefits

If the total costs of $6,152,209 - $7,382,651 are able to be offset against the projected savings, it would equate to total blockchain costs in the low range of ($6,857,791) to ($5,627,349), see Table A 24, in the mid-range of ($25,022,791) to ($23,792,349), see Table A 26, and ($47,457,791) to ($46,227,349) in the high-level scenario, see Table A 28. The values are negative because the benefits of blockchain are forecast to outweigh its costs. The ranges are decreasing in value because although costs have been forecast up 20%, the cost reductions have not. This is a significant finding and highlights the disruptive potential of transitioning to a blockchain system.

When comparing the projected value of transition to a blockchain system consider before any new IT system can be introduced, it must first be tested. Because the blockchain system being reviewed is new, potential benefits may not be attainable. In order to compare these two scenarios, the following analyses will examine the best outcome of cost benefits gained from transitioning to a blockchain system and the costs of moving to a blockchain system if no benefits are realised. This is to establish the extreme bounds of the potential benefits and detriments of being a first mover on implementing a turnkey blockchain solution. It is also because of the likelihood a company may want

to keep two systems operating in case blockchain does not prove to be functional in providing mission critical services. There will also likely be a transition period when a company must rely on legacy and blockchain systems simultaneously.

The following figures illustrate the best and worst case scenarios of transitioning to a blockchain system. Any company undertaking a capital investment, such as transitioning to a different IT platform, is unlikely to be making simultaneous capital expenditures on a third system. For this reason, a value that excludes capital expenditures for the total blockchain costs without benefits is also stated for the three scenarios. Although not graphically represented, it is these values that are the most realistic worst case financial scenario for a company considering blockchain. The scenarios presented where companies are seeing no cost reductions is the current state of those business models at present. By not transitioning to blockchain, those costs are to be expected.

7.4.10.1 **Low Revenue**

As shown in Figure 7.14, the five year total benefits for transitioning to a blockchain system with cost benefits included are projected to be in the range of ($6,857,791) to ($5,627,349). Full details are in Table A 24. If no cost benefits are achieved, this will be in the range of $19,162,209 to $20,392,651 and is illustrated in Figure 7.15 and detailed in Table A 25. Excluding capital expenditure for an additional IT system, makes the prudent estimate for costs after transitioning to a blockchain system without any financial benefits be from $13,962,209 to $15,192,651.

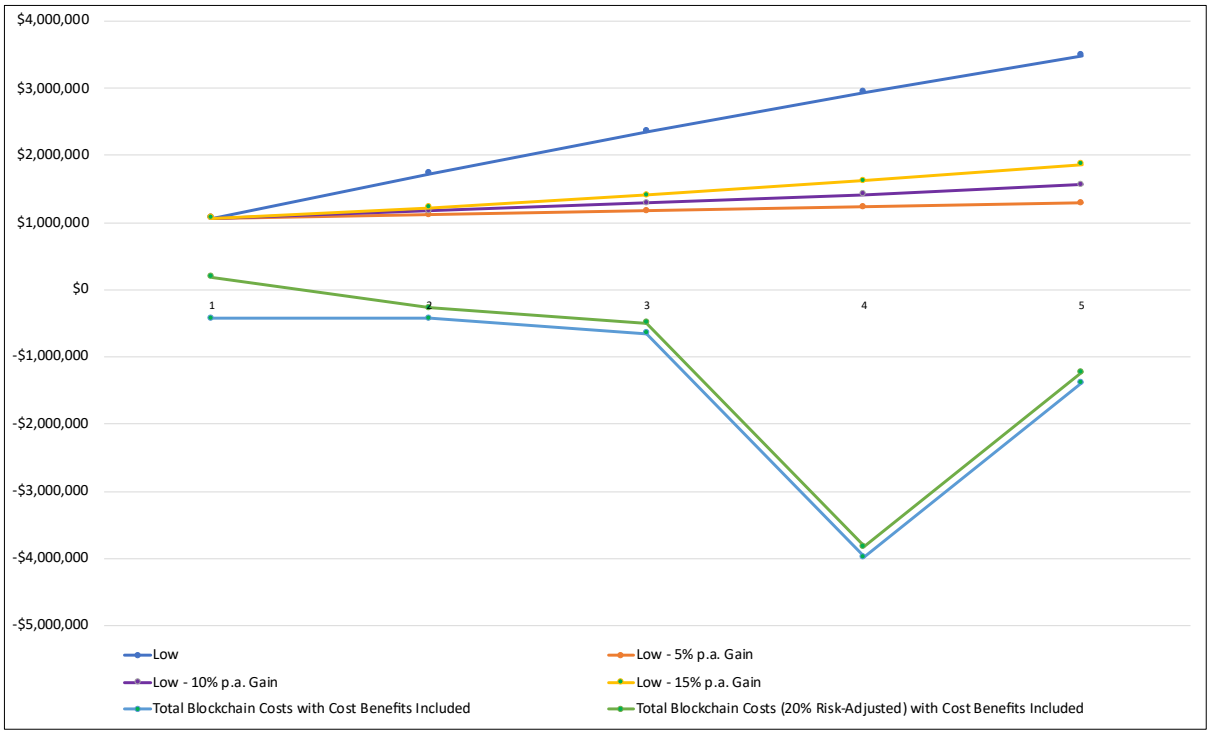


Figure 7.14 Projected Low Revenue Versus Total Blockchain Costs with Cost Benefits Included

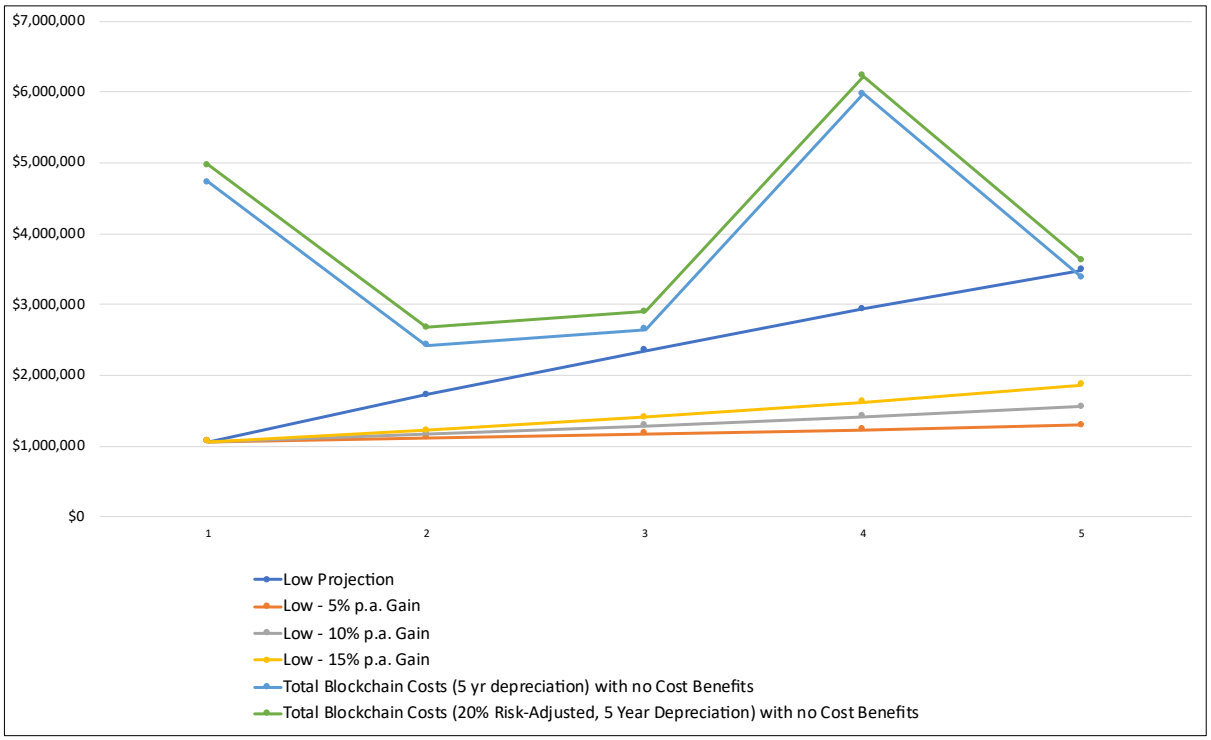


Figure 7.15 Projected Low Revenue Versus Total Blockchain Costs Without Cost Benefits

7.4.10.2 **Mid-Range Revenue**

As can be seen in Figure 7.16, the five year total benefits of transitioning to a blockchain system with cost benefits included are projected in the range of ($25,022,791) to ($23,792,349), details are in Table A 26. If no cost benefits are achieved, the value range is $37,327,209 to $38,557,651, see Figure 7.17 and Table A 27. With capital expenditure for an additional IT system excluded, the estimated cost of transitioning to blockchain and not realising any financial benefits would be between $24,327,209 to $25,557,651.

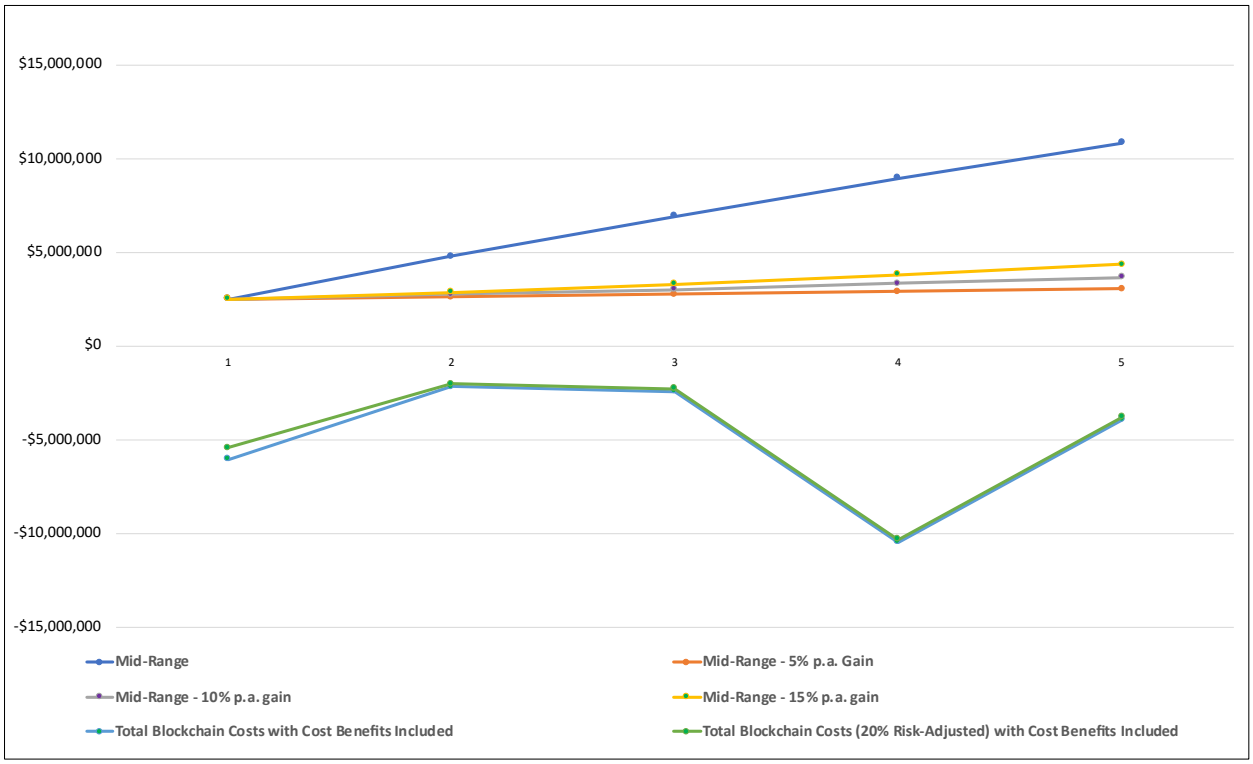


Figure 7.16 Projected Mid-Range Revenue Versus Total Blockchain Costs With Cost Benefits Included

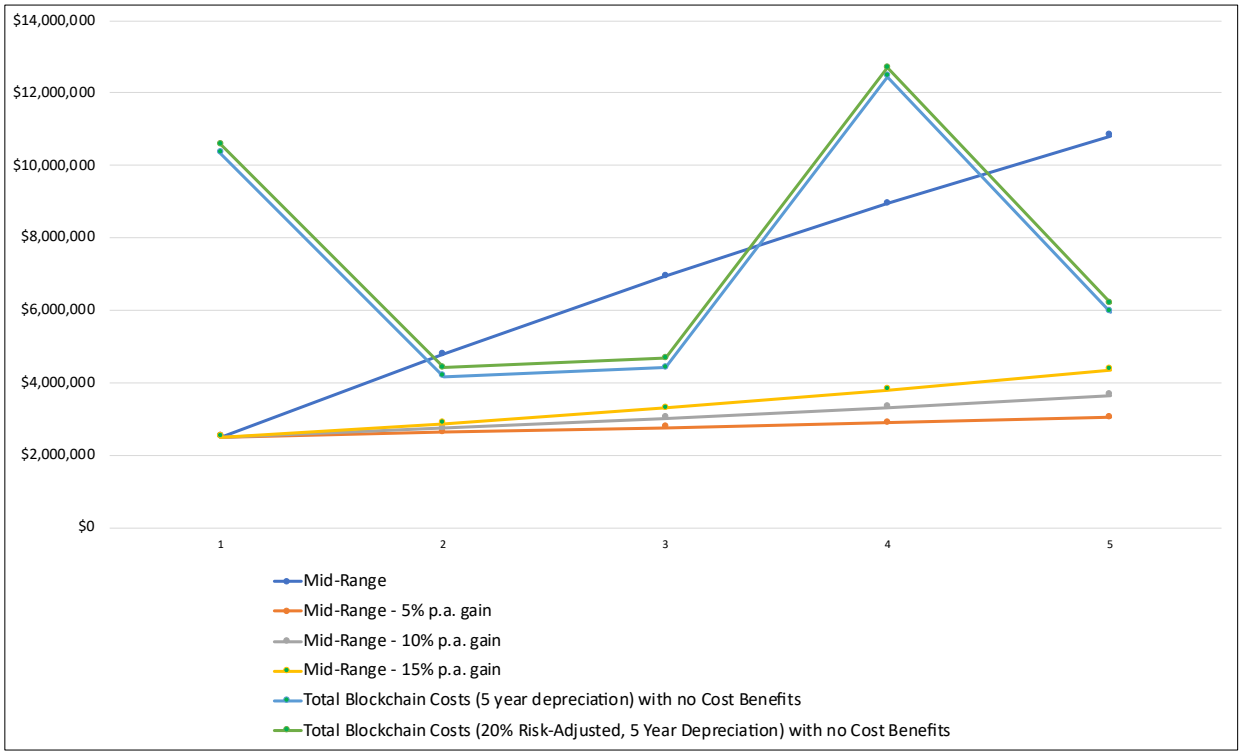


Figure 7.17 Projected Mid-Range Revenue Versus Total Blockchain Costs Without Cost Benefits

7.4.10.3 **High-Level Revenue**

As shown in Figure 7.18, the five year total costs for transitioning to blockchain with cost benefits included are projected to be in the range of ($47,457,791) to ($46,227,349), as detailed in Table A 28. If no cost benefits are achieved, this equates to costs of $59,762,209 to $60,992,651, as shown in Figure 7.19, details are in Table A 29. With capital expenditure for an additional IT system excluded, the prudent estimate for costs after transitioning to a blockchain system and not realising any benefits would be from $38,962,209 to $40,192,651.

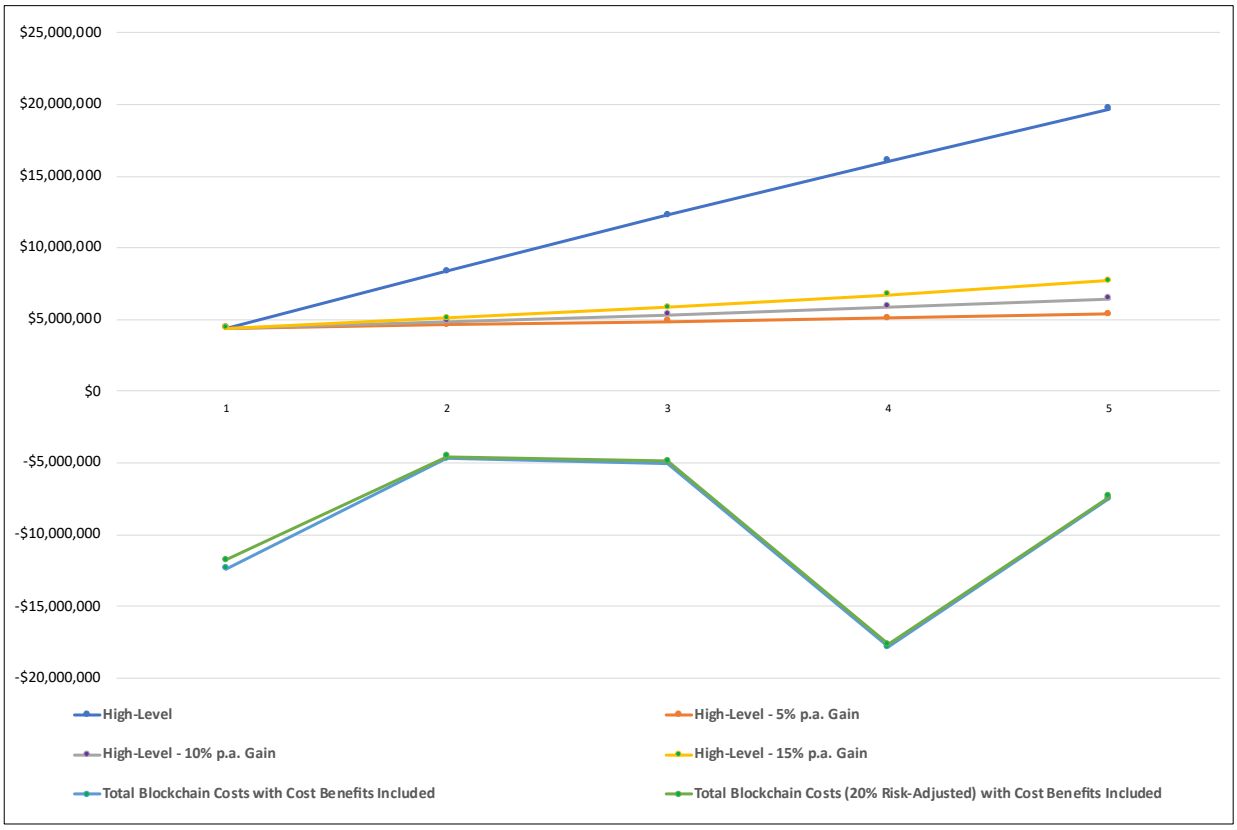


Figure 7.18 Projected High-Level Revenue Versus Total Blockchain Costs With Cost Benefits Included

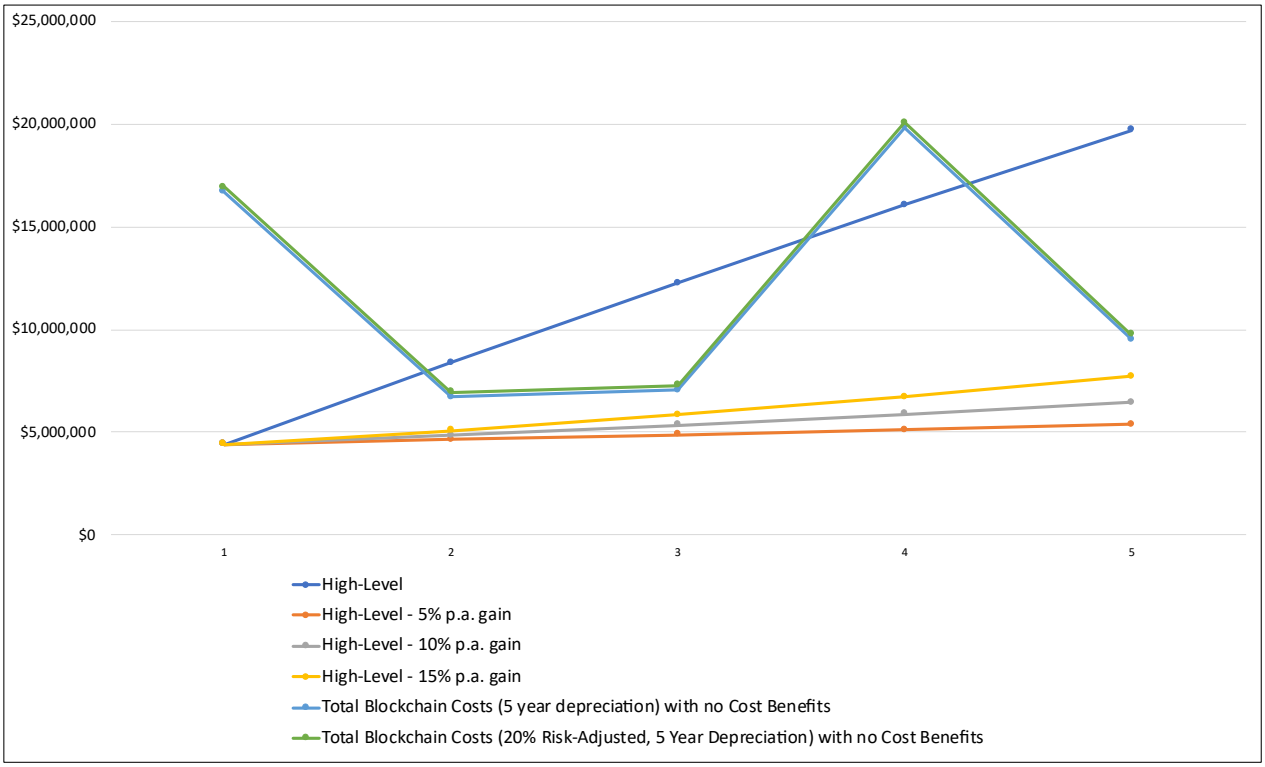


Figure 7.19 Projected High-Level Revenue Versus Total Blockchain Costs Without Cost Benefits

7.4.11 **Cost Benefit Analysis - Summary**

Table 7.1 summarises the extreme bounds of the potential cost benefits for companies that choose to be a first mover and transition to a blockchain system. This is independent of the costs of implementing a blockchain system versus the potential revenue it could generate reviewed earlier. The analysis shows should a company not transition to blockchain or not realise any efficiencies from switching, then it will still incur costs shown in the Without Benefits column. The With Benefits column shows the savings potential a blockchain system could provide. These are both extreme scenarios; the true value of a blockchain system will likely be somewhere in the middle.

Table 7.1 Total Blockchain Costs Versus Benefits

	With Benefits	Without Benefits	Difference
Low	$ (6,857,791)	$ 19,162,209	$ 26,020,000
Risk-Adjusted	$ (5,627,349)	$ 20,392,651	$ 26,020,000
No Capital Expenditure	$ (6,857,791)	$ 13,962,209	$ 20,820,000
No Capital Expenditure, Risk-Adjusted	$ (5,627,349)	$ 15,192,651	$ 20,820,000
Medium-Range	$ (25,022,791)	$ 37,327,209	$ 62,350,000
Risk-Adjusted	$ (23,792,349)	$ 38,557,651	$ 62,350,000
No Capital Expenditure	$ (25,022,791)	$ 24,327,209	$ 49,350,000
No Capital Expenditure, Risk-Adjusted	$ (23,792,349)	$ 25,557,651	$ 49,350,000
High-Level	$ (47,457,791)	$ 59,762,209	$ 107,220,000
Risk-Adjusted	$ (46,227,349)	$ 60,992,651	$ 107,220,000
No Capital Expenditure	$ (47,457,791)	$ 38,962,209	$ 86,420,000
No Capital Expenditure, Risk-Adjusted	$ (46,227,349)	$ 40,192,651	$ 86,420,000

Determining exactly where that is will require further analysis of companies that have fully implemented blockchain. Such an assessment could also quantify whether any of the other previously mentioned potential benefits have been realised by using blockchain. This is an area for future research. This cost benefit analysis has highlighted the disruptive potential using shared databases by means of a blockchain based smart contract system has to offer. Not only could it massively reduce standard business costs, it could also be a source of revenue. If blockchain is to be successful it ultimately needs to reduce costs. The fact blockchain has the potential to not only reduce operating expenditure, but also to provide a source of revenue means there is a likelihood its use may be a paradigm shift for business software.

Chapter 8 Trump Era Financial Legislation

8.1 Introduction

Chapter 4 assessed three major pieces of US financial legislation. With Sarbanes-Oxley, the US implemented clear, concise legislation that correlates well with ISO 9001. Dodd-Frank took direct action to prevent financial disasters, such as the GFC, from recurring and implemented the Basel III standards. With FATCA, the US passed a law that seeks to benefit its own interests on tax reporting whilst it has yet to comply with the Convention on Mutual Administrative Assistance and the Common Reporting Standard.

Within the literature review the presumptions of Boushey from March, 2017 of how despite what was on show for the media, the Trump administration's ultimate goals would be to deregulate the financial sector, remove consumer and environmental protections, foster privatisation and reduce social provision of health care and provide tax cuts for the wealthy were noted (Boushey, 2017). Her forecast has been proved by the legislation enacted during Trump's tenure. When the literature review was conducted, Dr. Boushey was just another source who had written on the subject at hand. In December 2020, she was chosen to be one of three members on President Biden's Council of Economic Advisors (CEA) (Rappeport & Tankersley, 2020). The two major laws passed under Trump were the Tax Cuts and Jobs Act of 2017 (115-97) (US Congress, 2017) and the Economic Growth, Regulatory Relief, and Consumer Protection Act (115-174) of 2018 (US Congress, 2018). These will be examined to gauge the regulatory direction of the US regarding deglobalisation.

8.2 Tax Cuts and Jobs Act

The Tax Cuts and Jobs Act became law on December 22nd, 2017. It is 186 pages in length and was a comprehensive and finely detailed overhaul of the tax code in more than 30 years (USDT, 2019). Full analysis of this act alone would be lengthy. The most outstanding actions of the TCJA have been covered, as they are representative of the other changes included. Analysis of the law revealed the following objectives:

1. Weaken the Affordable Care Act.
2. Develop hydrocarbon extraction.
3. Exploit US petroleum reserves.
4. Expand exemptions and reduce taxation for corporations and high-earners.
5. Eliminate exemptions and benefits for low-earners**.**
6. Increase taxation of offshore assets.

(US Congress, 2017).

The TCJA's changes are not of consequence to financial services, but are of direct relevance to the root causes for deglobalisation of growing economic inequality, decades of stagnant wages and rising national debts. What is of most importance is the concept of opportunity cost. At a point when the global economy had suffered and changed technologically and only so much time for action was available, the Trump administration chose to focus its efforts on the six aforementioned objectives. This is in contrast to what transpired with the EU. As detailed in Chapter 4, it has drafted directives focused on user privacy and the novel use of data in ways that will foster efficiency and the betterment of society and has also worked on reducing debts amassed due to the GFC.

8.2.1 **Weaken the Affordable Care Act**

Much of what Trump sought to achieve was a reversal of President Obama's legacy. Title I Part VIII, § 11081 accomplished this by repealing financial penalties for failing to maintain minimum essential health care coverage as specified in the Patient Protection and Affordable Care Act. A major underlying factor of deglobalisation is the lack of health care security core to the US economic model. This section of the law presents itself as empowering people to not have to purchase health insurance. What it actually does is enable those in need to choose to go without (US Congress, 2017). It validates Boushey's prediction (Boushey, 2017).

8.2.2 **Develop Hydrocarbon Extraction**

Title II, § 20001 states the Department of the Interior must establish a competitive program for the extraction of oil and gas from the Coastal Plain in the Alaskan Arctic National Wildlife Refuge (ANWR). It declares the Alaska National Interest Lands Conservation Act, which prohibits oil and gas production in the ANWR, does not apply to the Coastal Plain. It requires at least two lease sales to be conducted within 10 years of a minimum 400,000 acres each in the areas with the greatest potential for hydrocarbon discovery. Rights-of-way and access to 2,000 acres of federal land for production and support facilities are also permitted (US Congress, 2017)

With this act Boushey's prediction of Trump removing environmental protections and fostering privatisation has been put in place (Boushey, 2017). It is a giveaway to two of the three pillars of what Maczynska labelled the 'holy triad' of neoliberalism - privatization and deregulation. The third pillar, stabilisation, is supposedly the goal of this manoeuvre, but it appears to be asset stripping of public property (Maczynska & Pysz, 2010). The issue is also evidence of the back and forth nature of American governance.

On his last day as president, Tuesday the 19th of January 2021, per Trump's desires, the US Bureau of Land Management issued leases for nine of the eleven drilling bids that had been submitted at the January 6th auction (US BLM, 2021). The incoming Biden administration placed a moratorium on them the very next

day based on the adequacy of the environmental review process taken (Executive Office of the President, 2021).

8.2.3 Exploit US Petroleum Reserves

§ 20002 stipulates the increase of the offshore revenue sharing from $500 million to $650 million annually for Alabama, Louisiana, Mississippi and Texas during fiscal years 2021 and 2022 (US Congress, 2017). The four all Republican states; this was overt favouritism.

§ 20003 states that the Department of Energy must sell seven million barrels of crude oil, or up to $600 million, from the Strategic Petroleum Reserve (SPR) during fiscal years 2026-27 and deposit the proceeds with the US Treasury (US Congress, 2017). It is another drawdown of assets on America's balance sheet. The intent of the SPR was to enable the US to weather disruptions, like the oil embargoes in the 1970s. Reducing this supply is not in accord with the neoliberal concept of stabilisation. It is another case of privatisation and resource depletion. As will be examined, this was needed to compensate for the tax cuts enacted for higher earners and the expanding deficits they created.

8.2.4 Expand Exemptions and Reduce Taxation for Corporations and High-Earners

There are many changes enacted by the TCJA which fall into this category; the most notable will be covered. The biggest change from the individual's point of view are the changes to tax rates and allowable standard and itemized tax deductions.

8.2.4.1 Title I – Individual Tax Reform Part I – Tax Rate Reform

§ 11001 made temporary changes to the existing tax brackets, see Table 8.1. The tax rates are marginal, meaning higher tax rates are paid only on the portion of income within that tax bracket. It is a progressive system of taxation. The more someone earns, the more they progressively pay in tax on higher earnings.

Table 8.1 TCJA Tax Bracket Amendments

Previous Rate	Current Rate
10	10 (unchanged)
15	12
25	22
28	24
33	32
35	35 (unchanged)
39.6	37

(US Congress, 2017)

The changes also mean the greater someone's income, the more tax brackets they are subject to and more tax breaks they have been granted. A summary of the brackets and the respective income levels is listed in Table 8.2:

Table 8.2 Tax Cuts and Jobs Act US Income Tax Brackets

Tax Rate	Single	Married Filing Jointly	Head of Household	Married Filing Separately
10%	$0-$9,700	$0-19,400	$0-$13,850	$0-$9,700
12%	$9,701-$39,475	$19,401-$78,950	$13,851-$52,850	$9,701-$39,475
22%	$39,476-$84,200	$78,951-$168,400	$52,851-$84,200	$39,476-$84,200
24%	$84,201-$160,725	$168,401-$321,450	$84,201-$160,700	$84,201-$160,725
32%	$160,726-$204,100	$321,451-$408,200	$160,701-$204,100	$160,726-$204,100
35%	$204,101-$510,300	$408,201-$612,350	$204,101-$510,300	$204,101-$306,175
37%	$510,301 or more	$612,351 or more	$510,301 or more	$306,176 or more

(IRS, 2019a; Lazarony, 2020)

US taxpayers can either take the standard deductions listed in § 11021 or itemize their deductions. § 11021 temporarily increases the standard deduction to $24,000 for married individuals filing a joint return, $18,000 for head-of-household filers and $12,000 for all others. The amounts were indexed for inflation after 2018. Deduction limits were previously $12,700 for married joint returns, $9,350 for head-of-household and $6,350 for individuals and married couples filing individual returns.

§ 11022 enacts a temporary modification of the child tax credit to $2,000 from $1,000 for children under 17 and allows a $500 non-refundable credit for each dependent who is not a child under 17. The credit is phased out for adjusted gross income levels of $200,000 for individuals and $400,000 for married joint returns. The refundable portion is limited to $1,400 per qualifying child. § 11023 temporarily increases the income-based charitable deduction limitation from 50% to 60% for cash contributions (US Congress, 2017).

The result of the changes is the process of taxation is simplified for most taxpayers. The number of households itemizing was expected to drop from 26% of filers in 2017 to around 10% in 2018. For the four largest deductions, it means the cost of itemization for the IRS is it has been significantly reduced from $242.1 billion in fiscal year 2017, before the TCJA went into effect, to $108.1 billion in 2020, as shown in Table 8.3 (Tax Policy Center, 2020).

Table 8.3 Cost of Selected Itemized Deductions, Fiscal Years 2017-2020

Tax Expenditure ($ billion)	2017	2018	2019	2020
Deduction for all non-business state and local taxes	100.9	36.6	21.2	22.5
Deduction for mortgage interest on owner-occupied residences	66.4	40.7	27	30.2
Deduction for charitable contributions	61	58.3	46.7	48
Deduction for medical expenses and long-term care expenses	13.8	10.5	7.1	7.4
TOTAL	**242.1**	**146.1**	**102**	**108.1**

(Tax Policy Center, 2020)

As shown in Figure 8.1, the result of these changes is individuals are now paying more tax and businesses are paying less. For fiscal year 2021, it is estimated income tax will be 50% of IRS receipts, payroll taxes will be 36% and corporate taxes will be 7%. This is in contrast to 2015, when individuals accounted for 47% and businesses for 11% of tax receipts (Amadeo, 2020b). Figure 8.1 also illustrates how tax revenue in the US has continually increased, but since the TCJA went into effect in fiscal year 2018, the tax burden has been marginally shifted from businesses to individuals. This is evidenced by the increase in individual and estate and trust income taxes and decrease in business income taxes, both of which remained flat from 2018 to 2019.

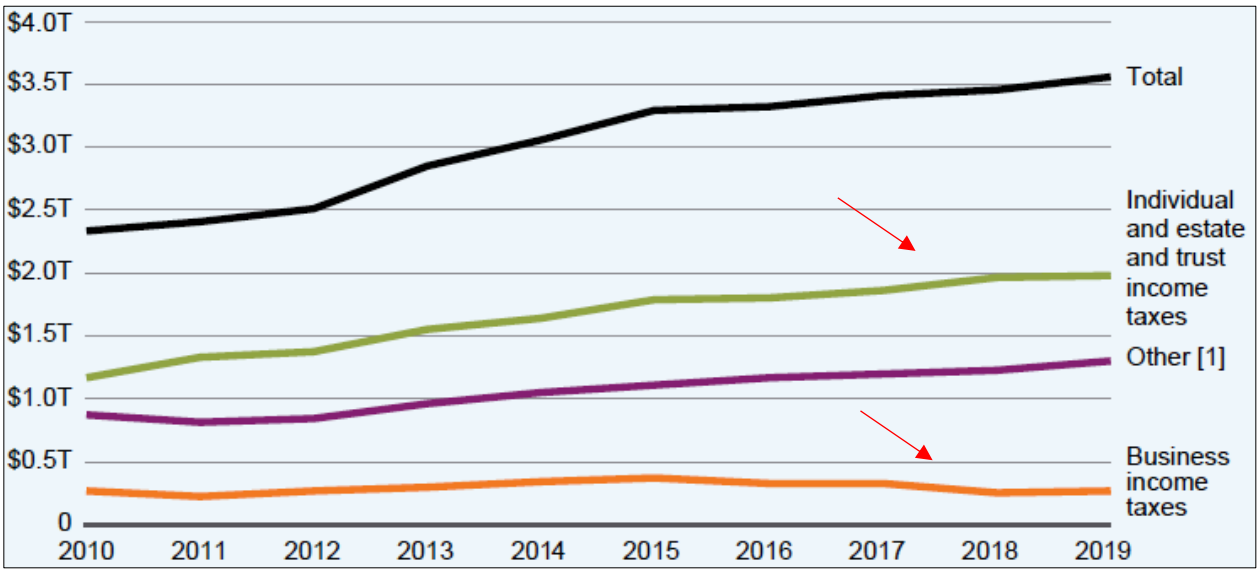


Figure 8.1 Gross Collections by Type of Tax, Fiscal Years 2010-2019

(IRS, 2020a)

Since 2017, the IRS' level of net collections (amount collected less refunds issued) rose from $2.979 trillion in 2017 to $3.112 trillion in 2019; gross collections were $3.416 trillion in 2017 and $3.564 trillion in 2019 (IRS, 2017; 2020a). As shown in Table 8.4, tax revenue in the US has risen, but as assessments in Chapter 9 will show its national debts have gone up even more.

Table 8.4 US Tax Revenue by Fiscal Year ($ trillions)

2021	$3.86 (estimated)
2020	$3.71 (estimated
2019	$3.46 (actual)
2018	$3.33
2017	$3.32
2016	$3.27
2015	$3.25

(Amadeo, 2020b)

As of 2009, average income in the US was $33,190 with a 50% confidence interval of $21,940-$52,920 and an 80% confidence interval of $17,140-$81,160. Median annual wage change was $800, or 2%, which equates to an average wage of $43,590 in 2021 with a 50% confidence of $32,340-$63,320 and 80% confidence of $27,540-$91,560 (WolframAlpha, 2021). As illustrated in Figure 8.2, as of 2013, over 42 million US households were in the 15% (now 12%) tax bracket (Greenberg, 2013).

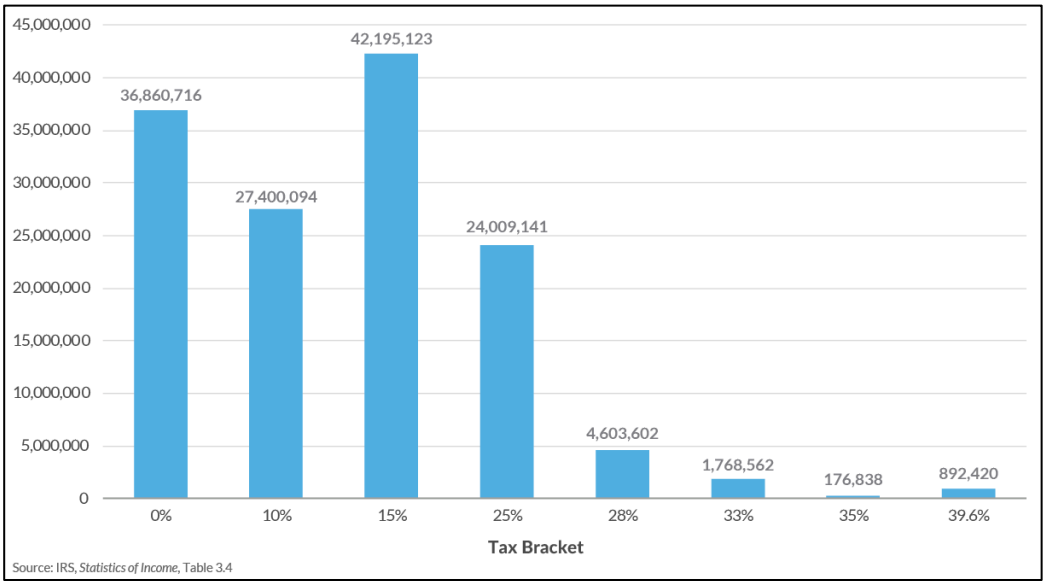


Figure 8.2 Number of US Taxpayers in Each Tax Bracket - 2013

(Greenberg, 2013)

Due to deductions, exemptions and credits, many of which are no longer available due to the TCJA and will be reviewed, this averaged out to 6.5% of income being due in the form of federal taxes (Greenberg, 2013). These tax breaks are not permanent. Beginning in 2021, automatic tax increases every two years will take effect that by 2027 will affect all groups with income under $75,000, which is about 65% of taxpayers. They will be paying more in tax in 2027 than they did in 2019 (Stiglitz, 2020).

What the tax reform enacted by TCJA has done for the majority of Americans is the exact opposite of what it promised. It is a long-run a tax rise for lower earners masqueraded in the short-term as a tax cut. As of 2027, there will be two distinct groups of taxpayers – those earning less than $100,000 (3/4 of taxpayers) and those not. Those over the $100,000 threshold on average will still be receiving a tax cut, those below will not (Stiglitz, 2020). This part of the legislation also favourably loosens regulations regarding unearned income of children, something beneficial only to those in possession of significant assets (US Congress, 2017).

8.2.4.2 **Part IV – Education**

§ 11032 allows 529 plan account funds - which are often deductible at the state level and are not subject to income and gains taxes - to be used for attendance at public, private or religious elementary or secondary schools. Previously these funds were only able to be used for secondary education (US Congress, 2017). This provides tax advantages for circumvention of the public school system. It is an encroachment of the private and religious sectors on the secular public domain and part of a long-term strategy aimed at social segregation by means of privatisation.

8.2.4.3 **Part VI - Increase in Estate and Gift Tax Exemption**

§ 11061 is a ***doubling*** of the estate and gift tax exemption from $5 million to $10 million for decedents dying or gifts made between 31/12/2017 and 01/01/2026 (US Congress, 2017). This exemption is only for the very wealthy.

8.2.4.4 **Subtitle B – Alternative Minimum Tax**

§ 12001 repeals the corporate Alternative Minimum Tax (AMT). The AMT was enacted to counteract the fact the US tax code is maze of loopholes and deductions. Its intent was to ensure parties able to use the code to their advantage in such a way to avoid all taxes are still required to pay some minimum amount of tax (US Congress, 2017). For corporations this no longer exists.

§ 12002 modifies the AMT credit for corporations to allow credits to offset regular tax liability for any tax year and makes the credit refundable for any tax year after 2017 and before 2022 in an amount equal to 50% (100% from 2021) of the excess of the minimum tax credit for the taxable year over the amount of the credit allowable for the year against regular tax liability. Previously, a corporation subject to AMT in any year is allowed an AMT credit in any subsequent taxable year to the extent that the taxpayer's regular tax liability exceeds its minimum tax in the subsequent year (US Congress, 2017).

§ 12003 temporarily increases the exemption amount and the phaseout thresholds for the individual AMT. It is increased to $109,400 for married joint filers, $54,700 for married filing separately, and $70,300 for all others. The phaseout threshold increased to $1 million for married joint filers and $500,000 for all others, other than estates and trusts. After 2018 these amounts are indexed to inflation (US Congress, 2017). This

elimination of the corporate AMT and increase of AMT exemptions for individuals is another of the sweeping changes to the tax code designed to benefit only the business sector and high-earners.

8.2.4.5 **Part III – Cost Recovery and Accounting Methods, Subpart A – Cost Recovery**

§ 13202 enacted an increase of depreciation limits for luxury automobiles and removed computers and their peripherals from being defined as listed property subject to additional substantiation and restriction requirements for expensing and business usage (US Congress, 2017). Businesses can now accelerate depreciation and deductions allowed for luxury cars and there is greater levity to how electronic technology can be used by business owners. This amendment is emblematic of the general loosening of the tax code for those with assets and high incomes by the TCJA.

8.2.5 **Eliminate Exemptions for Low-Earners**

The TCJA eliminated most exemptions for individual taxpayers. Also notable are the exemptions not disallowed for tax deduction purposes. Investment interest, which is interest due on money borrowed to fund an investment, is still available up to the amount of taxable investment income earned on dividends, royalties and interest. Amounts above the taxable investment income can be carried forward for future use (US Congress, 2017).

Specified in § 11050, gambling losses also have not been affected by the TCJA. They can include otherwise previously deductible expenses incurred in travelling to or from a casino, which would not be remarkable aside from the fact that Trump has long had interests in gambling (Fishman, 2020; US Congress, 2017). His casino in Atlantic City failed and his hotel in Las Vegas does not even have a casino. This was purportedly due to him being denied a license by the Nevada Gaming Control Board. It is a tangential subject that requires further substantiation, but appears at the onset to be plausible based on Trump being denied the ability to build a casino in Sydney, Australia in 1987 due to ‘mafia connections’ and from his mentorship by none other than the ignominious Roy Cohn, see Figure 8.3 (Castle, 2019; Von Drehle, 2018). Because residents at his Las Vegas hotel are not able to gamble on site, the allowance for deductions related to travel expenses to and from a casino is convenient. As with many aspects of the Trump administration’s actions, it indicates manipulation of the situation for his personal benefit.

Figure 8.3 Donald Trump and Roy Cohn - Trump Tower Opening October 1983

(Marcus, 2021)

§ 11041 suspends personal exemption deductions, modifies wage withholding rules and changes who is required to file a tax return. It also limits state and local tax deductions to $10,000 per year, but does not apply to taxes paid or accrued for businesses or trades regarding income generating expenses; it is another double standard for businesses. § 11045 is a full suspension of miscellaneous itemized deductions subject to the 2% floor of adjusted gross income. § 11046 suspends the limitation of itemized deductions when the AGI exceeds a specified amount (US Congress, 2017).

§ 11047 Suspends exclusion for qualified bicycle commuting reimbursements. It is an attack on environmental initiatives and their supporters and is the most specific and petty of this litany of amendments, especially when juxtaposed with the changes to depreciation on luxury automobiles. § 11048 suspends exclusion for qualified moving expense reimbursements, except for active duty members of the military as required by military order and a permanent change of station. US servicemembers are traditionally Republicans (Newport, 2009); this was direct pandering. § 11049 fully suspends deductions for moving expenses; businesses are still allowed this deduction (US Congress, 2017). This was one of the most important deductions previously available to the average worker and now makes the costs versus benefits of relocation for employment less advantageous.

Some of the most extreme TCJA eliminations are unreimbursed job expenses incurred, which cannot be deducted from 2018-2025. This includes tools, supplies, home office, legal fees and many more expenses related to a job. Instead an employee must seek reimbursement from their employer, which remains tax free as long as it is properly documented (Fishman, 2020). The result is employees are at the discretion of

their employer as to which expenses will be covered. It is a disenfranchising of an employee's ability to adequately equip themselves for employment. It also means more people will likely incur these expenses themselves without relief from taxation.

8.2.6 Corporate Tax Changes and Increased Taxation of Offshore Assets

8.2.6.1 Subtitle C – Business-related Provisions

Part I – Corporate Provisions

§ 13001 reduces the corporate tax rate from a maximum of 35% to a flat 21% rate after 2017. § 13002 reduces from 70% to 50% and from 80% to 65% the dividends received deductions to account for the lower corporate tax rate (US Congress, 2017). These changes are substantial, benefit only businesses and are far greater than the 2-3% tax cuts offered to individuals. The change in America's corporate tax rate has global ramifications. It is designed to function in conjunction with major changes to how global corporate income is taxed.

Prior to the 2017 Tax Cuts and Jobs Act (TCJA) the US operated a residence based corporate tax system. That system of taxation led to the use of inverted corporate structures of US corporations using offshore subsidiaries for sheltering worldwide income. International taxation has three main systems for tax computation: (1) Source based (territorial) – corporate profits are taxed based on the location of the production of goods and services. (2) Residence based (worldwide) – Corporate residence is the basis for taxation. This system provides foreign tax credits for avoiding double taxation. (3) Destination based – the location of sales is used for the determination of corporate taxes (Pomerlau, 2018; US Congress, 2017).

The TCJA includes aspects from all three methods for corporate taxation. It has attempted to reform the tax code by exempting foreign profits from domestic taxation while implementing provisions that prevent base erosion on foreign profits, intangible income and US income that has been transferred offshore. The modified US corporate taxation method is best described as a hybrid system of taxation because it contains features of both a worldwide (residence-based) and territorial (source-based) system of taxation. It is similar to what many OECD nations have implemented by introducing anti-base erosion provisions uncharacteristic of purely territorial systems (Pomerlau, 2018; US Congress, 2017).

The previous residence-based system taxed multinational corporation (MNC) income on worldwide profits. This meant they paid a 35% tax rate, but were given credit on foreign income already taxed. It allowed deferment of US taxes due on foreign profits as long as the profits were reinvested in foreign activities. The deferment did not extend to dividends, interest, rent or royalties, known as passive income under Subpart F of the US tax code, which were taxed on a current basis to prevent companies from keeping mobile financial assets abroad indefinitely (Pomerlau, 2018).

Residence-based taxation was thought to have motivated US MNCs to shelter around $2.6 trillion of profits offshore because additional US tax was due only when the funds were domesticated. It also meant if US companies moved their legal headquarters oversees they would only would pay US tax on domestic profits. This was considered to have put the US at a competitive disadvantage versus countries with territorial tax systems. For instance, a US company operating in Germany would pay local corporate taxes of 30% and 5% in the US too, but a French firm would not be subject to any additional tax in France on its German income (Pomerlau, 2018; US Congress, 2017).

The four provisions of the TCJA related to offshore assets are in:

> Subtitle D – International Tax Provisions, Part I – Outbound Transactions
>
> Subpart A – Establishment of Participation Exemption System for Taxation of Foreign Income;
>
> Subpart B--Rules Related to Passive and Mobile Income
>
> Chapter 1--Taxation Of Foreign-Derived Intangible Income and Global Intangible Low-Taxed Income;

and

> Chapter 3--Prevention Of Base Erosion Base Erosion and Anti-Abuse Tax
>
> (US Congress, 2017)

Assessment of what these accomplish and how they are designed to operate in conjunction with the change to the corporate tax rate follows.

8.2.6.2 §§ 14101 – 14103 Participation Exemption (PE)

Foreign profits relocated to the US are exempt from US taxation; it is most similar to a territorial system of taxation. PE means dividends paid on foreign profits to US parent corporations can be deducted fully against taxable income and are subject to no additional US taxation; it does not apply to capital gains. There are three requirements to qualify for PE. (1) a 366 holding day requirement, (2) the US company must own at least 10% of the foreign corporation's stock, either by voting rights or market value, (3) dividends that have received foreign tax benefits cannot be deducted against US taxable income, i.e. hybrid dividends are disallowed (Pomerlau, 2018; US Congress, 2017).

8.2.6.3 §§ 14201 – 14215 Global Intangible Low Tax Income and Foreign Derived Intangible Income

These categories create a minimum worldwide tax on income at rates lower than the new corporate tax rate of 21% and are designed to prevent the use of intellectual property (IP) for tax avoidance. Global Intangible Low Tax Income (GILTI) combats shifting of profits through IP and taxes earnings exceeding a 10% return on foreign invested assets at an annual rate of 10.5-13.125%. It is calculated annually by means of determining 'net tested income', i.e. all foreign profits earned by US corporations through controlled

foreign corporations (CFC) that has not been taxed by the US minus Qualified Business Asset Investment (QBAI), which is the value of depreciable assets owned by the CFC (Pomerlau, 2018; US Congress, 2017).

This sets an allowable rate of return of 10% and taxes the remaining profit. 50% of GILTI can be deducted. This will reduce to 37.5% in 2026, the remainder is taxed at 21%, resulting in an effective tax rate of 21% (16.406% as of 2026). Foreign tax credits are limited to 80%; any excess can be carried neither forward nor back. The purpose of limited foreign tax credits is so US companies are subject to a higher total tax burden, even if it is below the US rate and is a residence based method of taxation (Pomerlau, 2018; US Congress, 2017).

Foreign Derived Intangible Income (FDII) is a tax related to income derived from US intellectual property used for production of exports. It is calculated by deducting 10% of QBAI from foreign-derived income. 37.5% (21.875% as of 2026) of FDII can be deducted against US taxable income and equals an effective tax rate of 13.125% (16.406% as of 2026). It is most similar to a destination based taxation method (Pomerlau, 2018; US Congress, 2017). These two taxes should provide similar US tax rates to those MNCs enjoying favourable overseas tax regimes and motivate them to keep IP and profits stateside.

8.2.6.4 §§ 14221 – 14502 Base Erosion and Anti-Abuse Tax

The base erosion and anti-abuse tax (BEAT) is designed to prevent excess payments to foreign affiliates by US MNCs through asset stripping. It is resemblant of destination based taxation. It is a 10% (12.5% as of 2026) minimum tax designed to prevent shifting of profits away from the US through base erosion. It is only applicable to companies with $500 million or more in gross receipts and only if the US operation has made payments in excess of 3% of total deductions taken to related foreign corporations. It operates like a minimum tax and is due over and above standard corporate tax liability. It is calculated by adding base erosion payments back into ordinary taxable income and using it as a means for calculating modified taxable income. It does not include GILTI or FDII deductions or payments for costs of goods sold or dividends received (Pomerlau, 2018; US Congress, 2017).

8.2.7 Effects of the Tax Cuts and Jobs Act

The stated motive of the corporate tax rate cuts was they would amount to savings that would then stimulate corporations to make new investments due to equity holders receiving greater dividends that are then passed on through additional spending. It is a return to Reagan era trickle-down economics, which time and again, but most recently by Messrs Hope and Limberg of the LSE in December 2020, has been found not to work (Hope & Limberg, 2020). Their research concluded what has been known since the era of Thatcher and Reagan - regressive taxation leads to greater income inequality. As shown in Figure 8.4, since the TCJA came into effect, the US has seen the wealthiest 400 persons pay a lower combined rate of local, state and federal taxes than all other income groups.

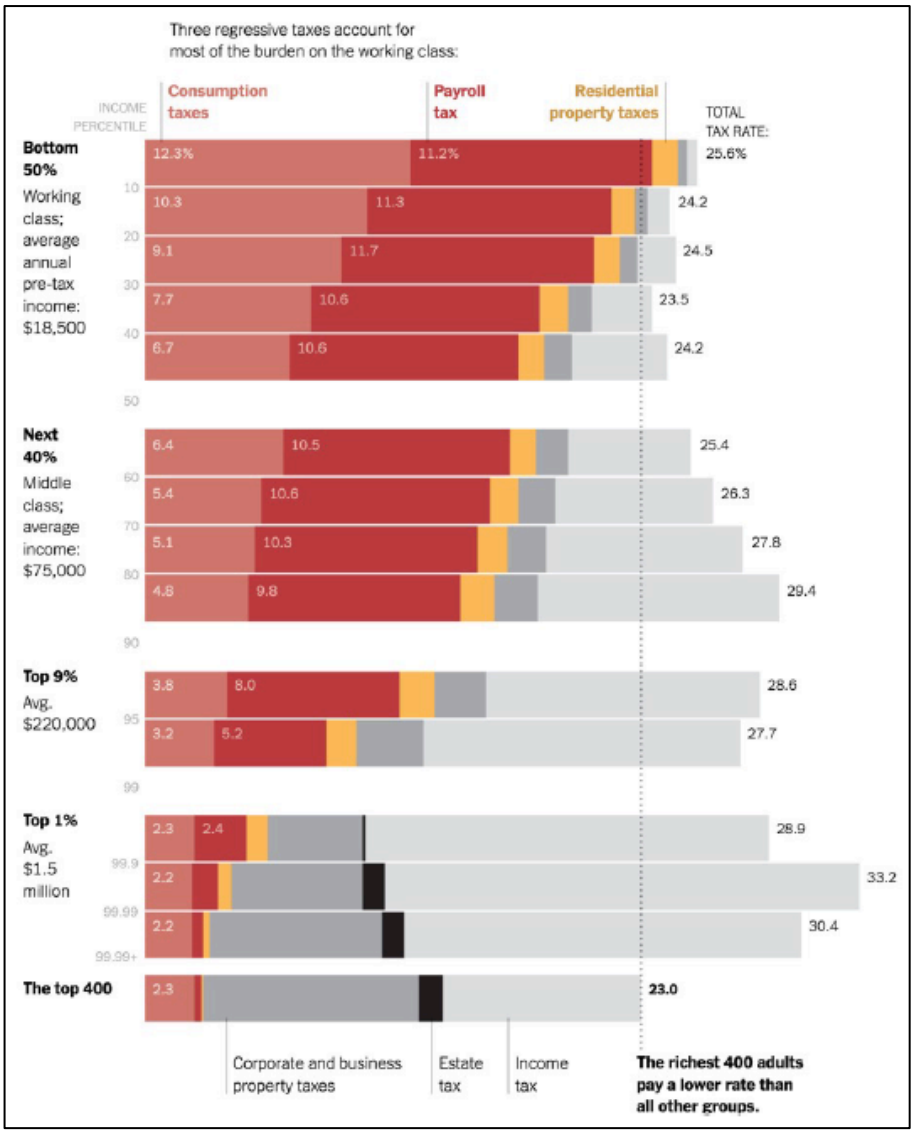


Figure 8.4 The Regressive American Tax System

(Saez & Zucman, 2019)

The Economic Policy Institute (EPI) contends greater investment likely would not be the outcome and it was just a corporate PR ploy because the tax cuts are creating greater budget deficits for the US. As seen in Figure 8.5, as of 2019 Q3, the year-over-year change in real, non-residential fixed investment was 1.3%. Since the TCJA came into effect, it dropped from a high of 6.9% in Q2 2018 (Blair, 2019). That was before Covid-19.

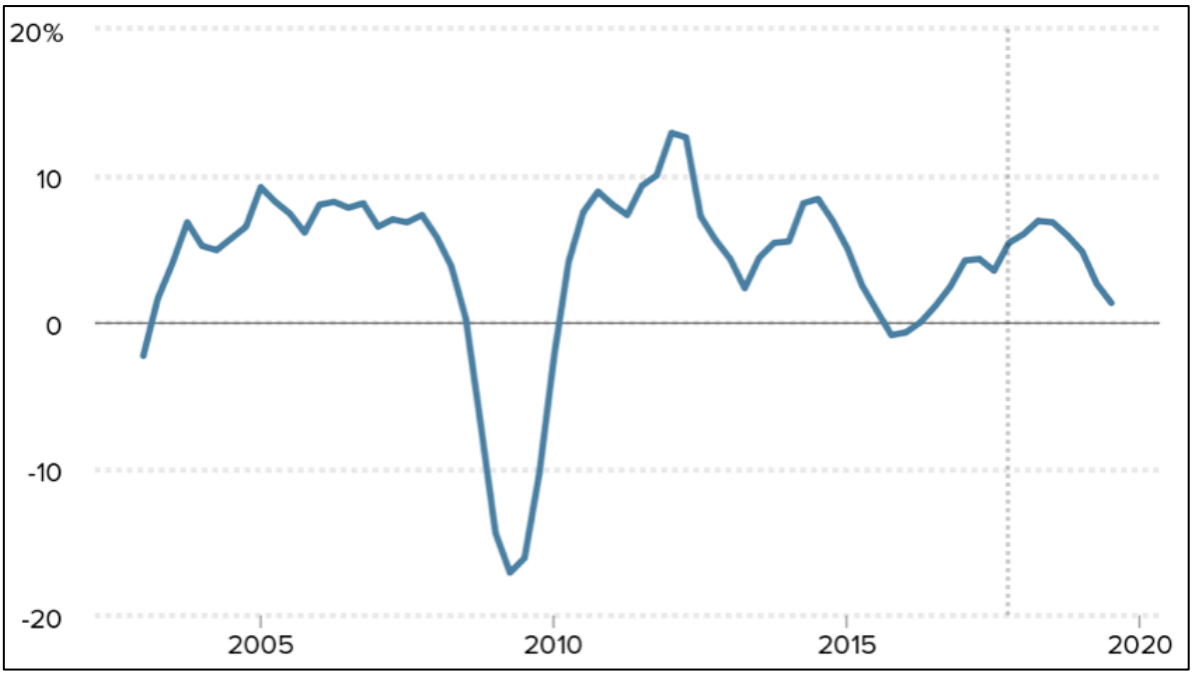


Figure 8.5 Year-Over-Year Change in Real, Non-Residential Fixed Investment, 2003 Q1-2019 Q3

(Blair, 2019)

What transpired was the opposite of the forecast by Trump's Council of Economic Advisors (CEA). The EPI also stated the tax cuts have not materialised in the form of increased wages or bonuses and are instead exacerbating rising income inequality. As evidenced in Figure 8.6, the drop in non-residential investment was accompanied by a fall in non-defense capital goods orders; as of August 2019 they were -0.4% (Blair, 2019).

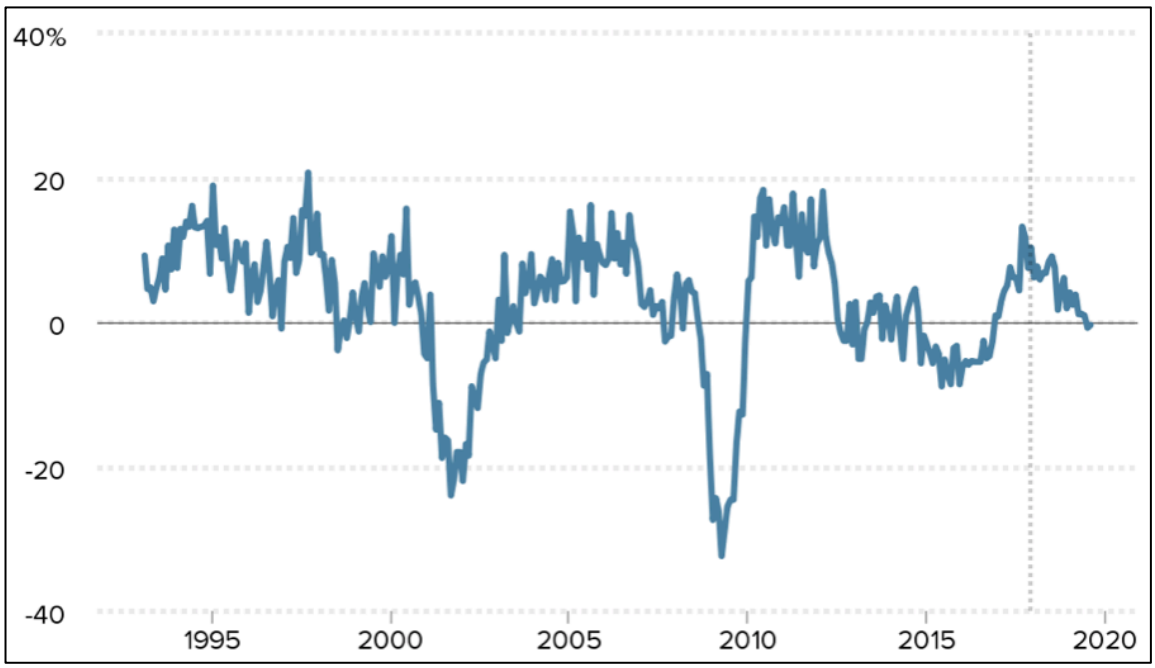


Figure 8.6 Change in Non-Defense Capital Goods Orders, Excluding Aircraft, 02/1992 – 08/2019

(Blair, 2019)

8.2.8 Tax Cuts and Jobs Act – Summary

The TCJA was promoted to the public by Trump as legislation that would bring jobs back to America. He said:

> Factories will be pouring into this country ... The tax cut will mean more companies moving to America, staying in America and hiring American workers right here (Trump, 2019b).

Research by economists Tørsløv, Zucman and Wier for the National Bureau of Economic Research found multinational companies are the main benefactors from globalisation because they have already sheltered close to 40% of their profits in off-shore accounts in places like Bermuda. Because of this, the reduction of the US corporate tax rate from 35 to 21 percent is unlikely to motivate MNCs to invest in the US; they are already receiving preferential tax treatment elsewhere (Tørsløv et al., 2018). The combination of the corporate tax change and changes on foreign corporate income mean income earned by US overseas subsidiaries is taxed at 10.5%, whereas domestic income is taxed at 21% (Kitroeff, 2018).

Kevin A. Hassett, Trump's Chairman of the CEA, argued wages are increased in countries where companies source their profits on paper. He estimated in 2017 that reduction of the corporate tax rate would create a medium-run average US household increase of $4,000-9,000 per year (CEA, 2017). Tørsløv, Zucman and Wier disagree, basing their conclusion on research showing MNCs operating in tax havens are much more profitable than local companies, which is not reflected in the incomes of US MNCs' local workers (Tørsløv et al., 2018).

Their research found economic growth is being underestimated and corporate tax revenues under-collected by advanced countries due to MNCs shifting on paper their profits to tax havens (Tørsløv et al., 2018), as will be further researched in Chapter 9. Stephen Shay of Harvard Law School is one academic who has concerns the changes might actually act as a motivator for jobs to be moved out of the US (US Senate, 2017). This is because US taxes are not due on foreign income earned from plant, property and equipment abroad if the earnings are less than 10% of the total investment (Kitroeff, 2018; US Congress, 2017). It means it is in a MNCs best interest to keep a level of production within the bound of this limit overseas.

What the TCJA has done in its entirety as forecast by Boushey is reduce access to the social provision of healthcare, give access to a wildlife refuge for oil drilling, sell off petroleum reserves, give businesses and high-earners greater exemptions and lowered taxes, reduce exemptions for low-earners and make domestication of untaxed offshore corporate assets more attractive by offering lower tax rates (Boushey, 2017). An analysis of tax havens in Chapter 9 will explain how this last item is an effort by the US to try and collect tax on worldwide profits that MNCs have already earned and sheltered from taxation by funnelling profits through somewhere like Ireland and then placed for later use in a tax haven. As of 2015, the Joint

Committee on Taxation had estimated the amount of offshore sheltered profit to be at $2.6 trillion (Kitroeff, 2018).

This analysis shows with the TCJA, under Trump the US did exactly what he said it would do - it placed America's interests first above all others. The TCJA is an exacerbation of the root causes of deglobalisation. The greatest potential threat of the TCJA is the opportunity cost of not focusing on forward-looking legislation that seeks to make the US a leader of financial regulation on technology.

The analysis of regulations in Chapter 4 found the US approach to fintech regulation is consumed by a battle between state and federal jurisdictions. The patent analysis in Chapter 5 found the technology behind the fintech movement is dominated by US businesses, but is primarily of interest to the US federal government only in as far as whether they control it. The TCJA is an example of how the short-term self-serving goals of neoconservatism are a detriment to the economic future of the US. This is different than the ordoliberal approach of the EU and its motive to utilise the benefits 21st century technology and big data by means of regulations like the European Data Governance Act (EC, 2020d).

8.3 The Economic Growth, Regulatory Relief and Consumer Protection Act

8.3.1 **Introduction**

The Economic Growth, Regulatory Relief and Consumer Protection Act (EGRRCPA) was ratified on May 24th, 2018. It is 74 pages long. It was designed to loosen the regulatory measures put in place by Dodd-Frank, which was a reaction to the GFC and an implementation of the requirements of Basel III. The motives of the EGRRCPA are to ease oversight of banks with less than $250 billion in assets and exempt community banks from key provisions of Dodd-Frank. Despite being labelled as a rollback of Dodd-Frank, it mostly remains intact (CBO, 2018; Schroeder, 2018; US Congress, 2018).

Key provisions are:

1. Larger banks had the systemically important financial institution (SIFI) threshold for enhanced supervision raised from $50 billion to $250 billion. It increased the asset threshold for company run stress tests from $10 billion to $250 billion and mandatory risk committees from $10 billion to $50 billion (CBO, 2018; Michel, 2018; US Congress, 2018). Banks below the $250 billion threshold are not automatically subject to annual Federal Reserve Board (FRB) stress tests or required to submit for approval to the FRB a 'living will', detailing how to sell off the its assets without creating a financial crisis (Lane, 2018).
2. The FRB was given ability to apply enhanced supervision requirements to any bank or bank holding company with assets of at least $100 billion as well as to tailor regulatory requirements on an individual basis based on the structure, size and type of financial activities or any other risk-related factors seen appropriate by its Board of Governors. Should it be deemed necessary, the FRB can

apply special standards to bank holding companies below the $100 billion threshold (CBO, 2018; Michel, 2018). Holding companies were originally designed to circumvent restrictions on bank branching, as covered in Chapter 4.

3. The community bank leverage ratio enables banks with less than $10 billion in total assets to be exempted from risk-weighted capital requirements; these were imposed in the 1980s and not by Dodd-Frank. Banks in this asset range are provided safe harbour from ability to repay rules if their business model is to hold mortgages they issue rather than sell them on the mortgage-backed security market (CBO, 2018; Michel, 2018; US Congress, 2018)
4. The most significant change is banks or credit unions below $10 billion are exempted from the Volcker Rule, so long as their liabilities do not exceed total assets by more than 5%. (CBO, 2018; Lane, 2018; Michel, 2018; US Congress, 2018). As covered in Chapter 4, the motive of the Volcker Rule is to prohibit proprietary trading between banks, hedge funds and private equity funds.
5. Firms holding fewer than 500 mortgages per annum are excluded from reporting information on home loans to federal regulators regarding anti-discrimination legislation (Lane, 2018). The US has an embarrassing history of racial discrimination in the home mortgage industry. With this exemption, whether or not this is again happening at those banks is unknown. As with hate crime reporting covered in Chapter 4, this exemption means in future the information will not even be available.

8.3.2 **Risks Posed by the EGRRCPA**

Detailed in Table 8.5, as of December, 2020 in the US there were 144 holding companies with greater than $10 billion in assets. Total assets held were $22.8 trillion; $14.259 trillion (62.45%) was held by the top ten banks; $12.273 trillion (53.75%) was held by the just the top six banks. Concerning the changes made to SIFIs, the Congressional Budget Office stated the changes would ‘slightly’ increase probability of a large financial institution failing (CBO, 2018; Michel, 2018). The largest banks are not able to avoid the full requirements of Basel III.

Table 8.5 Top 10 Large Holding Companies in the United States - 2020

Rank	Bank	Total Assets
1	JP Morgan Chase & Co.	$3,213,115,000,000
2	Bank of America Corporation	$2,741,688,000,000
3	Citigroup Inc.	$2,232,715,000,000
4	Wells Fargo & Company	$1,968,766,000,000
5	The Goldman Sachs Group, Inc.	$1,141,526,000,000
6	Morgan Stanley	$975,363,000,000
7	U.S. Bancorp	$546,652,000,000
8	Truist Financial Corporation	$504,336,000,000
9	TD Group Holdings LLC	$475,630,910,000
10	The PNC Financial Services Group, Inc.	$459,038,463,000
	TOTAL	$14,258,830,373,000

(NIC, 2020)

What is more disconcerting is the loosening of regulations on the community bank sector. As noted in Chapter 4, it accounts for 79% of regulated lending institutions in the US (CSBS, 2020a). As of 2018, 98% of Federal Deposit Insurance Corporation (FDIC) insured banks have assets below the $10 billion threshold (Richardson et al., 2018), and 10 banks have 62% of assets. The US has a two-tiered banking system.

Kress and Turk have written at length about the threats posed by the EGRRCPA, most notably in the *Northwestern Law Review*. They found three flaws with the loosening of regulatory oversight of the community banking sector. First, and most important, they are a source of systemic risk; when they fail, they fail as a group. This is something that happened in every US banking crisis, including the S&L Crisis and the GFC; it is known as the 'too-many-to-fail' phenomenon (Kress & Turk, 2020). It happened six times between 1819 and 1907, but back then all banks were small in comparison to today's market (Kress & Turk, 2019; NIC, 2020).

Three reasons small banks pose a systemic risk are:

1. Assets held are undiversified. By nature they are niche lenders and exposed to failures in one particular market, like agriculture loans or commercial real estate.
2. When viewed as a group, they are all subject to the same vulnerabilities, as they cannot diversify their product offerings like large conglomerates by offering foreign exchange, wealth and trust management or other products.
3. Because of the diminutive nature of community banks, they are generally held by a small number of local controlling shareholders who have the ability to use special dividends or other

means of capital distribution to reduce their equity in the bank and weaken its ability to withstand a crisis caused by default on its debts (Kress & Turk, 2019).

The second flaw with the regulatory loosening for community banks is Dodd-Frank already exempted them from its most significant rules and provided subsidies to offset their compliance costs. This indicates they were not overly burdened with regulatory requirements by Dodd-Frank (Kress & Turk, 2020). Accusations of increased regulatory burdens were more hyperbole than fact.

The third flaw is large banks and community banks are not in competition with one another. The community bank sector has increased its market share since the GFC and Dodd-Frank has not impacted its profitability. The number of community banks has reduced. This is due to changes in the banking sector as a whole; Kress and Turk assert it is not due to regulatory burden (Kress & Turk, 2020). Analysis of the European banking sector in Chapter 4 detailed how the number of banks in the EU has also declined.

The biggest issue Kress and Turk highlight is the EGRRCPA's loosening of oversight of the community bank sector is creating an opportunity for regulatory arbitrage. The Volcker Rule exemption for community banks specifies community banks have their exposure be capped at 5% of their assets. This is in excess of the minimum leverage ratio requirement for small banks that have not opted in to the Community Bank Leverage Ratio (CBLR). Early evidence indicates these banks are taking on more risk than prior to the law's passage because they are not subject to the stress tests that large banks must undergo. Were they to do this, many would not pass (Kress & Turk, 2020).

What has been seen throughout the history of US banking regulation in the late 20th up to now is laws being continually passed that either weaken or strengthen regulatory oversight by allowing or preventing the exploitation of loopholes that exist due to the verbose and convoluted nature of US legislation. This has again happened with the EGRRCPA. It means hedge and private equity funds are now able to exert greater influence on the community bank sector, whose directors by nature are less sophisticated in managing the more risk prone types of investments these funds invest in, as it is not their area of expertise (Kress & Turk, 2020).

Based on research by Kirti and Sarin regarding entrance of these types of funds into the insurance sector post GFC, it equated to a move away from fixed income products towards riskier investments and the creation of value by lowering the tax liabilities of their subsidiaries. The results of this behaviour were less tax revenue and increased risk disguised by the fact it was accumulating in multiple small lending institutions instead of at the largest banks which are subject to the provisions of Basel III (Kirti & Sarin, 2020).

What Kress and Turk highlight is the setting of boundaries for enhanced supervision, such as the $10 billion limit which first imposed by Dodd-Frank, has created a two-tiered system of regulation that is an opportune situation for regulatory arbitrage. It created a demarcation in the market of firms with assets just below this limit. (Kress & Turk, 2020). From 2003-2006, there were 20% more banks just below the threshold than above, but by 2015-2017 the market had adapted to the boundary and there were then three times as many banks below the limit than above (Kress & Turk, 2019). This is similar to what was seen with the Trump changes to SOX in Chapter 4.

Kress and Turk propose regulators use their authority to conduct macroprudential supervision of banks appearing to be intentionally avoiding crossing this threshold, as well as implement either binding or non-binding stress test requirements on individual community banks and the sector at large. Their research indicates these tests do not create an undue burden on the sector; the same tests required of the large banks would not be ill suited to the task (Kress & Turk, 2019). As detailed in Chapter 4, all EU banks are subject to Basel III.

Based on the financial crises covered in the literature review, what is apparent is the EGRRCPA and its loosening of oversight of the community banking sector is the making of a situation where another catastrophe could occur. The reasons are regulatory capture on the part of the legislators who enacted these laws and regulatory arbitrage on the part of investment professionals who are managing the assets and lending institutions.

In reaction to the Covid-19 pandemic, the US federal funds rate was dropped from 1.75% in March 2020 to a rate of 0.25% (NY Federal Reserve, 2021). Cheap money was available again, but interest rates will eventually need to rise, meaning the causes of the GFC are again manifesting. Based on previous events covered in the literature review, if some sort of macroeconomic shock should occur, such as a reduction of liquidity in the short-term debt market, a sudden rise in interest rates or the lagging effects from massive unemployment, growth in private debt and economic slowdown caused by the pandemic, it will expose whether exploitation of the two-tiered threshold has been used to obfuscate unsound lending practices within the community banking sector. Shown in Figure 8.7, as of January 2021, US house prices had escalated rapidly, meaning eventual intervention by the Federal Reserve is likely.

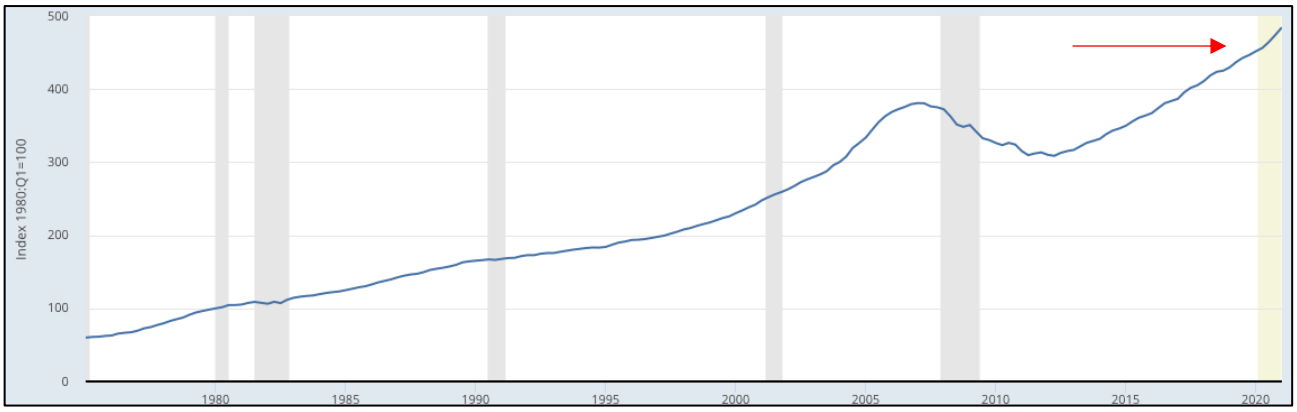


Figure 8.7 All Transactions US House Price Index 1980-2020

(St. Louis Federal Reserve, 2021a)

8.4 Trump Era Financial Legislation – Summary

The Trump administration passed two major pieces of financial legislation. The TCJA shifted the tax burden from businesses and high-earners to low-earners and implemented looser regulations, privatisation, reduction of social health care, and exploitation of natural resources. The EGRRCPA loosened banking regulation, especially for community banks. The administration's tenure was a period of veering financial regulation towards less oversight. As has repeatedly been found regarding what transpires in the US, it is a continuation of the long-term waxing and waning of regulatory control. Under Trump the US was not focused on proactive legislation, but rather on how to structure the regulatory environment for maximum financial gain despite future risks. The US is a country continually at odds with itself. As President Abraham Lincoln said, "A house divided against itself cannot stand" (Lincoln, 1858). The potential again exists for another too many to fail banking crisis to occur.

Chapter 9 Deglobalisation 2021

9.1 Introduction

This chapter focuses on the state of deglobalisation in 2021 regarding current conditions and the most recent regulatory changes that occurred. Its provides a timely assessment of the outcomes of deglobalisation and Brexit and what the changes mean for the socioeconomic climate, particularly in the UK.

9.2 Deglobalisation Metrics

Due to the effects of the Covid-19 pandemic, the ability to forecast the direction of deglobalisation was severely impacted. The existence of ceteris paribus - all other things remaining equal - was no longer available, which made tracking the rate of change far different than was expected at the onset of this research. Analysis of the metrics available as of early 2021 is based on extreme conditions never experienced by the modern economy. The pandemic exposed how rapidly assets can flow to safe harbour in times of distress and how the world economy reacted to this unexpected circumstance. The assessments will begin with a current analysis of four metrics for measuring the level of globalisation as defined in the literature review. They are:

- World Trade Growth
- Migration
- Capital Flows
- Trade Tariffs

9.2.1 **World Trade Growth**

As of October 2020, the WTO forecast world merchandise trade for 2020 would have fallen by 9.2%; this was better off than that 12.9% drop expected as of April 2020. The sharp decline was caused by the pandemic. The WTO expect 2021 to see a 7.2% rise, which is less optimistic than the 21.3% growth they previously forecast as a rebound from the pandemic (WTO, 2020b).

The WTO sees rising levels of public debt as having the long-term ability to adversely affect GDP growth and trade, but it is likely to be restricted to poorer countries. They forecast the use of deficit spending during the pandemic will cause greater trade imbalances and reductions in national saving (WTO, 2020b). As shown in Figure 9.1, their forecasts illustrate merchandise trade was severely impacted by the GFC; it is a trend that persisted for more than a decade. What the trend lines fail to illustrate is trade volumes do not possess the ability to rise ad infinitum; there are only so many goods and consumers in the world. Be it through natural disaster, war, trade disputes or a lull in the business cycle, the pandemic has shown it is in the best interest of governments to employ prudent financial behaviour and expect the unexpected. Future revenue is never guaranteed and unforeseen market corrections inevitably happen.

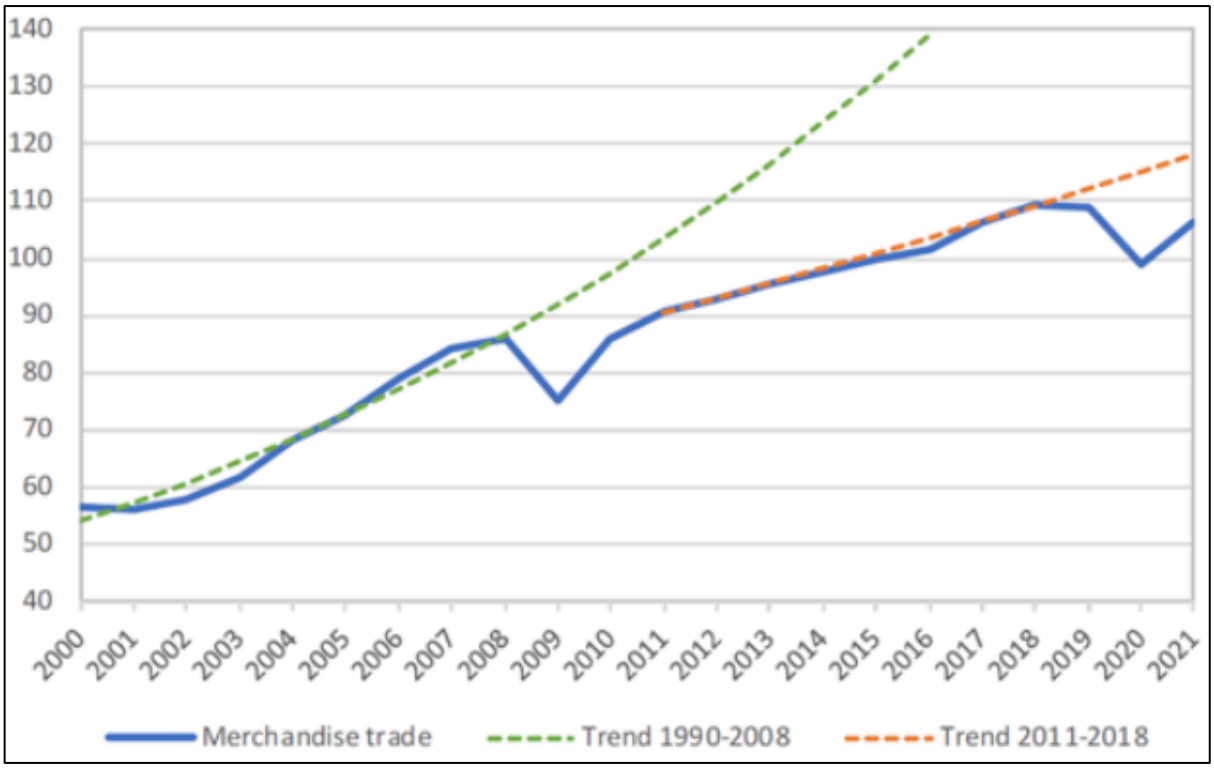


Figure 9.1 World Merchandise Trade Volume 2000-2021 (indices, 2015 = 100)

(WTO, 2020b)

9.2.2 **Migration**

The United Nations International Organization for Migration 2020 report estimated in 2019 3.5% of the world's population (272 million persons, or 1 in 30 of the global population of 7.7 billion) were international migrants (IOM, 2020). This figure was quoted in the literature review as being 2% per annum from 2000-2005 and 1.9% from 2010-2015 . Based on current estimates, it appears prior to the pandemic migration was back on the rise. Figure 9.2 shows the value of 2% from 2000-2005 to be accurate, but the value of 1.9% from 2010-2015 has been revised to be 3.4%, meaning there never was a dip in global migration – in fact it rose from 2010-2015. This is substantial, as it indicates one of the metrics used for measuring the rate of globalisation/deglobalisation was flawed from the onset.

This discrepancy is attributed to the fact the source cited in the literature review, the *UN International Migration Report 2015*, stated in 2015 there were 244 million migrants. The *2020 UN World Migration Report 2020* (same report, updated name) shows the 2015 value to be 258 million (IOM, 2020; UN, 2015).

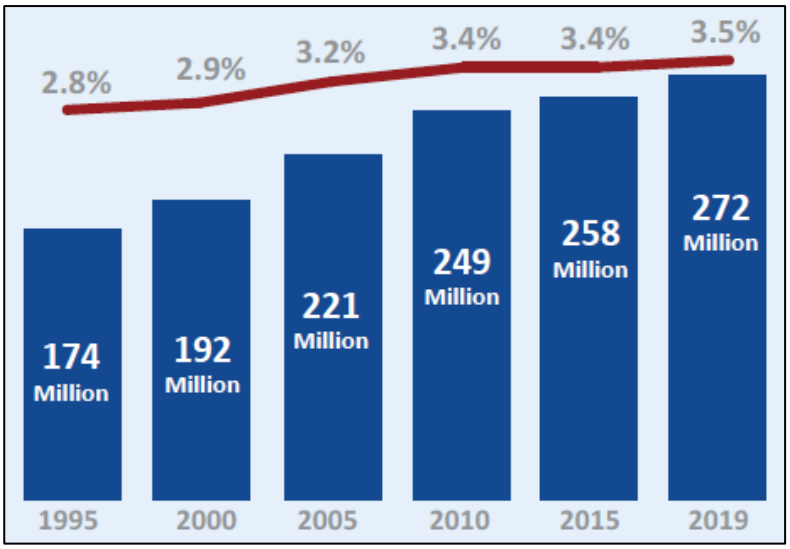


Figure 9.2 Global International Migrant Population 1995-2019

(IOM, 2020)

9.2.3 Global Capital Flows Due to Deglobalisation

In February 2018, the European Central Bank (ECB) reported since the GFC, banks in the euro area had reduced cross-border claims by 25%. They determined non-performing loans had been an impediment to post-crisis cross-border lending. The EU's banking sector is the largest in the world; this reduction in lending was considered one of the major effects of deglobalisation of the finance sector. From their research the ECB concluded there exists a significant link between this reduction in cross-border lending and the low quality of assets on offer. They stated one outcome of this might be the use of regulatory arbitrage via foreign branches of EU banks for engaging in risky lending; strict domestic lending policies have the ability to prevent EU banks from engaging in direct lending abroad (Emter et al., 2018).

Writing for the Bank for International Settlements (BIS), McCauley et al. found the post 2007 decline in cross-border banking was not indicative of financial deglobalisation. Rather than using a balance-of-payments measure, their method of examining nationality of ownership showed it was only European banks that reduced lending abroad for the purpose of restoring capital ratios (McCauley et al., 2017). This European specific phenomenon skewed global market averages. As illustrated in Figure 9.3 and Figure 9.4, for other advanced economies (AE) - like Canada and Japan - and US banks, as well as emerging market economies (EME), foreign lending actually rose since 2007. Based on the BIS research, they believe the decline was a regional phenomenon only in Europe (McCauley et al., 2017).

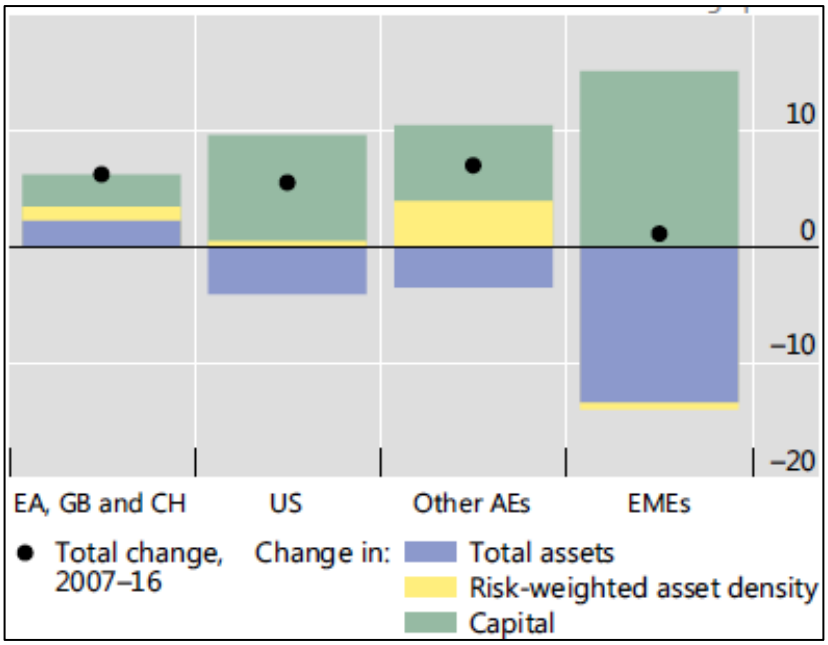


Figure 9.3 Capital to Risk-Weighted Asset Change, 2007-16 (percentage points)

(McCauley et al., 2017)

What the BIS have stated is in agreement with other data presented within this thesis and is in accord with recurring issues this thesis has found. With Germany as the economic leader in Europe, the EU has exhibited debt-adverse, ordoliberalistic behaviour. The German word for debt, Schuld, also means guilt; ergo they naturally think debt should be avoided.

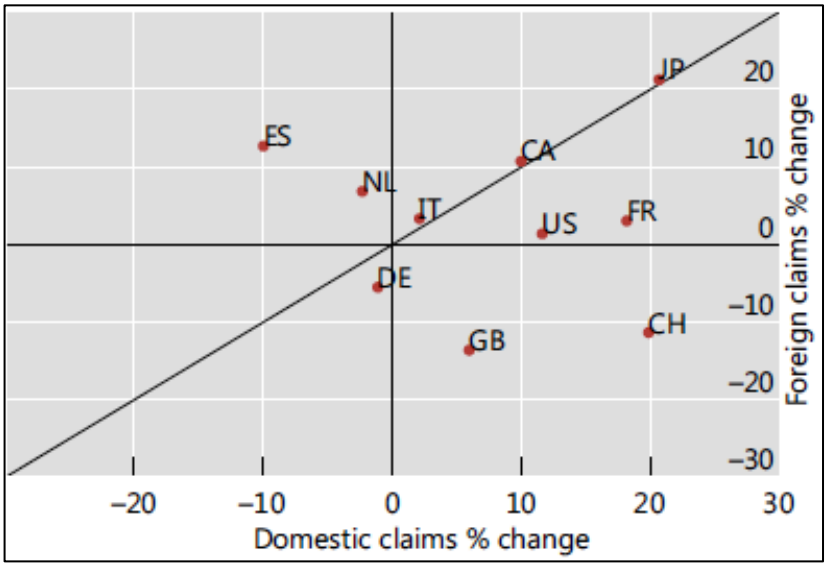


Figure 9.4 Domestic and Foreign Claims by Bank Nationality (percent Q4 2013-Q3 2016)

(McCauley et al., 2017)

9.2.4 **Global Capital Flows Due to Covid-19**

According to the OECD, based on information from the Institute for International Finance, $103 billion in capital outflows occurred from mid-January to mid-May 2020, far exceeding the outflows during other crises and at a rate four times greater than during the GFC. Figure 9.5, compares this episode with other crises and illustrates the pandemic induced extreme shift in capital.

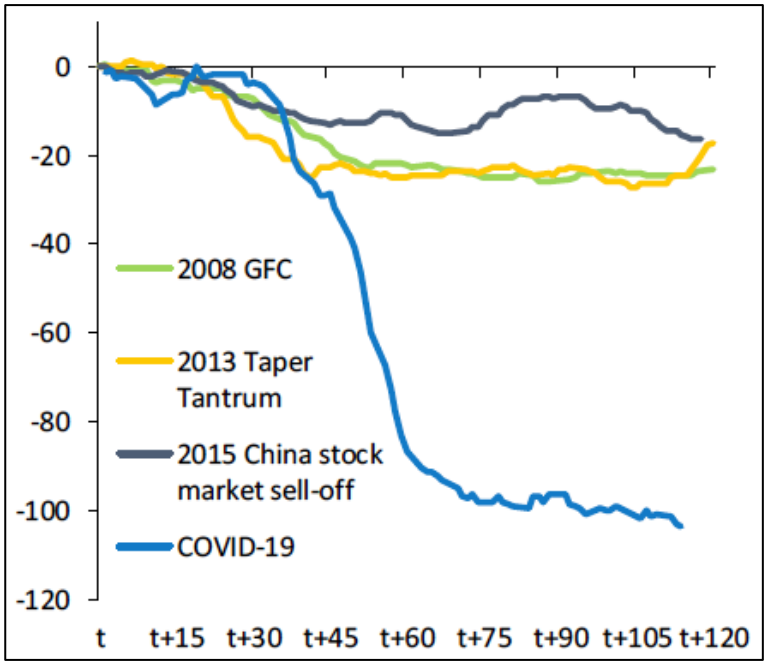


Figure 9.5 Portfolio Flows to EMEs in 2020 Versus Past Economic Shocks (billion USD)

(OECD, 2020a)

From Figure 9.6 it is evident how this outflow of non-resident owned assets was limited to March, 2020, with flows returning to positive values just one month thereafter.

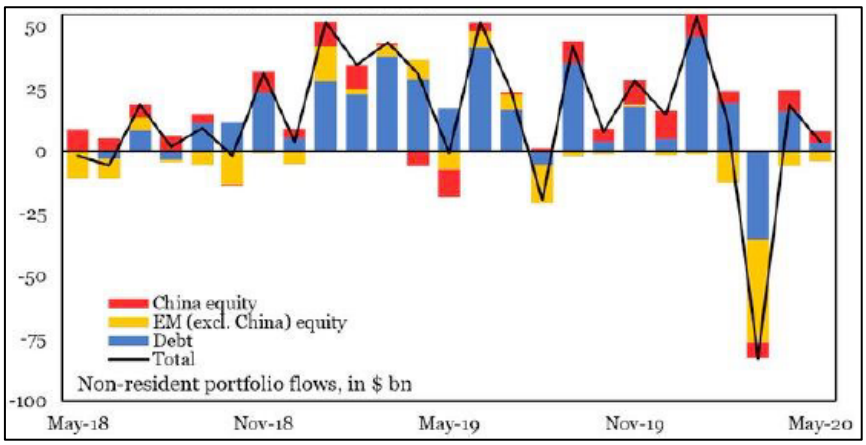


Figure 9.6 Non-Resident Portfolio Flows to Emerging Markets

(OECD, 2020a)

The OECD state the pandemic induced flight to safety caused a short-term liquidity shortage in US dollars. As shown in Figure 9.7, in times of distress, US dollar denominated debt is the instrument of choice for both US residents, non-residents and for cross-border transactions (OECD, 2020a). This unexpected situation exposed the velocity at which liquid assets can move and the growing need for investors to have access to non-dollar based assets.

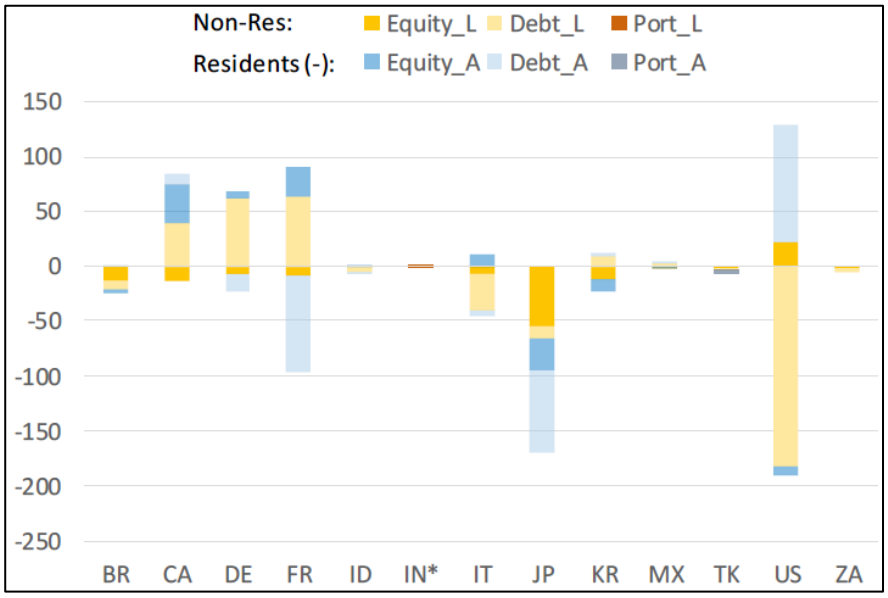


Figure 9.7 Portfolio Asset & Liability Flows in G20 Countries – 2020 Q1 (billion USD)

(OECD, 2020a)

These capital flows highlight the dominance the US dollar has in the global economy. Notice all the OECD's graphs are denominated in US dollars. Due to the global financial system established under Bretton Woods, the US dollar is still the de facto primary currency. This implicit economic superiority helps perpetuate the US' power in the globalised economy - it is the primary country that globalised the modern world.

Shown in Figure 9.8, as of 2019, based on information from BIS, the US dollar accounted for 88.3% of daily currency trades, down from 87.6% in 2016 (BIS, 2019). This is the root of America's economic dominance and power; the world economy functions on US dollars.

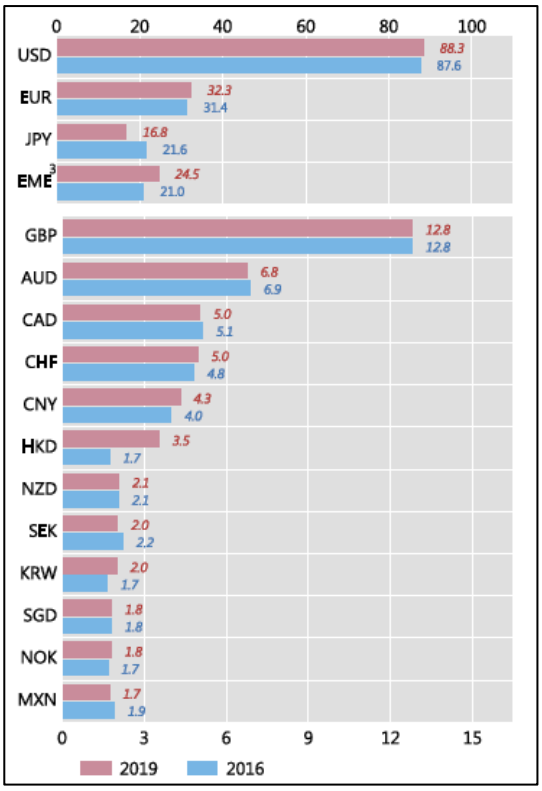


Figure 9.8 Daily Currency Trades - 2019

(BIS, 2019)

9.2.5 **Non-Tariff Barriers**

The literature review stated according to the WTO, non-tariff trade barriers amongst the G20 had grown from 324 in 2010 to over 1,263 in 2016. This was based on information from the WTO report in Figure 9.9 (WTO, 2016a).

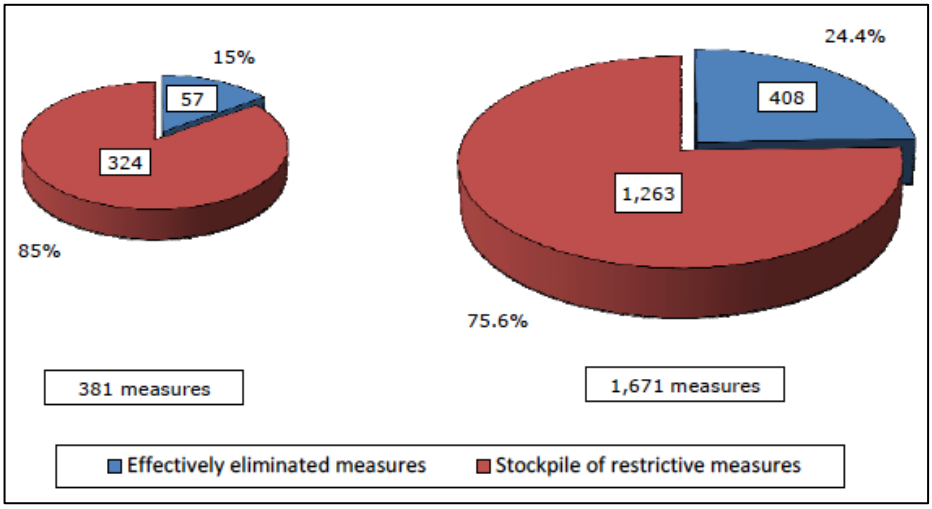


Figure 9.9 Stockpile of Trade-Restrictive Measures (mid-October 2010, mid-October 2016)

(WTO, 2016a)

The WTO *Report on G20 Trade Measures (Mid-May 2020 to Mid-October 2020)* focused on the pandemic's impact on trade. The information contained in Figure 9.10 was the most relevant available. It excludes restrictive measures due to Covid-19 and its tracking aligns with the rise of restrictive measures previously reviewed. The number of import restrictions practically trebled from 507 in 2016 to 1,516 in 2019. From 2017 onwards, the US engaged in a tariff war with China. It is thought to be the primary reason for the increase (WTO, 2020a).

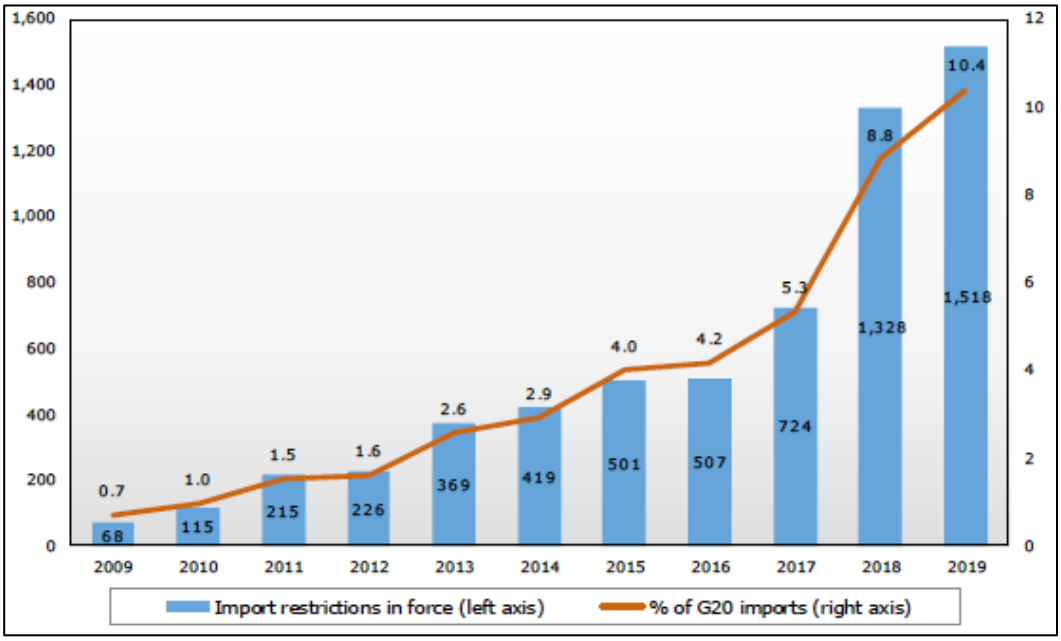


Figure 9.10 Cumulative Trade Coverage of G20 Import-Restrictive Measures on Goods in Force Since 2009 (USD billion, % of world merchandise imports)

(WTO, 2020a)

Table 9.1 provides a more detailed analysis of the information in Figure 9.10. It illustrates how not only have the number of import restrictions grown amongst the G20, the percentage of world imports that are subject to restrictions has gone from around 0.55% in 2009 to 8.04% in 2019. This is a large escalation in restrictions and supports the hypothesis that deglobalisation is on the rise.

Table 9.1 Cumulative Trade Coverage of G20 Import-Restrictive Measures on Goods in Force Since 2009 (USD billion, % of world merchandise imports)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total imports (world)	12,486	15,163	18,109	18,193	18,483	18,654	16,360	15,812	17,587	19,402	18,869
Total imports (G20)	9,823	11,933	14,263	14,143	14,340	14,451	12,561	12,228	13,615	15,064	14,629
Total G20 import restrictions in force	68.12	114.82	214.60	226.26	369.04	418.51	500.95	506.92	724.23	1,327.78	1,517.86
Share in G20 imports (%)	0.69	0.96	1.50	1.60	2.57	2.90	3.99	4.15	5.32	8.81	10.38
Share in world imports (%)	0.55	0.76	1.19	1.24	2.00	2.24	3.06	3.21	4.12	6.84	8.04

(WTO, 2020a)

9.2.6 **Deglobalisation Metrics - Summary**

World merchandise trade volume suffered a major correction in 2008. Although the WTO estimated it would have trended higher were it not for the disruption of the GFC, as of 2019 volumes were larger than ever. Covid-19 severely impacted the trend; it is expected to reverse itself in 2021. Net migration was at 3.5% as of 2019. The figures in the UN report relied on in the literature review have been revised upward, meaning there never was a drop in migration. European specific post-GFC declines in cross-border lending skewed the global average, meaning it also was not a good indicator of deglobalisation. Thus, in retrospect neither the decreases in trade volume, net migration nor cross-border lending were indicative of a long-term rise in deglobalisation.

Capital flows away from emerging markets towards low-risk assets in Q1 2020 were the most severe on record. Recent data showed this was due to massive outflows in March 2020, which have since partially reversed. It was expected with stability returning and an end to the pandemic in sight in the form of multiple available vaccines, confidence in emerging markets and subsequent inflows of assets to those locations would also return. The one overwhelming supporting factor in the four metrics assessed is the proliferation of import restrictions, especially since 2017. This is presumed to be in large part due to the protectionist measures that flourished under the Trump regime. With new leadership in the US, whether or not this trend continues remains to be seen and is an area for further research.

9.3 Digital Currencies

Deglobalisation, fintech and financial services are central to the issue of national governments and their desires to create digital currencies. China is in the public test stage of the creation of a digital yuan. As of December 2020, transactions totalling 2 billion yuan (US$ 300 million) had been executed. It is viewed as an alternative to the Society for Worldwide Interbank Financial Telecommunication (SWIFT) system, should the US try to restrict China's access.

According to University of South Carolina Aiken Professor Frank Xie, a digital yuan would also function as a major element in China's desire to maintain political control. The use of cashless electronic payment systems, such as Alipay and WeChat Pay, have already mostly replaced cash in China, but are outside of the remit of its central government. China's digital currency is expected to use aspects of blockchain technology where all transactions are recorded in an auditable ledger. Unlike with cryptocurrencies, the identities of the users will be known to the central bank (He, 2020).

China is not alone in formulating a digital currency. As of October 2020, the Bank of England, the BIS and six other central banks (Bank of Canada, Bank of Japan, European Central Bank, US Federal Reserve, Sveriges Riksbank, Swiss National Bank) released joint feasibility requirements for central bank digital currencies (CBDC). This represents initial cooperation without opinion or any commitment (BoE, 2020a). Regarding

privacy, the ECB stated a digital version of the euro would involve all transactions being recorded in the bank's ledger. As of December 2020, ECB President Christine Lagarde confirmed protection of user privacy would be a central theme (ECB, 2021). In its outline for how a digital euro would function, the ECB envisions it will be a compliment to cash and function as standard electronic deposits currently do (ECB, 2020a).

Through the course of this research one finding that has been continually implied in the source documents reviewed but not yet explicitly stated is if there is not a legitimate reason for the use of blockchain, then it should be avoided. Blockchain is unique in providing trust, transparency and the ability to use a shared database, but is also complex, expensive and slow and there is a trade-off between block size and processing time (Marx, 2020). Even permissioned blockchain systems require a portion of data storage be filled with the multiple hashes and other transaction identifiers on which blockchain functions and requires all transactions be kept in a live, ever growing database.

Using blockchain for currency transactions has the potential to create an unwieldly amount of data that needs to be maintained in a server farm and could create a system that is susceptible to failure. Digital currencies are intended as an alternative to functioning payment systems, but in the EU will be required to operate within the constraints of GDPR and the proposed EDGA. These are major conflicts that need to be resolved before a digital version of the Euro, or any digital currency into which it is converted that also needs to comply with EU standards, like a digital Swiss Franc, can be traded. It appears digital currencies would be another form of cash or cash equivalent included in the M1 level of the money supply. Fintech is at a point where digital versions of central currencies are possible; further research is required to determine whether it is worth the effort. Just because central banks can now do this, should they?

9.4 US-Chinese Relations

It was proposed in the literature review the motivation of the Trump administration's tariff war with China was to use the power of the US economy as leverage to coerce cooperation. As of January 2020, the US and China had announced a trade deal, known as 'Phase One'. Regarding financial services and technology, the agreement requires China to increase protections for intellectual property and makes it easier for US firms to seek both civil and criminal redress without exposing proprietary information and does not require US companies to provide their technology to Chinese authorities for access to its market. This is a commitment China made as part of the WTO and has repeatedly violated. Specific to financial services is China's pledge to allow US access to the Chinese market for the provision of banking, asset management, insurance, credit rating and electronic payment services. These actions on the part of China were reciprocated by the US through promises not to use financial regulation for discrimination against Chinese financial services firms wanting to provide services in the US. Critics state these concessions were not worth the total cost of the trade war (Jacobs, 2020; Office of the US Trade Representative, 2019a; Polti, 2020). It indicates Trump was initially successful in having China agree to his demands.

As of July 2020, the prospects of a second round of negotiations between the US and China, known as 'Phase Two', were not optimistic due to complications involving the pandemic, US-Chinese military aggression in the South China Sea and the ongoing issue of Hong Kong's autonomy (Jacobs, 2020). In December 2020, President-elect Biden indicated he was not planning to lift tariffs imposed by the Trump administration or take action to break the Phase One deal and would continue using them as an advantage in future discussions (AP, 2020b; White House, 2021b).

US-China relations and the ongoing tariff war is further complicated by the fact in November 2020 China and 14 other Nations in the pan-Pacific region signed the Regional Comprehensive Economic Partnership (RCEP), see Figure 9.11. This created the world's largest trading bloc that encompasses nearly one third of all global economic activity. It was the culmination of an eight year effort between Australia, Brunei-Darussalam, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, Philippines, Singapore, South Korea, Thailand and Vietnam (AP, 2020a; New Zealand Foreign Affairs & Trade, 2020).

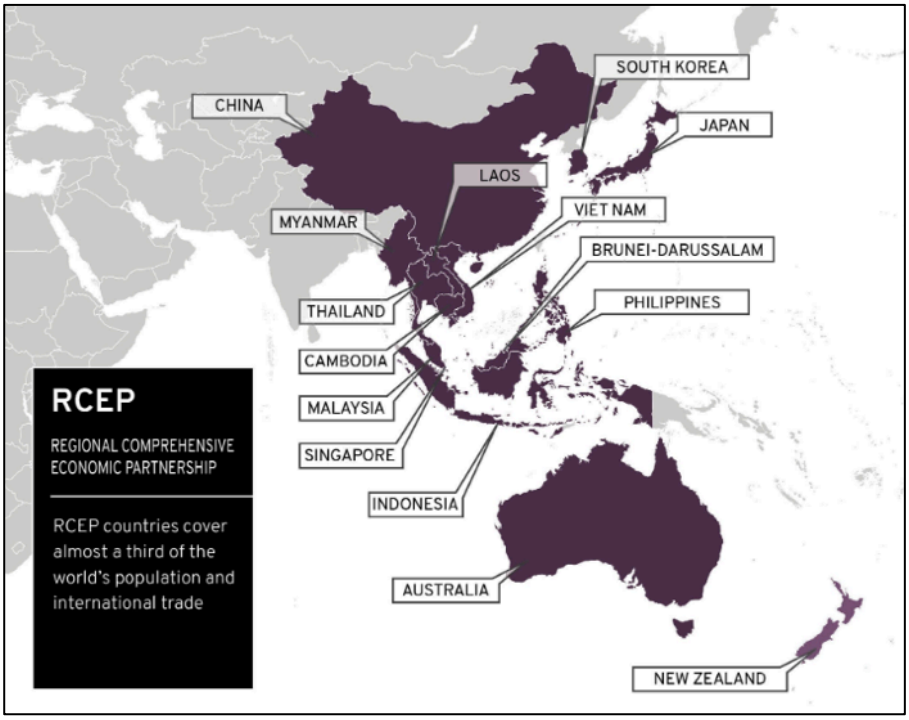


Figure 9.11 Regional Comprehensive Economic Partnership Members

(New Zealand Foreign Affairs & Trade, 2020)

Dynamics of the RCEP are complex as Australia, China, Indonesia, Japan and South Korea are also members of the G20. India is not involved with the RCEP due to opposition to opening access to its markets; something Bello highlighted as being one of the most damaging effects of globalisation (Bello, 2004). The partnership places China, with a population of 1.3 billion people and the largest economy in the area, at the centre of regional trade in the Pacific. It is an example of how Trump's 'America First' policy ignored the fact trade and continued globalisation will go on with or without full participation of the US. It is a legacy

the Biden administration will find difficult to manage due to the support he received in rust belt states like Michigan and Pennsylvania, meaning rejoining the Trans-Pacific Partnership trade pact is unlikely (AP, 2020a).

These events give credence to the viewpoints covered in the literature review of Professor Payne, who stated in 2017 Trump would use trade wars as a method of national diplomacy and Dr. Martin, who believed in 2018 deglobalisation is a short-run correction where integration slows down, but over the long-run globalisation persists (Martin, 2018; Payne, 2017). The most recent outcomes from the US-China trade war evidence how politics plays heavily in the provision of international financial services.

9.5 US, UK and EU Passive Equity Index Fund Performance Analysis

Analysis of equity index funds specific to the three respective markets of this thesis follows. Its purpose is to determine the performance of the three respective regions prior to Brexit and Trump up to November 2020 from the viewpoint of an investor. The fund company chosen, Vanguard, was selected due to its reputation for low management fees. The funds reviewed are passive, sterling denominated, accumulate dividends and track a well-known equity index. Descriptions as detailed in the funds' key features documents and illustration of their five year performance from 27 November 2015 to 27 November 2020 follow.

9.5.1 **Vanguard US Equity Index Fund**

This fund tracks the performance of the Standard and Poor's Total Market Index. It is comprised of holdings in US micro, small, mid and large market capitalisation equities. Shown in Figure 9.12, over the five year period, its cumulative return was 112.5% (Hargreaves Lansdown, 2020).

Figure 9.12 Vanguard US Equity Index (accumulation shares, GBP)

(Hargreaves Lansdown, 2020)

9.5.2 **Vanguard FTSE Developed Europe ex-UK Equity Index Fund**

This fund tracks the performance of the FTSE Developed Europe ex-UK Index. It includes mid and large-sized equity holdings in the developed European markets, excluding the UK. For the five year period its cumulative return was 62.44%, see Figure 9.13.

Figure 9.13 Vanguard FTSE Developed Europe Ex-UK Equity Index (acc. shares, GBP)

(Hargreaves Lansdown, 2020)

9.5.3 **Vanguard FTSE UK All Share Index**

This fund tracks the performance of the FTSE All Share Index. Shown in Figure 9.14, its cumulative five year performance was 22.95%.

Figure 9.14 Vanguard FTSE UK All Share Index (acc. shares GBP)

(Hargreaves Lansdown, 2020)

9.5.4 **US, UK and EU Passive Equity Fund Performance Analysis – Summary**

Over the five year period from prior to the vote for Brexit and Trump, the UK market substantially underperformed at 22.95% versus the developed European and US markets. In comparison with the UK index performance, the US had a 390% cumulative return; for the European markets this value was 172%. One shortcoming with this analysis is the European index is for developed companies, whereas the US and UK indexes are both very broad based indexes incorporating the small cap sector. The FTSE Developed Europe ex-UK fund was the most similar Vanguard fund available via UK investment manager Hargreaves Lansdown in relation to the other two. The equities it tracks would be included in a broader based UK index fund, were one available. Individual performance figures are in Table 9.2.

Table 9.2 US, UK and EU Funds Discrete and Cumulative Performance – 27/11/15 – 27/11/2020

Discrete Calendar Year Performance					
Fund	27/11/15 - 27/11/16	27/11/16 - 27/11/17	27/11/17 - 27/11/18	27/11/18 - 27/11/19	27/11/19 - 27/11/20
Vanguard US Equity Index Acc GBP	30.78%	10.88%	8.82%	17.62%	14.51%
Vanguard FTSE Developed Europe ex-UK Equity Index Acc GBP	12.43%	25.58%	-6.23%	14.44%	7.23%
Vanguard FTSE UK All Share Index Acc GBP	10.33%	13.01%	-1.15%	10.76%	-9.93%
Cumulative Performance					
Fund	**3 months**	**6 months**	**1 year**	**3 years**	**5 years**
Vanguard US Equity Index Acc GBP	5.63%	12.73%	14.51%	46.55%	112.50%
Vanguard FTSE Developed Europe ex-UK Equity Index Acc GBP	6.73%	15.31%	7.23%	15.05%	62.44%
Vanguard FTSE UK All Share Index Acc GBP	7.09%	7.34%	-9.93%	-1.39%	22.95%

(Hargreaves Lansdown, 2020)

9.6 Germany, UK and US Product and Service Exports, Imports and GDP

The following analysis reviews the product and service exports, imports and GDP of the US, UK and Germany. Germany was chosen due to its position as the de facto economic leader of the EU. The most recent information available from the Office of Economic Complexity at the Massachusetts Institute of Technology is shown in Table 9.3. Aside from service exports, the UK lags both Germany and the US in all factors (OEC, 2020). In the case of imports in regard to deglobalisation, some might consider this a benefit; it theoretically means more domestic production is locally consumed. Of most concern are the UK's service exports; they account for about 80% of the UK economy (Hall, 2020a). This is important regarding financial services. It is one area where the UK has a trade surplus and where its performance is superior to Germany (OEC, 2020). As will be covered in review of the completed terms of Brexit, this surplus is now under threat. The UK was also inferior to both the US and Germany in GDP growth in absolute and per capita terms from 2008 onwards.

Table 9.3 Germany, UK and US Product and Service Exports, Imports and GDP

COUNTRY	PRODUCT EXPORTS (2018)	RANK	PRODUCT IMPORTS (2018)	RANK
Germany	$1.5 T	2 of 222	$1.2 T	3 of 221
UK	$464 B	9 of 222	$651 B	6 of 221
USA	$1.44 T	3 of 222	$2.41 T	1 of 221
	SERVICE EXPORTS (2017)	**RANK**	**SERVICE IMPORTS (2017)**	**RANK**
Germany	$257 B	3 of 139	$283 B	3 of 139
UK	$352 B	2 of 139	$211 B	4 of 139
USA	$571 B	1 of 139	$422 B	2 of 139
	GDP (2018)	**RANK**	**GDP GROWTH (2008-2018)**	**RANK**
Germany	$3.95 T	4 of 196	5.83%	153 of 196
UK	$2.86 T	5 of 196	-2.31%	171 of 196
USA	$20.5 T	1 of 196	39.60%	99 of 196
	EXPORTS PC	**RANK**	**IMPORTS PC**	**RANK**
Germany	$18.2 K	119 of 219	$14.5 K	127 of 219
UK	$6.98 K	150 of 219	$9.8 K	135 of 219
USA	$4.41 K	141 of 219	$7.37 K	166 of 219
	GDP PC	**RANK**	**GDP PC GROWTH (2008-2018)**	**RANK**
Germany	$47,603	18 of 196	4.79%	131 of 196
UK	$42,944	22 of 196	-9.18%	168 of 196
USA	$62,795	10 of 196	29.80%	81 of 196

(OEC, 2020)

The question this comparison raises is how can the UK fare better economically outside the EU when its greatest export, financial services, were largely dependent upon passporting rights based on membership. Also, how can a country that was inferior in its per capita performance in comparison with Germany and the US prior to Brexit expect to compete more effectively with the limitations Brexit places on its ability to trade?

9.7 Government Deficits and General Debt of the US, UK and EU

One of Trump's campaign pledges had been to reduce US trade deficits. This did not happen. As of July 2020, the US trade deficit was $63.6 billion, its highest level in 12 years. The previous record was in July 2008 during an economic recession. The most recent deficit increase was due to a 10.9% ($231.7 billion)

increase in imports which offset the 8.1% ($168.1 billion) increase in exports. Despite enactment of the USMCA and a tariff war with China, the US trade deficit with Mexico was at a record high of $11.5 billion in July 2020 and $28.3 billion with China, a 5.6% increase over the previous month. One area where the US had a surplus was in services - including financial services, banking and insurance. The surplus declined to $17.4 billion; the lowest it was since August 2012 (US BEA, 2020). As these figures show, regardless of what transpired due to the pandemic, Trump's America First trade policy did not yield its promised results.

Of particular note in Figure 9.15 is the fact Greece, whose previous debt issues were mentioned in the literature review, was running a budget surplus in 2018 of 1% of GDP, as was Germany at 1.8%. The US was at -6.2%, the UK was at -2.2% and the EU was at -0.7% (OECD, 2020c). As shown, the US had the largest pre-pandemic government deficit as a percentage of GDP in the world (OECD, 2020c).

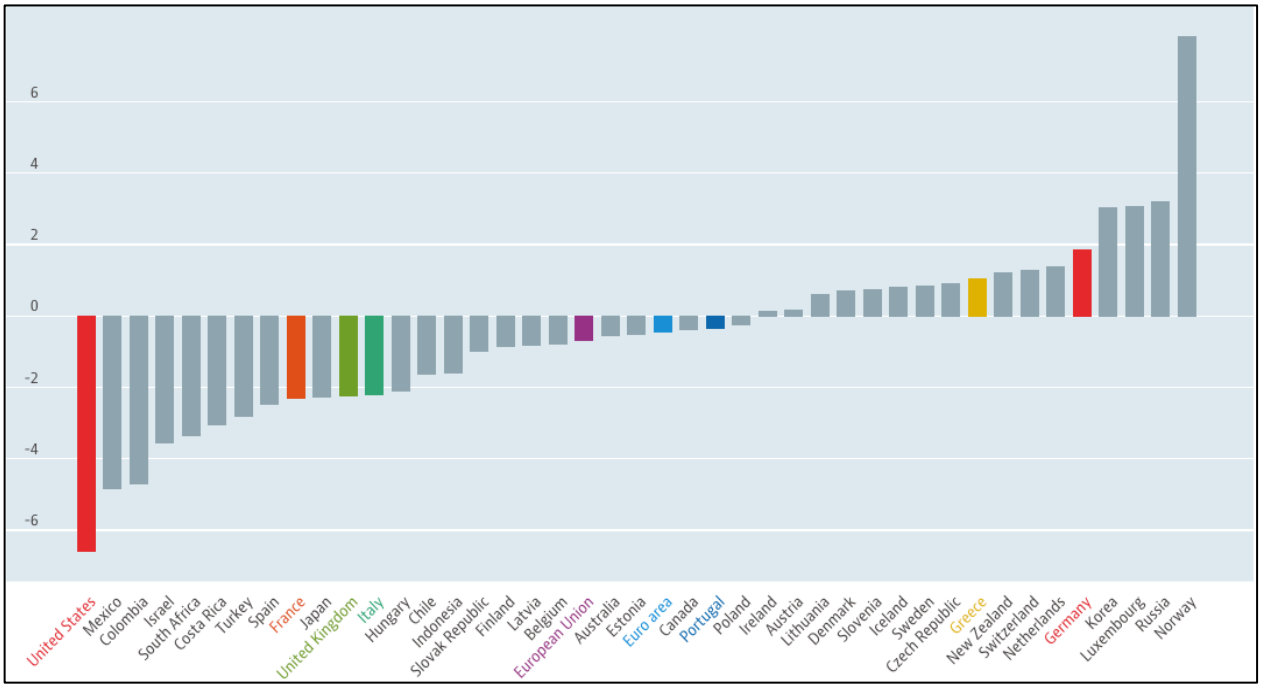


Figure 9.15 General Government Deficit - 2018 (total % of GDP)

(OECD, 2020c)

As long-term analysis of the deficit levels of the Euro area, EU, UK and US in Figure 9.16 shows, in 1996 and 2001 the four areas had similar deficit levels in relation to GDP (OECD, 2020c). Since 2008, the US and UK have not kept pace with the EU and Euro area at limiting government deficits. Of particular interest is what transpired with the US in 2017 when the effects of Trump coming to power were reflected in the figures. Its deficit took a negative course versus the other three. Further analysis of this US trend follows.

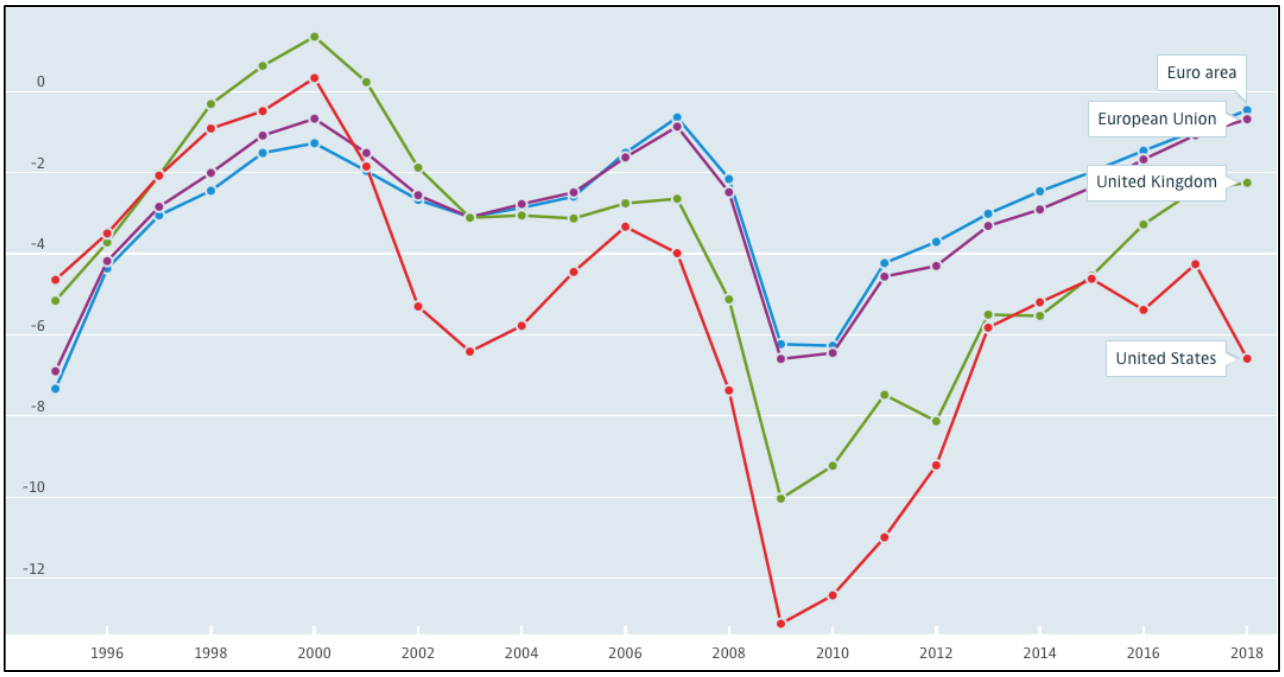


Figure 9.16 General Government Deficit 1995-2018 (total % of GDP)

(OECD, 2020c)

Shown in Figure 9.17, at the end of 2016, the last quarter before Trump was inaugurated, the total level of US public debt was $19.976 trillion. At the end of Q3 2020, the most recent quarter for which information was available, this figure had grown to be $26.945 trillion (St. Louis Federal Reserve, 2021b). This was a $6.97 trillion or 25.86% gain in less than four years. As of July, 2019, estimated net interest payments on US national debt were $393.5 billion per annum, or 8.7% of all federal money spent (Desilver, 2019); it is expected to reach 10% by 2030 (Amadeo, 2021). This expense was exacerbated because the average interest rate paid rose from 2.232% in 2016 to 2.492% in 2018. As of June 2019 the US national debt was $22.023 trillion; it is now larger than its GDP (Desilver, 2019).

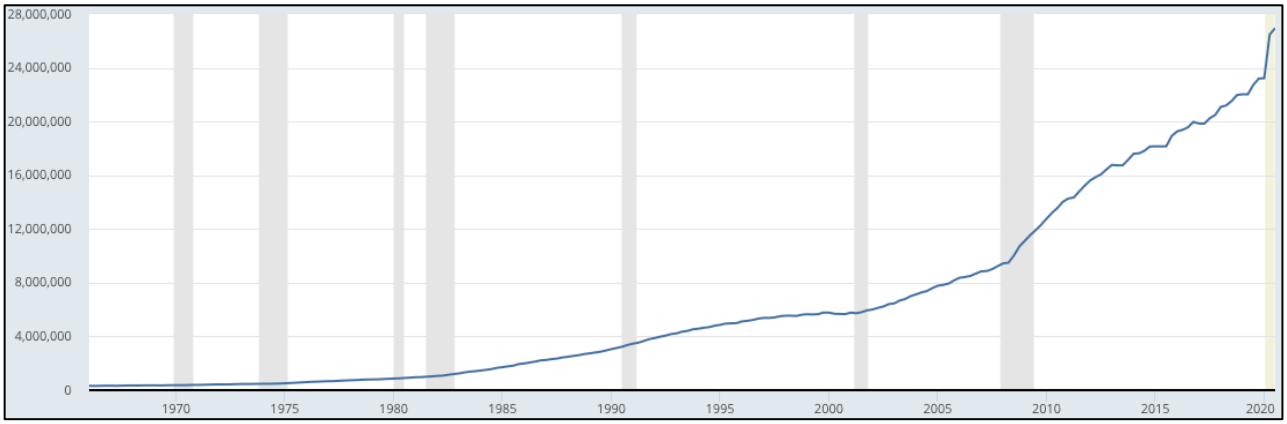


Figure 9.17 US Total Public Debt – Q1 1966 – Q3 2020

(St. Louis Federal Reserve, 2021b)

Due to Trump's policies and spending related to the pandemic, from Q2 2019 to Q3 2020, the US national debt rose by 18.27% over one and a quarter years. The largest dollar increase in the US debt occurred under President Obama, when it grew by $8.3 trillion or 70% due to the American Recovery and Reinvestment Act in response to the GFC. The largest percentage increase was by President Roosevelt of $236.1 billion from 1933-45, a 1,048% increase due to the Great Depression and World War II (Amadeo, 2020a). As of March 2021, under President Biden, the US planned to add another $1.9 trillion to the US debt (White House, 2021a). These periods of steep rises in the US debt level show how in times of crisis reliance on debt is the chosen solution. The most recent increases are at a time when the US is still burdened by debts from the GFC. This is concerning because the debt level already surpassed annual GDP even before the most recent round of Covid-19 stimulus under President Biden. The CBO projects by 2049 US debt will be 144% of GDP (CBO, 2021), see Figure 9.18.

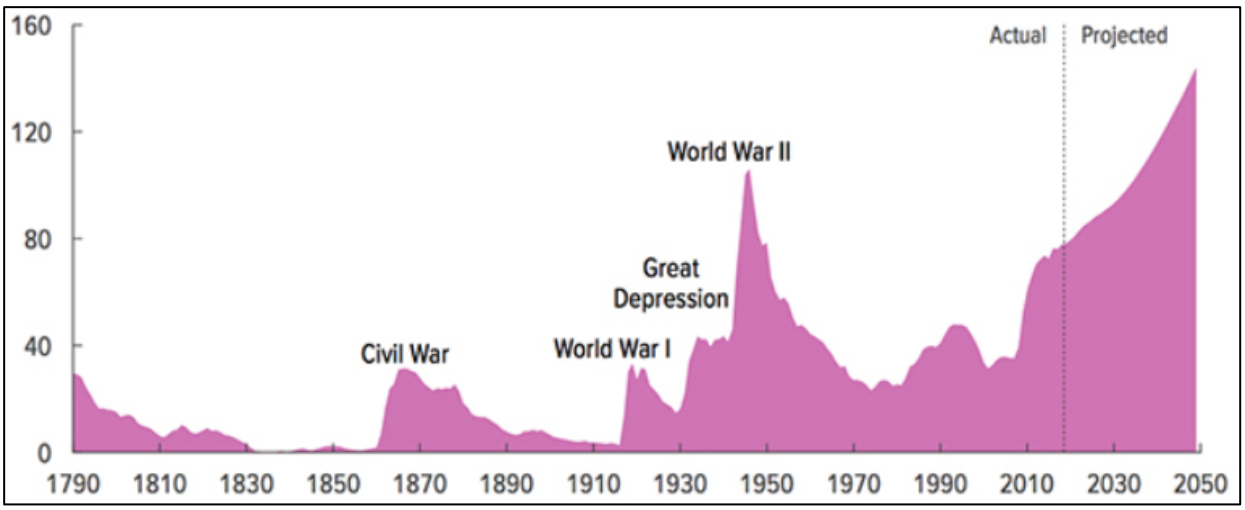


Figure 9.18 CBO US Debt-to-GDP Projection to 2049

(CBO, 2021)

The equity index and national debt information illustrate the paradox that is the US. It boasts phenomenal market performance while its government generates huge deficits increasing the level of debt it must service. It is the issue mentioned in Chapter 4 as the reason the world economy needs to move away from the US dollar as the main trading currency towards tokenised assets or something more trustworthy. As Dr. Kablan stated:

> Fiat versus crypto has become such a philosophical argument, but if we look at fiat as the world's largest currency, we see that the USD is based on a promise from a government mired in debt. No one in their right mind should actually put trust in this system because there is so much debt underpinning it, however, it is become the de facto store of value, which properly designed cryptocurrencies could be set to disrupt in a major way (Wolfson, 2018a).

Figure 9.19 shows as of 2019, the US had a level of debt equal to 136% of its GDP, the UK was at 117% and Europe is a mix of debt adverse countries, like Germany at 68% and several others, yet is in a financial union with debt laden places like France at 124%, Italy at 155% and Greece at 200% (OECD, 2020c). The trouble debt creates are the only ways to eradicate it are to implement austerity measures or increase taxation – neither of which are ever agreeable with the general public - or keep rolling it over by issuing new debt to pay off the old. It exacerbates the causes of deglobalisation because current generations are either paying off the principal of the debts caused by the excesses of previous generations or passing the debt on to future generations while still having their taxes go to paying interest due and not toward social programs or infrastructure development that would benefit the public in the form of employment.

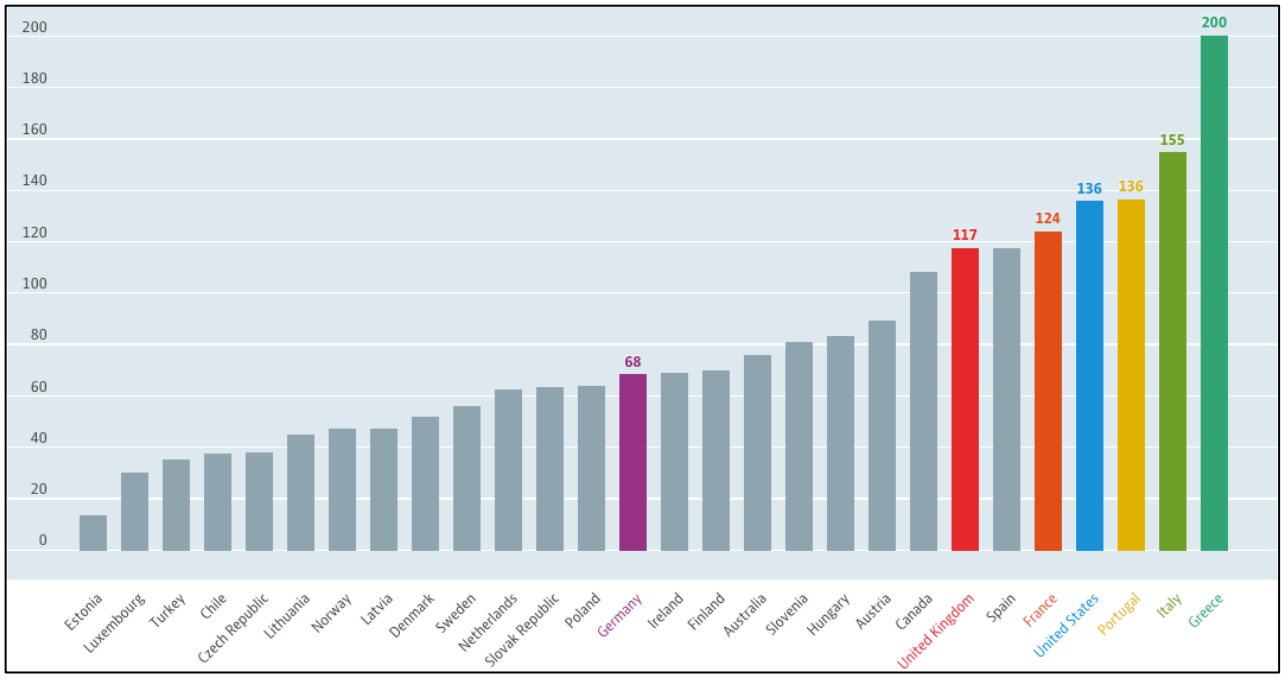


Figure 9.19 General Government Debt – 2019 (total % of GDP)

(OECD, 2020c)

9.7.1 **Debt Ratings**

Illustrated in Table 9.4, Germany, the UK and the US all have investment grade debt ratings. Germany's S&P rating is one grade higher than for the US. Both Fitch and Moody's downgraded the UK's creditworthiness in 2020 (CIA, 2020). S&P downgraded the UK's rating in 2016 - three days after the result of the vote for Brexit was announced (World Government Bonds, 2021). The rising levels of US debt have not affected its creditworthiness. Of all the superlatives the reputation of the US has, as of 2021, one of the largest is its debt. It is a country living on credit - only time will tell whether it can continue this behaviour.

Table 9.4 Credit Rating History of Germany, the UK and the US

Country	Credit Rating	Year/Month	Agency
Germany	AAA	1994	Fitch
	Aaa	1986	Moody's
	AAA	1983	Standard & Poor's
United Kingdom	AA-	2020 - March	Fitch
	Aaa	2020 – October	Moody's
	AA	2016 – 27 June	Standard & Poor's
United States	AAA	1994	Fitch
	Aaa	1949	Moody's
	AA+	2011	Standard & Poor's

(CIA, 2020)

The primary origin of America's current debt was the bailout for the GFC, which was caused by a lack of regulatory oversight due to enactment of the Financial Services Modernization Act of 1999 and the securitization of low quality debt (Amadeo, 2019). The three major credit rating agencies are an oligopoly that controls 95% of the US credit ratings market (CFR, 2015). In 2015 S&P paid $1.375 billion and in 2017 Moody's paid $864 million in fines to US federal and state authorities for the quality of their debt ratings which contributed to the GFC (CFR, 2015; US DOJ, 2017). Whether the current ratings can be trusted is a question for future research. As analysis of the current debt levels of the US and previous review of current legislation in the US show, the underlying causes of the GFC are manifesting again.

9.8 The Role of Tax Havens in the Globalised Economy

A major issue concerning deglobalisation is the use of tax havens. According to UC Berkeley associate professor of economics and renown expert on tax avoidance Gabriel Zucman, over the past 40 years governments have become less able to regulate and tax global capital. Approximately 8% of global household wealth is hidden offshore and avoids taxation by any government through the use of tax havens (Zucman, 2015). There is no mutually agreed upon definition of what constitutes a tax haven; just providing low tax rates to foreign investors is not sufficient. The OECD's characteristics of a tax haven are:

1. No taxes or nominal taxes for non-residents.
2. Lack of transparency.
3. Unwillingness to exchange information with tax authorities from OECD member countries.
4. No requirement for actual economic activity to take place in the country.

   (OECD, 1998:3)

Several major data leaks occurred in the 21st century which could not have happened in the past as massive amounts information can now be disseminated almost effortlessly. These exposed the amount of global tax avoidance that had been happening. Some of the most notable exposures were the HSBC Files, the Luxembourg Leaks, Panama Papers, the Paradise Papers and the SwissLeaks (Bowers, 2019; Bullough, 2018).

Global tax avoidance is structured around the simultaneous use of multiple jurisdictions so no one location knows or possesses too much information (Kerry & Brown, 1992). Liechtenstein specialises in the use of foundations, the British Virgin Islands (BVI) in incorporation, Jersey uses trusts. To combat global tax avoidance, the UK granted investigators access to corporate information in the BVI. In 2016, the UK also made it mandatory for UK companies to declare the identity of their true owners. Since 2012 this caused the number of companies created annually in the BVI to decrease by 50%. Jersey's banking operations have also reduced by about half (Bullough, 2018).

Not all jurisdictions have embraced greater transparency. In 2019, a committee of the European Parliament reported seven EU members - Belgium, Cyprus, Hungary, Ireland, Luxembourg, Malta and the Netherlands – display tax haven characteristics and facilitate the use of aggressive tax planning (European Parliament, 2019). The seven are one quarter of the members of the EU but possess a cumulative population of 10.3% of the EU27 total of 450 million. Only Belgium and the Netherlands have populations over 10 million (CIA, 2020).

Outside the EU, the most notable tax haven is Nevis. Since 2012, Nevis' financial services sector has grown by 25%. Incorporation and registration fees account for 16% of Nevis' government revenue. Nevis' appeal in global tax avoidance is centred around its corporate registry not knowing who the owners of a business are because it holds no information on company ownership or assets. It relies on the limited liability company (LLC) structure, which was conceived by the US state of Wyoming. The LLC is a hybrid structure that allows company owners to avoid identification and makes it difficult for creditors to track assets, unlike in the US, where courts can order such disclosure (Bullough, 2018).

The Nevis LLC is exempt from being dissolved or wound-up, so there are no means for confiscation of assets through local courts. Disclosure of financial information without a court order is subject to up to one year in prison and a $10,000 fine; this prevents administrative employees from disclosing information. A similar privacy law in Cayman was rescinded in 2016. Another form of obstruction in Nevis labelled as prevention against frivolity is a $100,000 bond requirement for filing of legal proceedings. The island is neither an independent country nor able to be controlled by any other country due to its being one half of the Federation of St. Kitts and Nevis. Due to Nevis' small size and unique structure, legal and diplomatic strategies that have been successful with larger jurisdictions, such as Switzerland or Jersey, are considered not germane (Bullough, 2018).

Global tax avoidance requires a significant amount of assets to make the costs of administration worthwhile. It involves the creation of an LLC somewhere like Nevis, deposit of cash or securitised assets in another jurisdiction, like Cayman or Malta, and then using this network for controlling real assets, like property, in more regulated locations. This process is known as siloing and is the type of behaviour Nick Cook, Director of Innovation of the FCA, stated was the impetus for GFIN (Fintech North Conference, 2019). Siloing is how BCCI and Enron were able to perpetrate fraud. The Wyoming Division of Banking is a member of GFIN (GFIN, 2020c). As Wyoming was the birthplace of the LLC, one might question their motives.

Anyone using the global system as it is currently designed for avoiding taxation is not doing anything illegal. It is in the interest of jurisdictions involved in tax avoidance to be abreast of any disruptive changes to the system, so they can ensure future developments are not detrimental to their business model. So long as jurisdictions, such as Nevis, are allowed to maintain their business model, global tax avoidance will continue unabated in some form.

As reviewed in Chapter 4, the US is focused on having other jurisdictions submit information via FATCA, but has not committed to the CRS. Chapter 8 detailed how the US has restructured its tax code to make its taxation more appealing so US MNCs might domesticate their overseas profits held in tax havens. Under Trump the US continued its behaviour of non-reciprocity on global tax avoidance regulation.

9.9 Ireland's Role in Brexit and Globalisation

Ireland has a small, modern, trade-dependent economy, has heavily invested in technical infrastructure, a well-educated population of 5.1 million, a high birth rate and one of the youngest populations in the EU. It has a bleak history of famine and mass emigration since the mid 19th century, revolution in the 1920s, economic boom from 1995-2007 and economic bust with the GFC that required intervention from the EU and IMF. Ireland exited the bailout program in 2013 (CIA, 2020).

Ireland established the International Financial Services Centre (IFSC) in Dublin in 1987; it has been very successful due almost entirely to US investment. When the IFSC was initially conceived it was subject to a favourable tax regime. That was phased out in 2003 when a general 12.5% corporation tax rate for all of Ireland was introduced (Tobin & Walsh, 2013). That led to investment outside of Dublin from the financial services industry.

The following are two examples of major financial services companies expanding beyond Dublin. In 2019, Deutsche Börse AG opened a major operations centre in Cork with 600 employees under the employ of its subsidiary Clearstream (Deutsche Börse Group, 2019). Pramerica Systems Ireland Ltd., a technology services subsidiary of the US company Prudential Financial (NYSE: PRU, $26.94b market cap.), has a major operations centre in Donegal with approximately 1,600 employees in the republic who are employed in two divisions - back-office contact centre services and software development (The Irish Times, 2020).

Ireland is a favoured outsourcing destination for US financial services firms. One could make the argument this is because of fewer regional barriers. For example, the Irish accent is very understandable and more similar to the US accent than many regional British dialects and the Irish share an attitude of willingness and affability Americans find relatable, conducive to business relations and more attuned to American mannerisms than a staid British approach. The two countries also share a 'special relationship', as both have a mutual history of being former British colonies. The most important issue regarding US-Irish relations is Ireland has been the European destination of choice for US corporations due to the favourable tax treatments it offers.

9.9.1 Irish Taxation

Ireland was previously labelled a tax haven by the US due to inclusion in a US Government Accountability Office report based on outdated information the US Internal Revenue Service held from when Ireland had a zero tax rate on export sales of manufacturing goods. That tax rate was introduced in the 1950s and was phased out for new companies in 1980 and for existing companies in 1990 (Tobin & Walsh, 2013). Tobin and Walsh describe its tax rate as a natural outcome of its position on the edge of Europe and the need to attract investment. They assert that it does not behave as a tax haven, as evidenced by its willingness to share information with other tax authorities. As of 2012, Ireland had implemented the FATCA agreement with the US as well as the EU Savings Directive of 2005 and the CRS (OECD, 2019; Tobin & Walsh, 2013).

From the previous assessments Ireland appeared well positioned to have its own financial service industry benefit from the deglobalising effects of Brexit and fintech. It has positive relations with the US government and US business interests. It is now the only English speaking country within the EU, despite English being the EU's prima lingua franca, is politically neutral, has a past history of poverty followed by boom and bust years and appears content to continue in its role as a base of operations for US MNCs. The problem with all of this is that Ireland is dependent on US corporations, which are there mainly for the tax advantages. Professor Tony Foley of the Dublin City University Business School states US MNCs:

> Account for 90% of all our manufactured exports, employ around 10% of the workforce and they helped pull Ireland out of the eurozone debt crisis (Beard, 2018).

The American Chamber of Commerce Ireland claims 160,000 people in Ireland are directly employed by 700 US firms; they support another 128,000 jobs and account for over 20% of employment and $444 billion in investment. Ireland represents just 1% of the European economy, but received 12.2% of US FDI in Europe in 2016 (ACOCI, 2021). The relationship is being redefined by the changes to US tax code and EU attempts to deter MNCs from transferring European generated profits to Irish subsidiaries (Beard, 2018; Pomerlau, 2018).

Messrs. Tobin and Walsh were respectively working for the Irish Department of Finance and the Irish Office of the Revenue Commissioners when they researched why Ireland is not a tax haven in 2013. They may contend Ireland is not a tax haven because of its willingness to share information and claim its low rate of corporate tax is just a natural outcome of its desire to be competitive globally, but this is not the full scope of Ireland's tax situation. The biggest criticism of Ireland was a tax treatment known as the 'double Irish' that allowed corporations, like Apple, which as of August 2020 had a market capitalization of $2 trillion – double what it was only two years prior - to be a stateless entity - i.e. not tax resident anywhere (Beard, 2018; McGee & Bradshaw, 2020).

Presently more than one thousand large American MNCs, like Apple, Google, Facebook, PayPal, Microsoft, eBay, Twitter and Intel are situated in Ireland for the favourable tax treatments. The EU forced Ireland to change its double Irish tax law in 2014; companies had until 2020 to restructure their tax situation. Google had used the double Irish scheme since 2004. It is estimated the $55 billion in marketable securities held by Google Ireland Holdings Unlimited, a company resident in Bermuda, was funded by Google being able to avoid worldwide taxation by funnelling their profits through the Irish tax loophole (Beard, 2018; Turner, 2020).

The double Irish tax scheme functioned through exploitation of different definitions of corporate residency in the US versus Ireland; it is regulatory arbitrage. Ireland taxes companies if control and management is based in Ireland; the US based tax residency on the location of a company's registration (US Senate, 2013). Companies assign ownership of intellectual property to an Irish registered company controlled elsewhere, like Bermuda. This means to the Irish tax authorities the company is Bermudan, but to the US tax authorities it is Irish. The result is royalty payments go completely untaxed, unless they are domesticated to the US. The Financial Times estimated in 2014 these types of tax structures have allowed US MNCs to keep around $1 trillion of cash or cash like assets in tax havens (Houlder, 2014).

The exact means for how Google uses tax jurisdictions to its advantage is by having customers in various global regions invoiced by a company based either in Singapore or Ireland operating under a license from Google held by another wholly owned subsidiary, Google Ireland Holdings Unlimited of Bermuda, which has no employees yet recorded a profit of $15 billion in 2018. Because the license is very expensive, the company shows little to no taxable profit, despite generating all of Google's non US sales (Turner, 2020). This scheme reduced Google's tax provision by $2.2 billion in 2012 (Donohoe et al., 2013).

The double Irish scheme was abolished in 2014; companies already using the structure had until 2020 to end its use (Lewis, 2017; Turner, 2020). Google claimed to have paid an effective tax rate of 23 percent on global profits. The change in America's corporate tax structure from 35 to 21 percent would likely not mean Google would see an increase in its tax rates. What it is designed to do is entice US MNCs to move untaxed worldwide profits to the US to help compensate for the revenue losses created by the Trump tax cuts

enacted by the Tax Cuts and Jobs Act of 2017 (Turner, 2020; US Congress, 2017). Research by economics professor Clausing estimated this profit shifting costs the US Government $100 billion annually (US Senate, 2017) The double Irish is not the only tax treatment available. Others are various forms of base erosion and profit sharing.

As of 2014, a scheme known as the 'single Malt' was in operation that functioned like the double Irish, but instead of relying on non-EU tax havens for funnelling royalties uses Malta. This was possible due to the specific wording of the US tax code and the tax treaties in place with Ireland and Malta (Lewis, 2017). University College Dublin Economics Professor Frank Barry stated for this reason loss of the double Irish scheme was not a major concern to US tax experts because there are still multiple other tax schemes available (McCabe, 2014). Withholding tax on royalties for Irish registered patents is still also able to be cancelled through direct royalty payments to places like Bahrain, Switzerland or the United Arab Emirates. As Bahrain and the UAE have no corporate income tax, the tax on royalties can be effectively eliminated (Lewis, 2017).

Another tax avoidance method available through Ireland, known as IP onshoring, allows corporations to offset the cost of intellectual property (IP) rights against taxes on royalties from another of their subsidiaries. They can even borrow to finance the IP acquisition and deduct interest costs from taxable income. Based on information from the Central Statistics Office of Ireland, this caused a huge rise in the placement of IP into Ireland and equated to around €250 billion just in Q1 2015 when it was first made possible. Shown in Figure 9.20, the result was a drastic rise of capital allowances for intangible intellectual property of 989% from 2014-2015 (Lewis, 2017).

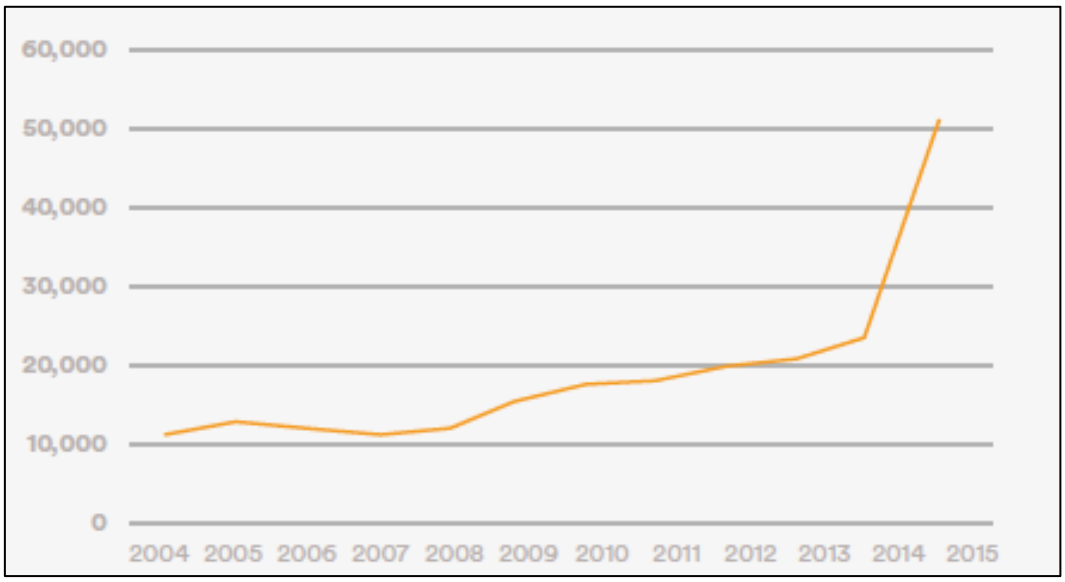


Figure 9.20 Capital Allowances Claimed Against Irish Corporation Tax - 2004-2015 (€m)

(Lewis, 2017)

Stipulations placed upon it by the EU have forced Ireland to do away with the double Irish tax scheme. Other tax avoidance schemes, such as the single Malt, 'Irish Sandwich with a Slice of Dutch' and possibly more, which are collectively known as 'check-the-box' types of schemes, as well as the previously mentioned move towards IP onshoring, either have been or are still in operation (Brothers, 2014; Tørsløv et al., 2018). An example of how these schemes function is given in Figure 9.21.

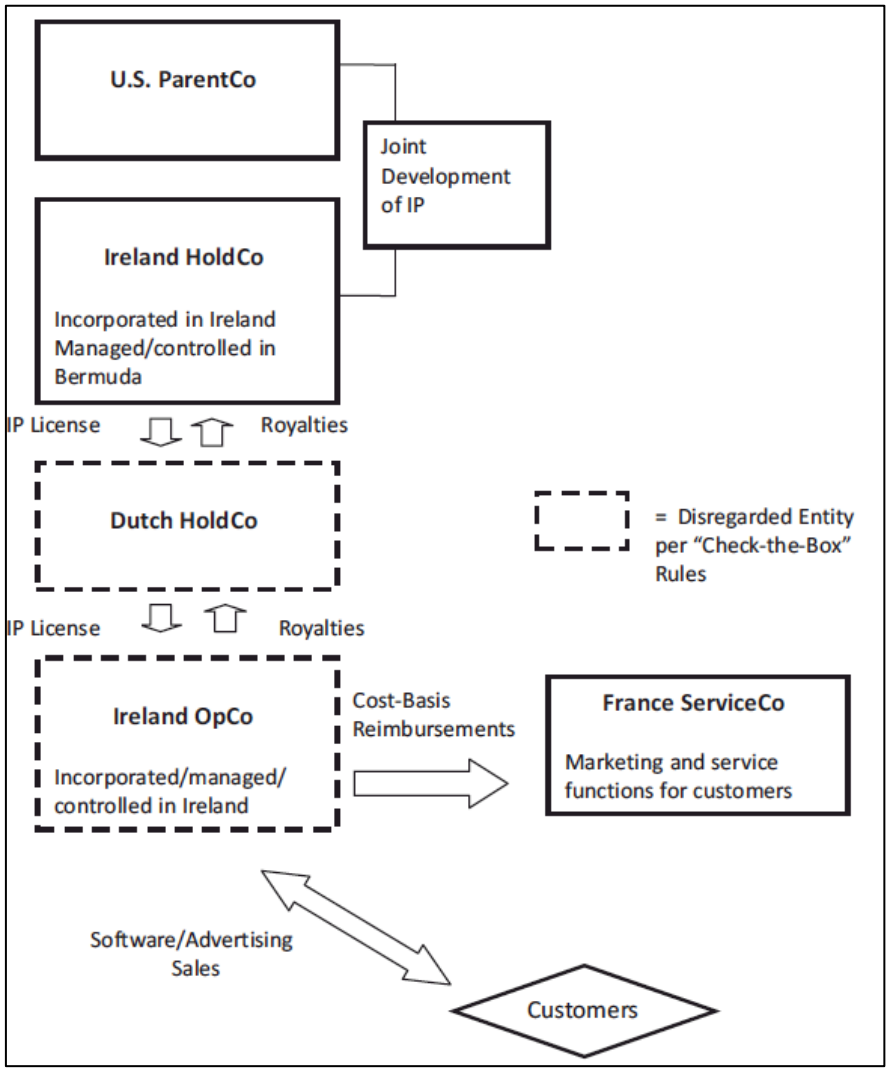


Figure 9.21 Irish Sandwich with a Slice of Dutch Tax Planning Model

(Brothers, 2014)

What Ireland's situation shows in regard to deglobalisation is taxation requires a coordinated effort by all countries involved if harmonization of financial regulations is to be achieved. As soon as one loophole is closed, another is exploited. It is an ongoing situation on a global scale not unlike the scenario wherein governments make illegal one type of drug only for a chemist to find a new molecular structure that circumvents the exact wording of the law. The difference regarding tax avoidance is it is private tax advisors and government agents whose goal is to bypass the intent of jurisdiction specific tax law and keep US corporations from incurring as little worldwide tax as possible.

When discussing the subject of a new scheme to replace the double Irish, former Irish Finance Minister Michael Noonan stated in 2017 to, “put on the green jersey” (Tithe an Oireachtais, 2017:5), meaning one should act in Ireland’s interests and allow favourable taxation for US MNCs to continue. Opinions like this from people in senior positions show Ireland will do what is necessary in order to maintain the relationship they have with corporate USA; Ireland’s economic future is dependent upon it and it does not want to return to its impoverished past or recent history of being under the control of the IMF.

9.9.2 Relocation of Financial Services Employment

Per estimates based on research by the firm Bruegel, shown in Figure 9.22, as of 2017, 10,000 banking jobs and 20,000 financial services positions in London were in danger of being lost. This could be accompanied by €1.8 trillion of assets leaving the UK (Batsaikhan et al., 2017). Despite Ireland being well positioned to benefit from the financial services industry moving jobs away from the UK, as of early 2019 the primary recipients in the competition for Britain’s jobs thus far had been Paris with 1,880 jobs, Frankfurt with 1,180 jobs, 1,500 jobs relocating to other EU locations and only 150 going to Dublin. (Brennan, 2017; Finch et al., 2019).

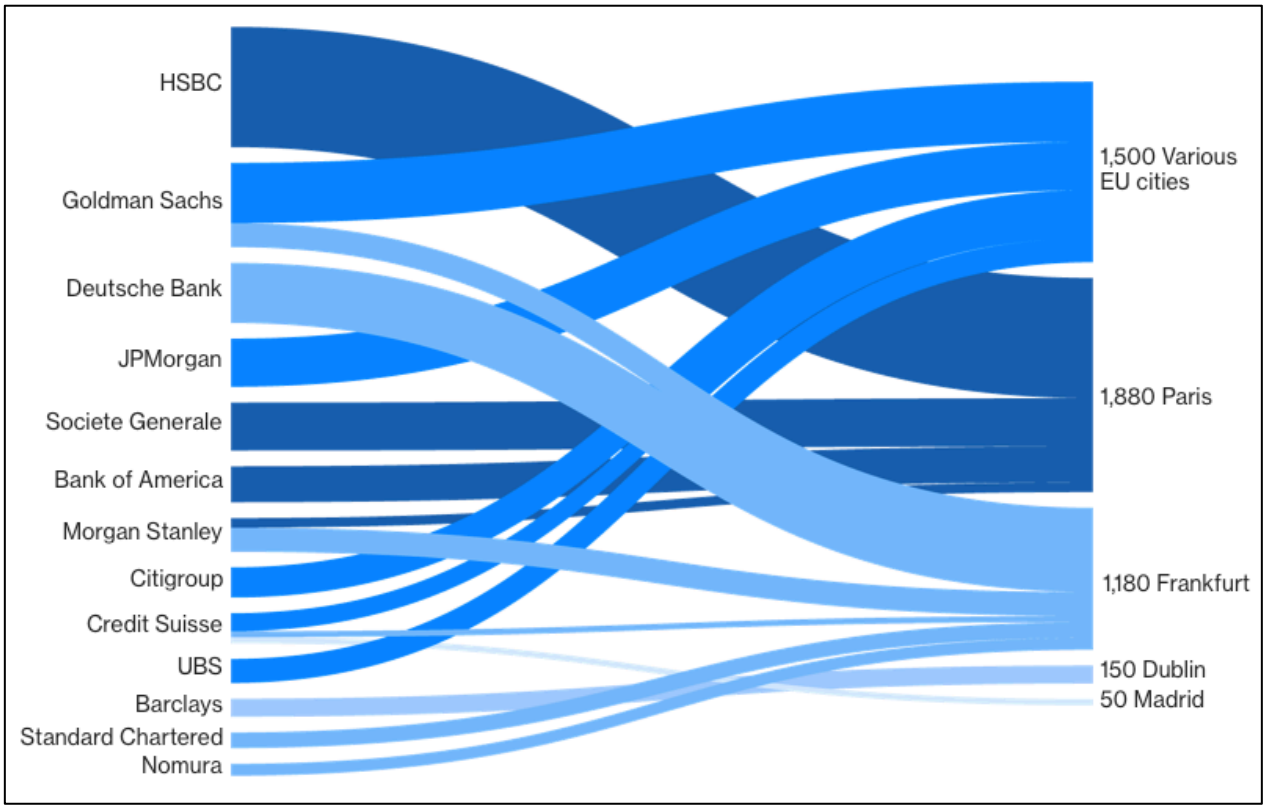


Figure 9.22 Destination of UK Financial Services Industry Jobs – January 2019

(Finch et al., 2019)

According to EY, as of October 2020, about 7,500 financial services jobs and £1.2 trillion in assets had moved out of the UK. 400 were lost in the month of September 2020; Dublin, Frankfurt and Luxembourg

were the recipients (EY, 2020). Financial services jobs with very large companies have left the UK for other European locations. As will be analysed, these positions in the financial services industry are important because auxiliary positions throughout the UK are reliant on the prevalence of large banks centred in London. It is a sizeable erosion of opportunity in the UK financial services job market directly attributed to Brexit.

9.9.3 Future of the Union of the Kingdom

Regardless of Brexit, the UK is still in the position of needing to abide by the Good Friday Agreement (GFA) and avoiding the re-emergence of a hard border in Ireland. It was something the US helped orchestrate under President Clinton and does not want to see undone (Hazleton, 2000). Many Americans have strong ties to and favourable opinions of Ireland, such as President Biden, who is the 23rd of 46 US Presidents of Irish descent (Irish Immigration Museum, 2022). Compliance with the GFA post-Brexit has been accomplished in the short run by implementing border controls on traffic to and from Northern Ireland from the rest of the UK, particularly ferry traffic (Cabinet Office, 2020).

The Irish and Scots have a long history of being managed by England in ways that made them unwelcome in their own countries. Historical events evident of this are the banning of the tartan with the Dress Act of 1746 (McIntyre, 2020), the relocation of Scots to Northern Ireland through the Plantation of Ulster (Moody, 1938) and the Troubles in Northern Ireland. These two Celtic nations have a shared history of emigration to North America and away from English control. The majority in both Northern Ireland and Scotland voted against Brexit. These are all factors requiring consideration when assessing how Brexit will affect the relations between the four countries of the UK. No one expected Brexit or Trump to succeed, but they did, which makes the possibility of a breakup of the UK seem much more possible in 2021 than it was five years ago.

Anyone intimately familiar with the UK knows there is a multi-generational, deep seated, mostly unspoken animosity towards England from the rest of the UK, as the other three countries were its first conquests and have for many centuries seen the wealth of the kingdom concentrate in the far south. There is now even a movement in the north of England, known as the Northern Independence Party, launched in October 2020, that wants to secede from the South (Northern Independence Party, 2021). As small a place as it is, the UK has four very distinct ethnic, linguistic, cultural and geographic regions. The European Economic Community was established to prevent another European war. As Figure 9.23 shows, the nationalism behind Brexit has opened old wounds in the UK; it is again facing wars of identity within. Beneath the national identity of Britain lies a deeper, older sense of self to the people of England, Ireland, Scotland and Wales.

Figure 9.23 English Democrats Flyer

(English Democrats, 2019)

As of early 2021, 21 consecutive polls found support for an independent Scotland to be in the majority, see Figure 9.24. The poll in February 2021 was a ratio of 47% in support of an independent Scotland with 42% opposed; when the 7% of undecided votes were excluded this equated to a 53% to 47% majority in favour of Scotland's independence (Cochrane, 2021). The future re-emergence of an independent Scotland is now more fathomable than it was at the time of the first Scottish referendum. The issue of Scottish independence is an influencing factor on what happens with Ireland.

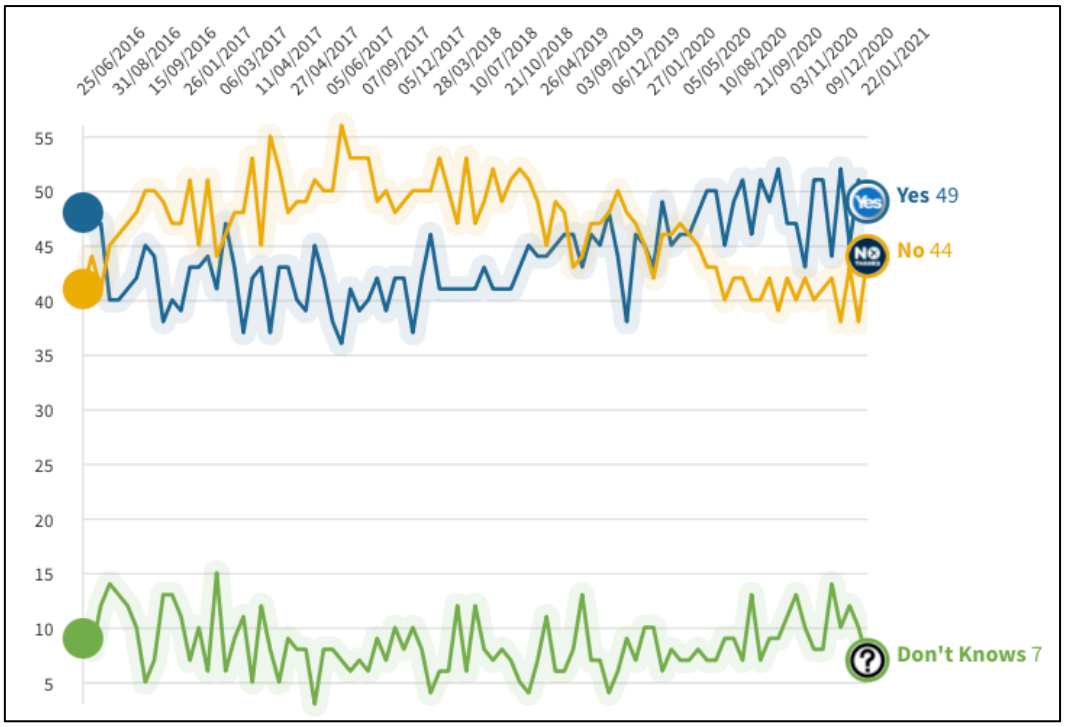


Figure 9.24 Support for an Independent Scotland 25/06/16 – 09/02/2021

(Cochrane, 2021)

As of January 2021, 51% to 44% of those polled in Northern Ireland wanted a referendum on reunification with the Republic of Ireland within five years. The majority of 47% versus 42% wanted to remain in the UK, but within the under-45 demographic 47% favoured reunification, whereas 46% opposed it (El-Bar, 2021). First time applications for Irish passports from persons born in Great Britain had risen from 7,372 in 2015 - before Brexit - to 54,859 in 2019 and from 24,492 for Northern Ireland born applicants to 76,958 (Ireland DFA, 2021). The fees for this are substantial and the administrative requirements are complicated enough that anyone completing this task can be viewed as being ardent in not losing access to the benefits of EU citizenship. It is evidence of the underlying sentiment that could sway the vote for an independent Ireland.

The immediate result of Brexit was a sea border between Britannia and Northern Ireland. The question now is how much more economic division will it take for the people of Northern Ireland to begin formally questioning whether they would be better off economically by taking advantage of the relationships the Republic of Ireland has with the US and the EU?

An example of the ongoing social rift in Northern Ireland is the Belfast Peace Wall, as seen in Figure 9.25. It illustrates the stance of one of two groups, both of whose membership is based on being of a particular ethnic group with motives based on a deep-seated ideological vitriol of their perceived enemy. What they have most in common is their ideology has become their identity and raison d'être. In Northern Ireland this exists on both sides of the religious and socio-political divide between Sinn Féin (Catholics) and the Democratic Unionist Party (Protestants), whose differences are indistinguishable to outsiders, but they can

discern, mostly by another's surname. These two now are oddly in agreement in their dissatisfaction of what Brexit has actually meant for Northern Ireland. Thus far it resulted in empty shelves in Northern Irish shops due to new border controls and the implementation of rules of origin. Those are meant to prevent UK companies from buying inexpensive non-EU products and repackaging them as being from the EU, and thus EU tariff free (Carswell & Pope, 2021; EU, 2021; Viner, 2021a).

Figure 9.25 Belfast Peace Wall

(Hayes, 2018)

To provide stability post-Brexit, Northern Ireland needs long-term economic equality and prosperity. Beginning in the late 70's, the UK invested £77 million into the iconic car and factory of American John DeLorean in Belfast in hopes of bringing economic success to the region; DeLorean put in just £2 million. The company was bankrupt by 1982 (Brownlow, 2015; RTE Archives, 1982). It is now an example of how not to place trust in the prospect of an American doing Britain a favour in hope of bringing prosperity to Northern Ireland. As of Q2 2021, UK GDP was -1.6%, Ireland's was 8.6%, see Figure 9.26 (OECD, 2021). Further research is needed regarding what the UK Government will invest in next to attempt to keep their Irish citizens content with Brexit.

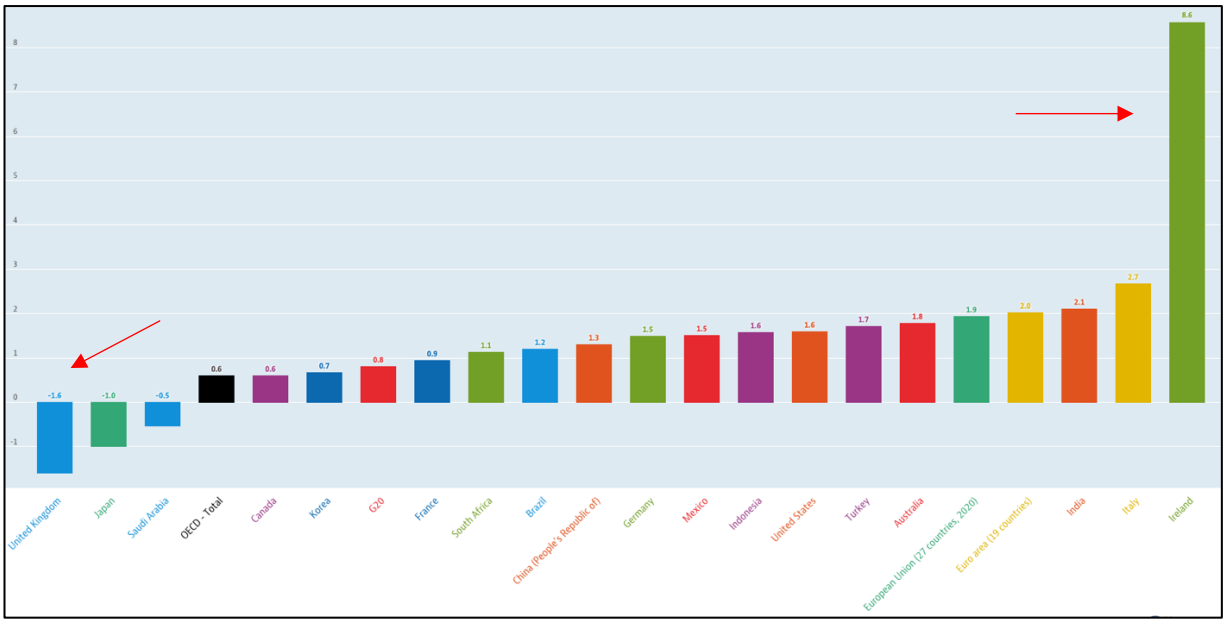


Figure 9.26 Quarterly GDP, Q2 2021

(OECD, 2021)

9.9.4 **Ireland's Role in Brexit and Globalisation - Summary**

The Irish isle is a location to watch for evidence of how the issues of deglobalisation and fintech progress. At the onset of this research, the Republic of Ireland first appeared to be in a position to see an influx of financial services jobs due to Brexit, a shared language with the US and the UK and the fact certain US financial services companies and most US MNCs in Europe are already headquartered there. Research found this is not Ireland's primary role in the globalised economy. Be it labelled a tax haven or not, its most important position is as a European locale for US MNCs to avoid paying taxes in high tax European jurisdictions; the most recent method is through the use of IP onshoring.

The dynamics of this business model are being challenged by the Trump tax changes enabling US companies to avoid paying tax in Europe and elsewhere, the UK included, and domesticate their worldwide profits and pay a reduced corporate tax to the US. Most financial services jobs that left the UK went to continental Europe with some going to the Irish Republic. Ireland is a willing participant doing all it can to keep US interests satisfied as their economy is dependent on US MNCs. They are what helped it recover from its own financial crisis, which ironically was caused by the GFC that originated in the US. The socioeconomic outcomes of Brexit are a threat to the continuity of the UK and an example of the concept of divide and rule. As will be covered, both Ireland and the UK are subject to American interests in some form. The situation is a real world example of game theory in action on an international level. Further analysis of the type of strategic behaviour on display and the long-term outcome for the players involved is required.

9.10 Socioeconomic Outlook for the UK Due to Brexit

According to City of London Economic Research, in the UK across all sectors 91% of businesses employ fewer than five people. For financial services and insurance, there are 1.07 million jobs, or 3.1% of all jobs in the UK; 66% of these positions are located outside of London. Large businesses are defined as those with 250 or more employees; of 5.5 million private sector businesses, only 7,200, or 0.1% meet this definition. Of those, 355 (5%) are within financial services. These companies comprise just 0.4% of the number or financial services firms in the UK, but account for 72% of the sector's jobs (Davison, 2017).

210 of those firms account for 67% of the jobs in financial services. Banking makes up 40% of the jobs; insurance is 10%. 40% of financial services jobs in the UK are within companies that provide auxiliary services like fund sales, management and advisory services. For banking, 84% are with 80 companies that have 500 or more employees. For insurance, 81% are with 35 large pension funds and insurers. What makes the concentration of these jobs misleading is the fact the Office for National Statistics (ONS) largest category of employer is 500 or more employees, but the largest banks each employ tens of thousands of people across the UK. Of most concern regarding the effects deglobalisation and fintech can have on the UK economy are the 40% of jobs deemed to be auxiliary services (Davison, 2017). Numerous conflicting sources regarding job losses due to Brexit forecast reductions at large employers somewhere between 5,000-75,000 jobs, which was so wide a variance as to be unreliable. One estimation all forecasts agreed upon and shown earlier was due to Brexit the UK would be losing key financial services jobs by the thousands.

The Peterson Institute for International Economics (PIIE) examined 12 different scenarios on the potential economic outcome of Brexit. In all instances they found it will be damaging to both the UK and EU, but the UK economy will fare worse. For the UK, a hard Brexit would have resulted in GDP losses of 1.2-4.5%. Their middle of the range results predicted a 2.53% decline in UK GDP. For the EU, they forecast its ability to trade unimpeded with other EU members would enable it to overcome losses to GDP; that is not an option for the UK (Latorre et al., 2019). As of February 2021, the PIIE's mid-range estimate of 2.53% appeared to be accurate. The European Commission calculated the terms of the Brexit agreement would result in a loss of GDP of 0.5% for the EU and of 2.25% for the UK by the end of 2022 (EC, 2021b). PIIE also concluded belief in the benefit of a no deal Brexit and the opportunity it presents for further deregulation is not realistic because the UK is already very deregulated (Latorre et al., 2019).

The ongoing outcomes of the late 2020 Brexit agreement left many issues unresolved, namely financial services. It raises the question of whether the result of Britain's desire for greater autonomy will be greater isolation. EU Covid-19 restrictions in place at the time dictated non-EU nations, which due to Brexit also included the UK, would be restricted from travel to the EU as of 1 January 2020 (EU, 2020a). The answer in the short-term was yes.

9.10.1 **Early 2021 Economic Conditions the UK**

The role of the IMF as a lender of last resort to financially insolvent nations was covered in the literature review. The focus of that research was on the relationship between the IMF and developing nations, but the UK was also forced to rely on the IMF for stabilisation of its currency in 1976. According to Economics Professor Randal Wray at Bard College, this was due to it attempting to link the value of the pound to the US dollar (Coy et al., 2019). Historian Richard Roberts stated from the mid-1940s to the mid-1970s it was actually the UK that was most reliant on IMF resources, particularly during the years of 1964-67, which resulted in the pound being devalued by 14% on 18 November 1967. He claimed this was due primarily to Britain's WWII debts owed to the US as part of the lend-lease program coupled with an unsustainable initial exchange rate under Bretton Woods (Coyle, 2017; UK National Archives, 2020).

Pound sterling suffered another currency crisis on September 16, 1992, known as Black Wednesday, due to its inability to hold a value in a range of 2.78-3.13 Deutschmarks, which was a stipulation of the European Exchange Rate Mechanism (ERM), a precursor to the introduction of the Euro. The Deutschmark was chosen as the base currency due to its strength and the independence of the Bundesbank. The ERM essentially required other currencies to follow Germany's monetary policy. When Germany raised interest rates to counter inflation caused by its reunification costs, other states were unable to keep up when the US dollar began depreciating and speculators – particularly George Soros - took advantage of the situation. The result was Britain was £3.4 billion worse off (Dury, 2011).

Governor of the Bank of England Andrew Bailey stated in June 2020 the central bank had again relied on quantitative easing (QE) due to the financial stress caused by the pandemic and put £200 billion into the economy. There were serious issues regarding Britain's ability to remain solvent without the intervention (Partington, 2020). As of November 2020, there had been another £150 billion in QE, bringing the total of UK government bond purchases since the GFC up to £895 billion (BoE, 2020c). Britain's post-GFC history of bond purchases is detailed in Figure 9.27.

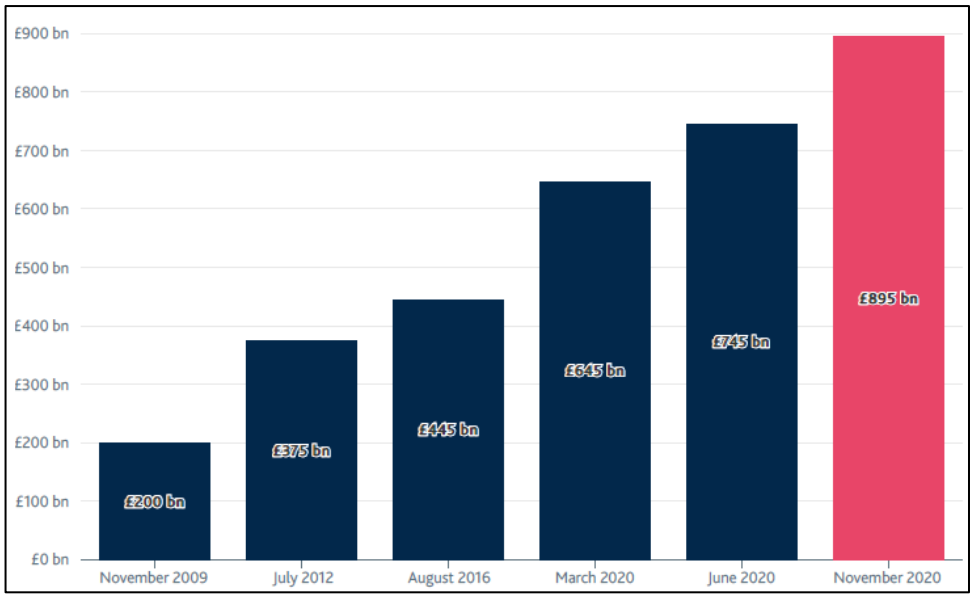


Figure 9.27 Bank of England Bond Purchases as of November 2020

(BoE, 2020c)

Chancellor of the Exchequer Rishi Sunak forecast on November 26, 2020 due to the pandemic, the UK economy would shrink by 11.3% in 2020 and would not be expected to recover to pre-crisis levels until 2022. Unemployment was expected to be 7.5%, its highest rate since 2009 (UK Government, 2020b). As of February, 2021 based on information from the ONS shown in Figure 9.28, GDP growth had been revised up to be negative 9.9%, which was still the worst fall on record – ever (ONS, 2020c). This was the biggest economic decline in 300 years (UK Government, 2020b) which is a timeframe for comparison wider was ever anticipated would be required for assessing the economic condition of the UK as it finalised its divorce from the EU.

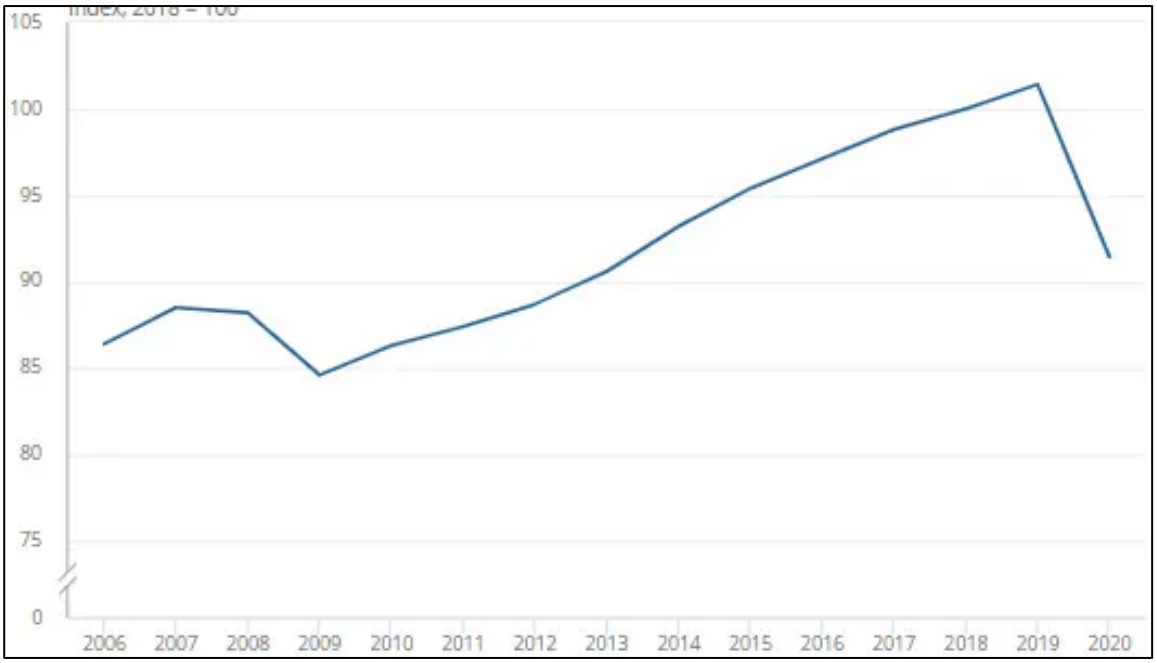


Figure 9.28 UK Annual GDP Growth, 2006-2020

(ONS, 2020c)

On March 3rd 2021, Mr. Sunak announced corporation tax will rise from 19 to 25% in 2023, a freeze on income tax personal allowances until 2026 and further borrowing to cope with the pandemic that will increase the total to £407 billion (UK Government, 2021a). This will inflate Britain's historic debt level of £2.198 trillion up to £2.804 trillion (OBR, 2021). Rising tax rates and regulatory isolation deter foreign investment. Britain's failure to pay off debts from the GFC combined with the impact of rising debts from Covid-19 spending were breaking the bank at a time when Brexit has isolated it from the rest of Europe.

9.10.2 **UK Pre and Post-Brexit Food and Drink Trade Figures**

One of the most stark indicators of the disruption Britain was undergoing in early 2021 with the twin effects of Covid-19 and Brexit was the changes recorded in the post-Brexit food and drink figures. The relevance of these figures to the changing economic landscape of the UK's relations with the EU and US will be explored later.

Table 9.5 shows the figures for UK-EU food and drink exports and imports. There were drastic year-on-year declines from January 2020 to January 2021 of -75.5% for exports and -18.1% for imports. Some of this can be presumed to be pandemic related, but using the figures for non-EU exports of -11.1% and imports of 4.1% as a reference indicates something more has happened (Food & Drink Federation, 2021). The plausible cause is Brexit.

Table 9.5 UK Food and Drink Exports and Imports

Exports	**January 2020**	**January 2021**	**Change**
EU	£1.0 billion	£256.4 million	-75.5%
Non-Eu	£639.9 million	£568.5 million	-11.1%
All Food and Drink	£1.7 billion	£824.9 million	-51.1%
Imports	**January 2020**	**January 2021**	**Change**
EU	£2.6 billion	£1.9 billion	-18.1%
Non-EU	£1.2 billion	£1.2 billion	-4.1%
All Food and Drink	£3.8 billion	£3.1 billion	-18.1%

(Food & Drink Federation, 2021)

Note: The figure for Non-EU imports shows the same value, but is noted as a -4.1% drop. It is assumed this is due either to currency fluctuations, rounding or both. This is the figure as reported by the Food & Drink Federation.

9.10.2.1 **Food and Drink Exports**

Exports to Ireland, Germany and Italy were down more than 80%. Ireland is the biggest export market for UK food and drink. It went from 18% to 5% of exports (£299.5m to £45.3m). All of the top 10 exports from the UK are down from between 45.1% for lamb and mutton to 98.0% for salmon (Food & Drink Federation, 2021).

9.10.2.2 **Food and Drink Imports**

Imports from all top nine supplying markets also fell. For the Netherlands, Ireland and Germany this was by about a third. Imports from certain countries were up. Lithuania went from £10 million to £29.6 million, a change of 194.3% and Luxembourg rose from £0.1 million to £0.2 million, or 86.7%. Slovenia, Hungary and Malta have also all seen imports to the UK rise from 20-30%. The value of these increases is negligible because total EU imports dropped by almost 25%, or £700 million (Food & Drink Federation, 2021).

9.10.2.3 **UK-EU Food and Drink Trade – Summary**

What these figures show is regardless of Covid-19, in the short-term Brexit had an overwhelmingly negative impact on the food and drink trade between the UK and the EU. It is the UK's biggest trading market for food and drink. The cost of Brexit at the same time as Covid-19 has been the loss of up to £743.6 million in exports. Prior to Brexit, Britain imported £1.6 billion more food and drink than it exported (Food & Drink Federation, 2021); it is more dependent on the EU for sustenance than the EU is on it. The issue is not whether Britain enjoyed being a part of the EU and subject to trade on its terms. Due to the UK's geography, modern production methods and economies of scale, it realistically has no other choice but to trade with the EU for perishables it cannot domestically produce.

Due to climate and geography, places like Andalucía in Spain are renown as Europe's hothouse and grow of much of its year-round produce for a reason - it is not possible to grow those types of food in northern Europe, the UK included; Brexit cannot change that. As shown in Figure 9.29, as of 2019, 26% of the UK's food was produced in the EU (DEFRA, 2020). Britain needs its relationship with the EU if it wants to keep consuming as it has.

The markets will adjust and find equilibrium. Economic theory holds this will result in is higher prices that are passed to the consumer. The loss of trade in food and drink will likely also result in reduced economic activity and taxable income within the UK. How Britain fulfils its pre-Brexit promises with this loss of revenue is an area for ongoing research.

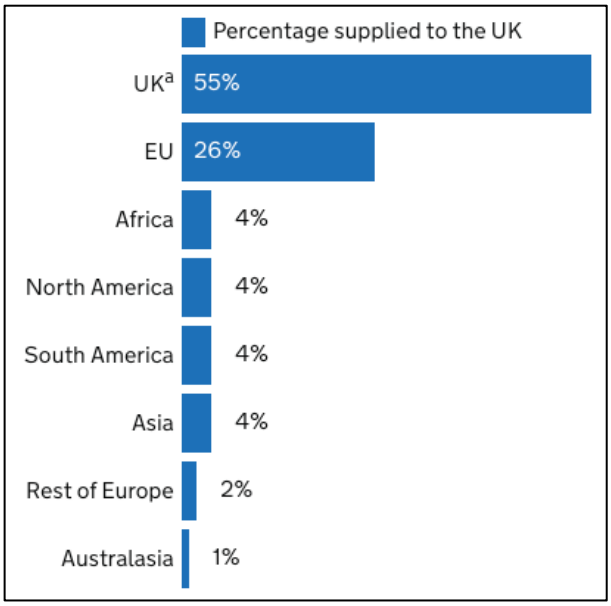


Figure 9.29 Origins of Food Consumed in the UK – 2019

(DEFRA, 2020)

9.11 US-UK Relations

Past performance is said to not be indicative of future results. It is also said someone who fails to learn from history is doomed to repeat it - just as it is said that those who do know history are condemned to watch others repeat it. That said, past performance is one of the best tools available for forecasting what the future might bring. What the past shows is be it through war, Bretton Woods or inclusion in the ERM, the UK has found itself time and again to be disadvantaged in its relations with the US and Germany. It is because of economic hardship that Britain joined the EU in 1973.

With Brexit the UK chose to align more closely with the US, which is a development that more than five years later still has not begun to happen. The Covid-19 pandemic highlighted the need for long-term financial prudence. Issuance of debt is needed in times of distress, but recovering from the US induced GFC

already put the UK deeply in debt. Those debts from 2008 have been exacerbated by the UK's efforts to keep its economy functioning during the pandemic.

As this thesis has repeatedly found, deglobalisation in regard to US/UK/EU relations is an ideological conflict between European ordoliberalism and American neoliberalism or neoconservatism - the latter being a more extreme version of the former; whichever is en vogue in America depends on which political party is currently in charge. Britain does not produce industrial goods in volume like Germany and has already transitioned to being primarily a service economy. Britain also cannot generate ever increasing debts and use its economic and military strength to its advantage like America. Britain and the US are two very different countries, which makes adoption of a US approach to economic policy questionable.

French philosopher Michel Foucault defined power as being a relation between individuals where one party can direct another's behaviour and the exercise of government in a broad sense being a situation where the entity holding power in a relationship can determine the behaviour of the other by using a number of tactics. Governmentality is a relationship based on shared values between two parties where the governed allow this power over them to be exercised (Philosophy Overdose, 1981). Power is used either through coercion or manipulation (Clegg, 2018). Exercising these tactics was defined by Bentham in terms of reward and punishment, (Hunt, 1995) which is also referred to as using the carrot or the stick.

Because of their special relationship the US is able to exert its influence over the UK. Bello claims America's prevailing ideological soft power is its greatest strength (Bello, 2004). Soft power is the ability to shape others' preferences through appeal and attraction; it is the use of manipulation. Like most aspects of its relationship with America, this is something Britain is not without - the royal family being its most prominent soft power asset and tourist attraction - but the US dominates. Where US soft power ends is where its hard power begins. This is its ability to coerce, which is a power Britain does not have over the US.

Appeasement does not work with adversaries who revert to strong arm tactics, a good example being Neville Chamberlain's expectation that 1930s Germany would be content with occupying the Sudetenland (Imperial War Museum, 2021). Britain has again placed itself between the US and Germany, albeit this time economically, with expectations of its comradery with one being a solution to its ills with the other. Such alliances come at a price.

9.11.1 **US-UK Military Relations**

Since World War II, throughout the cold war and up to now, the US has maintained a significant military presence in the UK. Research found this is only in England. The situation was strategic in the past and by nature of the bases' existence persisted. It is another representation of the economic and ideological rift between the four countries of the UK. The number of military installations has waned since the end of the

cold war from around 100 to 13, but due to modern warfare methods, there are still as many as the US needs. As of 2020, the US had 24,000 military personnel, civilian staff and family members in the UK (CND, 2020). The UK has 705 military and civilian Ministry of Defense (MOD) staff in the US in over 30 states for advancing its interests with the US (MOD, 2021).

In January 2015, the US announced that operations at RAF Mildenhall were to end by 2023, the air refuelling fleet would be transferred to Rammstein, Germany and the MOD would sell the site. As of April 2017, under Trump those plans were put on hold (Vandiver, 2017). Menwith Hill, North Yorkshire is the largest military spy base in the world and is controlled by the US National Security Agency. Construction of three additional radomes is scheduled to begin in August 2021 (BBC, 2019; CND, 2020; Harrogate Borough Council, 2021), an example is in Figure 9.30.

Figure 9.30 Recent Radome Construction at Menwith Hill, North Yorkshire

(Google, 2021)

The proposed 2021 US annual defense budget was $753 billion (Reich, 2021); that is more than the next 12 nations combined (Sanders, 2021). US military installations are economically vital to their local areas due to the large amount of revenue their presence brings, threat of the loss of which the US can use as a coercive tool. In 2014, the US Air Force appraised the economic value of its bases in the UK at £812 million ($1.3 billion) per year (Milmo, 2014); as of 2017, the US Air Force claimed RAF Lakenheath and RAF Mildenhall combined bring £700 million ($910 million) to the local economy (Cawley & Moore, 2017). In the case of Menwith Hill, technological advancements have enabled it to now be mostly run remotely from the US. The

on base schools have closed, multiple buildings have been demolished and the size of the US community has dwindled, as has the revenue its American workers brought to the local economy. The US' ability to utilise the site for whatever motives, such as drone warfare and mass communications interception, remains (BBC, 2019; Svan, 2015).

What has been made clear through America's actions in the case of Harry Dunn, a teenager killed by Anne Sacoolas, the American wife of a technical assistant at RAF Croughton in 2019 due to her driving on the wrong side of the road, is the US places its own interests above those of the UK. She was allowed to avoid arrest through US intervention which claimed diplomatic immunity on her behalf. This was later confirmed by the UK High Court. As of December, 2020 his parents had been given approval to appeal the ruling (Giordano, 2020). Most recently it had been disclosed Ms. Sacoolas was actually in the employ of a US intelligence agency at the time of the crash (Viner, 2021b).

The case parallels what happened with PC Yvonne Fletcher on 17 April, 1984 when she was murdered by gunshot by someone within the Libyan embassy in London. That led to an 11 day siege and the severing of diplomatic ties between the UK and Libya, but amongst a group of persons deported from the embassy the suspected killer was allowed to leave the UK and not face charges - again, due to diplomatic immunity. Justice has never been served for PC Fletcher's murder (Jones, 2019), whether it will be for Harry Dunn looks doubtful.

Britain has repeatedly rebuffed US desires regarding persons within the UK whom the US wants to extradite due to human rights grounds surrounding the possible treatment of persons incarcerated in the US and the potential effect on their mental health and risk of suicide. This happened in October 2012 in the case of Gary McKinnon, a Scottish IT specialist who had accessed computer systems of the US National Aeronautics and Space Administration looking for information on UFOs in 2002. All charges against him in the UK were dropped; a US extradition warrant for him appears to be outstanding, preventing him from travelling outside the UK (BBC, 2014; Wired Staff, 2006).

Extradition to the US was also denied for Julian Assange in January 2021 due to mental health and suicide concerns. He is the founder of Wikileaks wanted by the US for dissemination of classified documents obtained from former NSA contractor Edward Snowden in 2010-2011 who wanted to publicise how the US uses its intelligence services for maintaining its economic supremacy (Snowden, 2017). The US plans to appeal the ruling (BBC, 2021). What is evident from these cases, especially the most recent, is despite leaving the EU, as a continuing member of the Council of Europe, the UK is upholding its commitment to human rights and it is one area in which it has not succumbed to US demands.

9.11.2 **Evidence of US Power in the UK**

British architectural historian Jonathan Meades has devoted his career to documenting how power is displayed in physical form through the construction of grand buildings. Two such symbols of American power in England are the Citigroup Centre ($2.23 trillion in assets) in Canary Wharf and its new billion dollar embassy on the south shore of the Thames (NIC, 2020; US Embassy London, 2022). The most widespread evidence of US power in the UK (and the world) is seen by examining the corporate ownership of what is on sale. As shown in Table 9.6, ten multinational corporations now control almost all food brands in the world. They generate $1.1 billion of revenue a day; six are American, two are British (Johnson, 2017).

Table 9.6 Nationality of International Food Brands

Company	Nationality of Ownership
Associated British Foods (ABF)	UK
Coca-Cola	USA
Danone	France/Spain
General Mills	USA
Kellogg	USA
Mars	USA
Mondelēz	USA
Nestlé	Switzerland
PepsiCo	USA
Unilever	UK

(Johnson, 2017)

A recent example of how this came to be is Cadbury's, the British confectioner founded in 1824, which was bought by US company Kraft Foods (now named Mondelēz) in February 2010 (Mondelēz UK, 2021). Since then, it closed plants in the UK and dropped its commitment on the minimum price paid to cocoa farmers under Fairtrade rules, although it kept the Fairtrade logo on its packaging and reduced the quality of ingredients (Key, 2016; Rodionova, 2016).

This is how globalisation functions: buy a foreign brand, reduce local labour costs by integrating back office and production operations into those of the parent company, lower input costs, which in turn reduces quality, and maximise returns. Foreign investment in the UK has been a long-term trend. As evidenced in Figure 9.1, the percentage of foreign ownership of equites in the UK increased from 4% in 1980 to 54% in 2017 (De La Cruz et al., 2019). This is evidence of what the UK has become since the era of Margaret Thatcher – globalised.

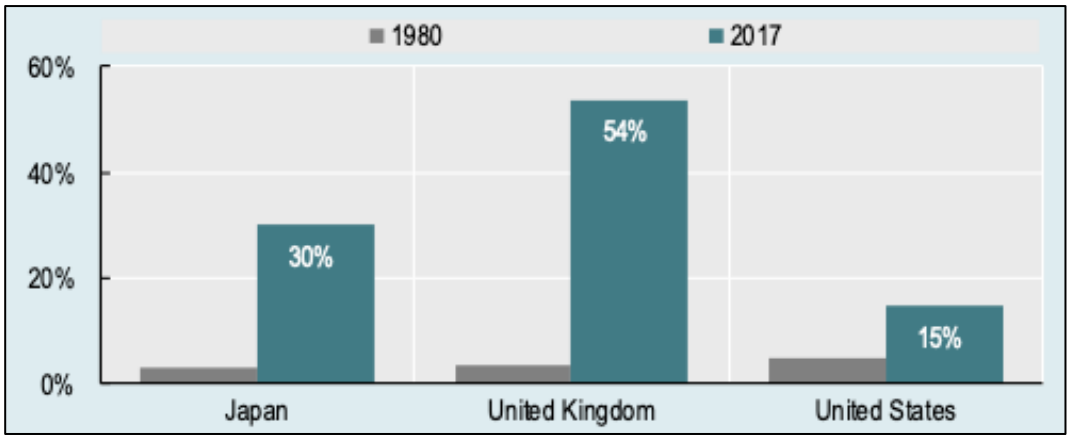


Figure 9.31 Changes in Foreign Ownership in Japan, the UK and US – 1980 Versus 2017

(De La Cruz et al., 2019)

The most visible sign of America's soft power and its greatest globalising influence in Britain and beyond is the consumer culture it exports. This is seen in the multitude of fast food chains that have proliferated throughout the UK. Because of its globalising power, the number of McDonald's restaurants in a country is one of the metrics used in computing the KOF Globalisation Index (Potrafke, 2015). There are more than 1,300 McDonald's in the UK, making it Britain's third most popular dining brand. Four of the top five burger restaurants in Britain are American; its pizza chains dominate the UK market (Point Franchise, 2020). The US has interests in the food market because consumers purchase durable goods only so often, but buy consumables constantly, which makes them an ideal source of repeat revenue.

As of 2017, 89% of UK cross-border investments were held by institutional investors. US based investors owned 22% of all publicly traded equities, as shown in Figure 9.32 (De La Cruz et al., 2019). Even for companies that are British, over one fifth of the UK's exchange traded assets are American owned. This is what globalisation looks like in Britain from America's point of view – its military, companies, financial investment and control embedded in another foreign land delivering economic returns to stateside investors. It is the long-term result of the proselytizing mindset behind the American concept of Manifest Destiny and ongoing self-perception of its role in the world as still being one of aid and a continuation of the Marshall Plan through the provision of American goods, which bring others America's purportedly superior way of life and living standards.

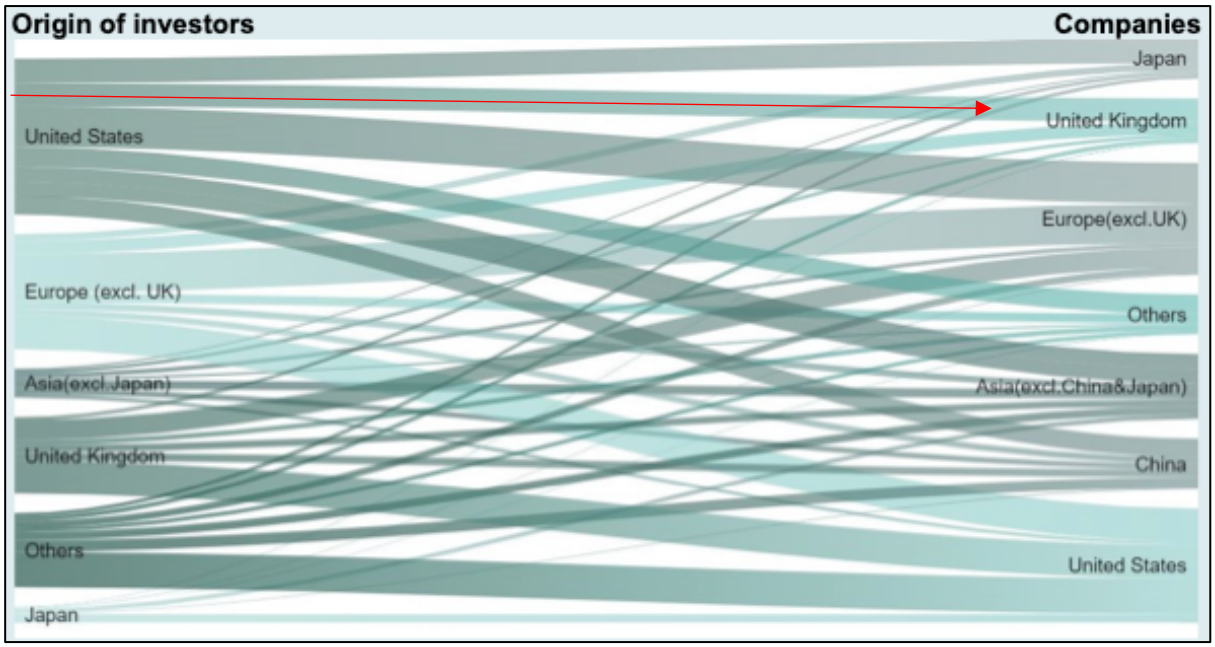


Figure 9.32 Cross-Border Public Equity Investments – 2017

(De La Cruz et al., 2019)

9.11.3 **The American Way**

According to University of Michigan economics Professor Mark Perry, from January 2000 to December 2020 the US consumer price index for all items increased by 54.6%, see Figure 9.33. He believes goods in the US subject to foreign competition have experienced price drops over the past two decades because of the reduction of trade barriers. Contrary to this, non-tradeable goods - like healthcare, childcare and college tuition - saw their prices rise substantially and well above the increase in wages (Perry, 2021). Another way of stating this trend is to say in the US, wants are cheap, but needs are expensive.

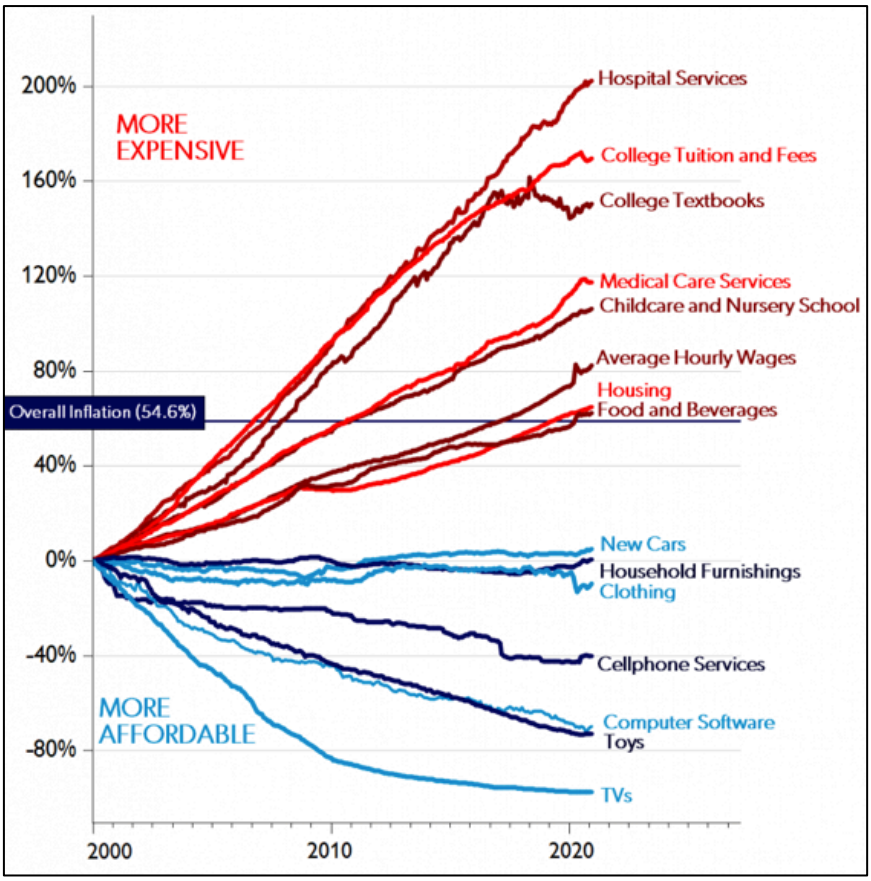


Figure 9.33 Price Changes: January 2000 to December 2020 – Selected US Consumer Goods, Services and Wages

(Perry, 2021)

A detailed breakdown of the price changes in Figure 9.33 is in Table 9.7.

Table 9.7 Price Changes: January 2000 to December 2020 – Selected US Consumer Goods, Services and Wages

Product	Rate of Inflation
Hospital Services	203%
College Tuition	170%
College Textbooks	151%
Medical Care Services	117%
Child Care	106%
Average Wages	82.5%
Housing	65%
Food and Beverages	62%
Cellular Phone Service	-40%
Televisions	-97%
Toys	-73%
Computer Software	-70%

(Perry, 2021)

The long-term results have been a widening of the social divide, erosion of the middle class and a exacerbation of the root causes of deglobalisation as envisioned by Bello. This is 21st century America. Due to Brexit and the isolation it might bring to the UK, and as the US is the one exporting its culture and economic influence, there already exists precedent this will be Britain's future direction. England and Wales introduced annual tuition fees of £1,000 in 1998, which have now risen to £9,250, while Scotland resisted allowing market forces into the higher education sector (Dearden et al., 2011; UCAS, 2021). Consider how Nick Clegg, former Deputy Prime Minister whose promises of no student fees were broken, now is Vice President of Global Affairs & Communications for Facebook and resides in Atherton, California (Clegg, 2022).

The US and UK diverge on minimum working standards. In the US as of 2017, 542,000, or 2.3% of workers, were paid the minimum wage of $7.25 (£5.20 at $1.39:£1) or below (US BLS, 2018); in the UK this figure in 2020 was 2 million, or 7% of all workers (Francis-Devine, 2020). The US has not had a rise in the minimum wage since 2009 (US BLS, 2018). In the UK it rises annually and is determined by age group. For 2021 the rates are £8.91 (25+), £8.36 (21-24), £6.56 (18-20), £4.62 (under 18), £4.30 (apprentice); the UK has the 8th highest minimum wage rates of the OECD countries, the US is 13th (Francis-Devine, 2020). In the UK the

minimum wages are higher, but more people are on them, public health care is available, yet suffers from underfunding. UK workers are also legally entitled to holiday, whereas in the US they are not (UK Government, 2021b).

Table 9.8 illustrates the fundamental difference between the UK and the US and why the former cannot behave as the latter. The UK is a small, densely inhabited country whose population has increased by 34% in the past 70 years. The US is 40 times the size of the UK and has seen its population more than double in the same time; it is a country still developing and expanding within its own borders. Speaking to the University of Hull on March 3rd, 2021, Aaron David Miller, former advisor to multiple US Secretaries of State, claimed the US can behave globally as it does because it is geographically very isolated, meaning any foreign policy it implements can have a wide margin of error without any real repercussions (Miller, 2021). Britain does not have this resource, nor due to its diminutive size can its wealthy geographically isolate themselves from the working poor like in the US.

Table 9.8 Population and Area of the UK and US

	United Kingdom	**United States**
Population (July 2021 est.)	66,052,076	334,998,398
Urbanisation	83.90%	82.70%
Rate of Urbanisation	0.89%	0.95%
Population Growth 1950-2020	17,269,987	173,198,256
Percentage Growth 1950-2020	34.12%	109.06%
Percentage of World Population	0.87%	4.25%
Percentage of Population of UK	-	-
England	84%	-
Scotland	8%	-
Wales	5%	-
Northern Ireland	3%	-
Area (km^2)	243,610	9,833,517
Population Density (persons/km^2)	281	36

(CIA, 2020; Macrotrends, 2021b; worldometer, 2021a)

US economic development in the 21st century has centred on encroachment of market forces on the public sector and rising costs on the goods needed for long-term prosperity, like home ownership, and decreasing costs of the things people want for short-term satisfaction, like a new television. It is what modern America is all about – a two-tiered social class system and consumer culture built around the concept of buy now, pay later, as debts owed are also debts owned. What it means in relation to the philosophies of Foucault

and Maslow is if the lower rungs of society can be kept at a level of constantly focusing on their security and pleasure, they never reach self-actualisation and develop the capacity to question the quality and motives of their governance.

This has been facilitated in the US over several decades through the constant broadcast of fear and misrepresentation of facts by Svengali-like newscasters blurring the line between news and entertainment on Trump's favourite channel, Fox News. It would not have been possible without repeal of the Fairness Doctrine in 1987 under Reagan (Antao, 2012) and deregulation of the media industry in 1996 with the Telecommunications Act under Clinton that allowed the formation of national media conglomerates that now dominate the industry (Gomery, 2002).

This type of yellow journalism has thus far been relegated to Britain's tabloids. Fox News segments from the US proved unpopular in the UK and stopped being aired on Sky News in 2017. In early 2021, GB News began broadcasting in Britain a UK tailored type of this news and Rupert Murdoch is considering launching a similar channel as well (Martinson, 2021; Volpicelli, 2020). They will likely be airing the same type of opinionated journalism Prince Harry stated in February 2021 made him and his American spouse choose to permanently leave the royal family and move to the US (Suliman, 2021). They now reside isolated from the media in a 18,671 square foot mansion on a 7.4 acre estate in Montecito, California (McClain, 2020).

What transpired during the Trump administration, especially during its last few months with the outright fraudulent claim of election theft and attempted insurrection at the US Capitol building inflicted severe, lasting damage to America's image and trustworthiness. Regardless of this or whether any of it is true, America still will claim to be - but most importantly, be perceived by some as being - the land of the free and the home of the brave where everything is bigger and better. Be it Hollywood action movies, Florida theme parks, the desert and mountain vistas in the West or any of the other superlative assets it possesses – which include government debt, military spending and Covid-19 deaths (worldometer, 2021b) – America's greatest asset is its cultural appeal and soft power which developed over time due in large part to its ability to capitalise on its vast amount of natural resources from the beginning of the industrial revolution and especially since World War II.

Much of what the US projects as its identity is illusory, based on bygone times and belies the economic disparity globalisation has wrought within, but this does not matter. The concept of the 'American Dream' persists, which is a belief anyone from any background can achieve personal success there due to it being a society that provides opportunity and promotes upward mobility, most notably through home ownership and education; nothing similar exists in perceptions of Britain or Europe (Adams, 2017; Hall, 2018). As Professor Perry's analysis found, housing and education are becoming increasingly difficult to obtain in modern America and as this research found, affordability of housing and education has also been on the wane in Britain since the turn of the century. Despite this, when it comes to propaganda and public opinion,

perception is reality. It is again as US President Abraham Lincoln never actually said, “you can fool some of the people all of the time”.

With a move towards a US style of neoliberal economic behaviour appearing to be its future, albeit one without the innumerable resources the US has, most notably the fact that the world economy is structured around the US dollar being the benchmark for creditworthiness regardless of its indebtedness, the outcome for the UK’s economy and society will require continuing research. Regarding Brexit, former President Obama stated in 2016 the UK will be, “at the back of the queue” (Office of the Press Secretary, 2016) when it comes to trade deals. Now that his former Vice President is at the helm, it can be expected this opinion from five years ago is a good indicator of the path of Britain’s immediate relations with the US. One thing that needs no further research is Brexit came to fruition at the worst economic point in 300 years. No one at the time of the vote for Brexit in June 2016 anticipated the dire social and economic climate in 2021 due to Covid-19 that would usher it in.

9.12 Brexit Agreement 2020

Brexit had been completed in name only up to Christmas Eve 2020 due to multiple years long delays so the intricacies of the working arrangement the UK would have with the EU could be finalised. Because the results were recent, the ability to obtain information from a peer reviewed journals was not possible and emphasized the need for credible sources.

9.12.1 **Economic Rationale for Brexit**

As illustrated in Figure 9.34, the Vote Leave campaign stated in the runup to the Brexit vote that the UK provides £350 million a week of funding to the EU.

Figure 9.34 Brexit Promises Waiting to be Fulfilled

(Worth, 2017)

The UK's net contribution to the EU in 2018 was €9.511 billion euros, see Figure 9.35. At 1.12 euros to the pound this would be £10.709 billion or £205 million per week. After accounting for foreign exchange fluctuations and annual variances, this figure is materially correct with the ONS assessment of the UK's net contribution to the EU budget in 2018 of £11 billion after consideration for public sector credits and abatement (ONS, 2019b). The value is far less than the £350 million stated by the Vote Leave campaign. Where that funding actually ends up being allocated or if a surplus still exists due to the economic condition of the UK post-Brexit is a subject for continued research.

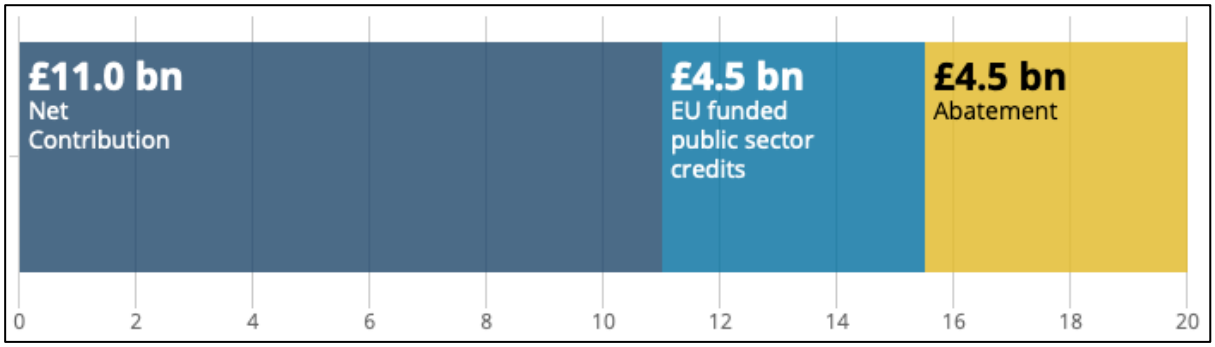


Figure 9.35 UK Net Contribution to the EU - 2018

(ONS, 2019b)

As shown in Figure 9.36, the EU is still in a situation where its greatest financial contributor is overwhelmingly Germany. What Germany and the EU contributors have as a strategic asset is the fact although they are partnered with other countries that are net recipients of EU funding, this relationship benefits their ability to export goods and services and outsource production to these locations due to the regulatory harmonisation being an EU member state provides. It is a situation of pay to play where Britain decided the price of membership was too high; the details of the loss of this status will now be reviewed.

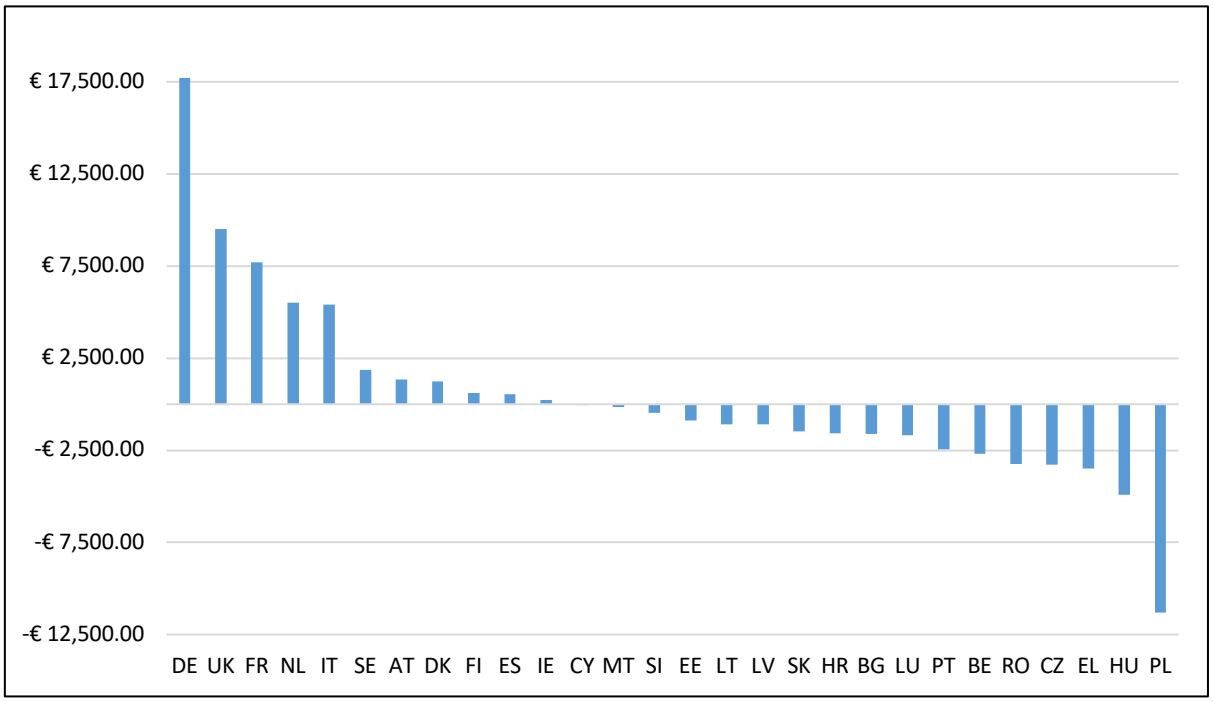


Figure 9.36 EU Budget: Net Revenue Versus Expenditure 2019 (EUR million)

(EU, 2020b)

The major complication regarding agreeing a deal and what the future would hold for financial services regulation post-Brexit was the EU wanted to have access to UK fishing waters and the UK indicated it would diverge from EU rules. The financial services industry of the UK is estimated to employ more than a million persons and is worth 169 times that of fishing, which employs just 8,000 (Cruise et al., 2020). What was decided is EU boats will still have access to UK waters, but 25% of their fishing rights will be transferred to the UK's fleet over a five and a half year transition period ending on 30 June 2026 (UK Government & Ares, 2021). This equates to a 15% drop of EU fishing quota in year one with 2.5% annual reductions thereafter and is expected to allocate an additional £145 million of the harvest to the UK. There will then be annual discussions to determine quotas and an arbitration system for disputes. This was for an industry that represents 0.02% or £437 million of the UK economy; financial services is worth £126 billion (ONS, 2020a). A deal regarding fishing was reached and a means for handling future disputes is in place, but the relationship between the UK and EU regarding fishing in 2026 will revert to being one of conflict and ongoing negotiations.

9.12.2 **EU Equivalence Policy**

The EU updated its financial services equivalence policy in 2018 to state:

> Third-country regimes, like those in Japan and the United States do not need to be identical but must have the same 'outcomes' as EU rules (European Parliament, 2018).

This is needed for countries to have access to EU markets. The EU also stated 'high impact' countries, like the UK, would be subject to additional scrutiny (European Parliament, 2018). A good indicator of what could await the UK were two recent actions by the EU.

In July of 2019, the EU withdrew Switzerland's status of financial equivalence which permitted Swiss and EU financial market participants freedom of access to each other's markets. The Swiss retaliated and banned Swiss stocks from trading in the EU. The result was restrictions stipulated under Article 23(1) of the Markets in Financial Instruments Regulation no longer applying to Swiss stocks. It did not mean European firms could not trade in Switzerland or vice versa. What it meant was any Swiss shares tradeable in Europe could not be traded in Switzerland by EU investment firms. EU firms were required to trade Swiss shares on an EU or third-country exchange that are still deemed equivalent, but as the Swiss restricted the trading of Swiss shares on EU exchanges, EU firms still need to trade the shares on Swiss exchanges (Baltensperger & Bruegel, 2019; EC, 2021a; Huertas & Schelling, 2019).

Switzerland was not alone in being relegated by the EU equivalence status. Due to insufficient credit rating agency standards, in July 2019 the EU removed some market access rights for five countries – Argentina, Australia, Brazil, Canada and Singapore. This was the first time it had ever taken such action. The five countries had been given six years, but failed to amend their legislation to comply with the EU Credit Rating Agencies Regulation standard. Rating agencies can still receive endorsement from an EU-based group member to continue to access the EU market (EC, 2019; Huertas & Schelling, 2019). Like with Switzerland, business continued and the EU could be viewed as not being idle in its threats of protecting its markets. This was a warning to the UK in the still ongoing Brexit negotiations, as the late 2020 Brexit deal did not resolve the issue of regulation of financial services. The two actions against the seven countries also signify a move towards deglobalisation due to reductions in regulatory harmony.

9.12.3 Brexit and Financial Services

What was determined in late 2020 by the UK-EU Trade and Cooperation Agreement (TCA) and an accompanying non-binding Joint Declaration of commitment to cooperation on matters of financial regulation was that EU law will no longer apply in the UK from 1 January, 2021 and the UK would lose automatic access to the EU single market. UK firms are now under the provisions of equivalence rights or must comply with the requirements of EU states on an individual basis and UK financial services firms lost passporting rights (EU and UK, 2020). Neither method now available is a replacement for passporting because core banking activities like lending, deposits and payments are excluded and equivalence rights can be withdrawn by the EU with 30 days' notice (Hall, 2020b). There is also no longer mutual recognition regarding professional qualifications; it now must be managed country by country (EU and UK, 2020; Hall, 2020a). This means regulation for UK firms providing financial services to the EU became more complicated

and expensive. It is what was predicted would be the outcome of deglobalisation – higher costs that will be passed to the consumer.

Maintaining a strong relationship with the EU for financial services is of great consequence to the UK. As of 2019, the UK financial services industry had the largest trade surplus of any industry. Exports that year were £79/$106 billion (Clark, 2020; ONS, 2019a); around 40% of exports were to the EU (Hall, 2020b). The path ahead will either be for the UK to maintain regulatory alignment with the EU or change course to attract business globally. Considering 90% of euro-denominated interest rate derivatives and 84% of forex trading within the EU pre-Brexit was in the UK and amounted to trillions of dollars of trading every day, there is much market share available for the UK to lose (Clark, 2020).

In the first post-Brexit trading period, January 2021, €4.87 billion of trading in EU equities moved out of London to the continent due to EU regulations stating transactions in EU companies must be completed within the bloc (CBOE Global Markets, 2021). According to senior staff at Aquis, a European wide share exchange, this business is lost and will not be returning to the UK (Chu, 2021). As of January 2021, Amsterdam eclipsed London as Europe's primary trading centre; an average of €9.2 billion shares were traded there that month – a value four times what it was the month prior. The daily average of all shares traded in London that same month fell by €6 billion (Winters & IHS Markit, 2021; Ziady, 2021). Deadlines of 18 months on the equivalence on derivatives clearing and six months on settling Irish securities were set by the EU; the UK will be granting equivalence to EEA based financial services providers (Hall, 2020b). These outcomes were not surprising, as all along the question had been how the UK will look to loosen its regulatory standards, which was expected due to its special relationship with the US.

As far as Brexit and financial services regulation is concerned, it is the most important economic aspect of Brexit due to Britain's large trade surplus in this area, but is something the 2020 agreement did not finalise. Markets like certainty, which is something the vote for Brexit and its protracted negotiation period did not provide. The TCA has 28 outstanding areas of equivalence; there is no indication of imminent resolution; the EU stated it will require further information to make its decisions (Hall, 2020b). This could just be a means for using time and its superior market size to leverage Britain, which is what happened with the Brexit deal all along. Due to Brexit, the continued ability for the UK to keep selling its greatest surplus item, financial services, to the EU was curtailed by the loss of the passporting rights it had as an EU member. This was the price for Britain's economic sovereignty – relegation of its financial services industry to other nation status which can be revoked at any time with 30 days' notice for a bunch of fish.

Brexit is not unlike any other separation where division of the couple's assets is debated at length. As they go on disputing the future dynamics of their relationship and how to divide their belongings, the costs of arbitration eat away at their wealth. When the divorce is finalised, some assets will have ended up in the hands of the negotiators, but the couple will still be there, forced to deal with one another by the terms of

the settlement with one party likely feeling more disadvantaged than the other. In regard to Brexit and financial services, debate over the main asset involved, which is the UK's market share of financial services in the EU, is still ongoing; all the 2020 TCA did was reschedule resolution of this complex issue for a later date. Now that the UK is separate from the EU, it must also be aware it is alone against its global competitors, most notably the US. From July 2020 to January 2021, London's share of trading in euro-denominated interest swaps dropped from around 40% to 10% of the market; the US' market share doubled to 20% in that same time period (Winters & IHS Markit, 2021). That was market share lost to America.

9.13 Deglobalisation 2021 - Summary

This chapter's assessments found the most definite outcome of the deglobalisation metrics has been increased trade barriers. The US treats its global connections as long-term strategic military and financial investments from which a return on equity is expected for accessing markets. Its global dominance persists due to Bretton Woods and an unchecked ability to generate debt. America's relationship with the UK is based on maintaining a competitive advantage and lacks any parity or cooperation the UK might have had as an equal member of the EU, however fraught that alliance might have been.

The conclusion of this research is America's ongoing presence in the UK and their continued relationship is so the US can control Britain and use it to protect its European sources of revenue. Britain allows this to happen due to supposed shared values. Brexit has left many issues unresolved, financial services in particular. Because of recent political changes in the US and the fact the UK can no longer work from within the EU as emissary for America's interests, the special relationship of the two nations post-Brexit and how Britain can compete against a rival deeply ingrained both in it and the Republic of Ireland is a precarious situation requiring continued research.

Chapter 10 Conclusion

10.1 Introduction

Both Trump and Brexit were nationalistic endeavours fuelled by a belief globalisation had been financially detrimental and a reaction to the loss of trust brought on by the GFC. The research of deglobalisation confirms what Professor Christopher Bovis described in late 2020 as a move towards more regionalised globalisation (Bovis, 2020).

There are multiple analyses within this thesis of various sources of economic information. In drawing conclusions the foremost method one can employ is to observe the situation in the UK and the US pre and post-Brexit and Trump from a chronologically parallax viewpoint and appraise whether things in the present are better or worse. For deglobalisation, are socio-economic conditions now better than in early 2016?

Regarding Brexit, the economic isolation, loss of jobs, market share, assets under management, passporting rights and the increased potential for greater subjugation to US interests indicate the result for Britain's financial services industry was a negative outcome. Britain spent four and a half years negotiating a deal. Now that Brexit is concluded it still has not gone away, as nothing absolute has been agreed regarding financial services. Regulatory costs will rise, undoubtedly so too will prices.

The FCA's GFIN and Digital Regulatory Reporting projects indicate the UK might be able to position itself as an innovative leader in fintech regulation. This could curtail some of the negative effects of the loss of EU membership. The ultimate determination of the outcome of Brexit will be to see how the UK economy performs, where funds previously contributed to the EU budget are allocated and whether the same amount of funding still exists. Due to the pandemic, the post-Brexit economic situation in Britain was the worst in 300 years; it was forced to issue more debt it must now continue to service.

Regarding what Trump resulted in for the US – the highest number of Covid-19 deaths, expansion of the national debt, continued attacks on the credibility of the election results, attempted insurrection, loosening of financial regulations, changes to the tax code, worsening of international relations and the socio-economic damage done will have long-lasting polarising repercussions on its integrity, international relations and the soft power of the American brand. The Biden administration must first be focused on stemming the harm caused by Trump's mishandling of the pandemic and counteracting the myriad regulatory changes that were a return to the voodoo economic policies of Ronald Reagan. The opportunity cost is not initially being focused on forward looking legislation that takes advantage of the potential of fintech.

The world economy and financial services will adjust to these new dynamics. Indicators are because of deglobalisation, the UK and US will find themselves having to cope with the long-term fallout from their behaviours while the world adapts to functioning without them being as engaged or trustworthy as before. In the case of the US, the ushering in of a new administration has the potential to begin to rectify the reputational damage done and change the course of Trump.

President Biden is also focused on a buy American approach to globalisation and intends to use tariffs as leverage. It appears the rise in protectionism due to deglobalisation will continue. The two legislative acts Trump passed will not be so quickly or easily undone. The corporate tax changes mean the US is focused on having untaxed worldwide profits domesticated for it to tax. Income tax changes have shifted the burden from businesses and high-earners to low-earners who will be subject to planned future tax rises. The banking regulation changes and influx to the sector by private equity and hedge funds mean there is increased risk of another too many to fail banking crisis. Although Trump may no longer be president, he has many elected supporters and is focused on a return to politics - Trumpism has not gone away.

For the UK, it has no recourse to changing the outcome of deglobalisation by electing a different government and must cope with the consequences of Brexit. Its circumstance with the EU is now like its relationship with the US. When it comes to future trade negotiations it is economically the smaller party and will likely be a rule taker and not a rule maker.

The Republic of Ireland is a minor benefactor due to Brexit. Based on its long-term opportunistic behaviour and history with the US, it will likely continue to placate US business interests. Corporate America made Ireland its European base of operations due to cultural similarities and its willingness to provide tax advantages. Perhaps Britain will conclude its relationship with America has always been about enabling the US to earn foreign profits, expand its European sources of revenue and ensure American economic domination and realise their interests are not aligned.

10.2 Research Findings

The financial services industry is impacted by regulatory harmonisation and technology. This thesis is the first known analysis to explore these twin themes simultaneously. It deconstructed the effects of deglobalisation and fintech on financial services and the interrelations between the US, UK and EU throughout. The following summaries provide a consolidated chapter level overview of what was discovered.

10.2.1 **Literature Review**

The literature review presented the current state of the globalised economy and provided a summary of the major themes that manifested in deglobalisation, the ideological difference between the neoliberal/neoconservative US and ordoliberal EU and how due to Brexit the UK is moving from one realm

to the other. It determined the original deglobalisation movement was overtaken by the actors who have benefitted most from globalisation. It found deregulation and unfettered access to capital markets results in regulatory capture and moral hazard and has repeatedly resulted in financial failures being borne by the taxpayer and private investor.

It assessed the evolution of fintech up to the beginning of the research period. It identified the gap in knowledge this thesis fills, which is how the most recent developments in deglobalisation and fintech are affecting financial services and interrelations between the aforementioned territories.

10.2.2 **Financial Regulation in the EU, UK and US**

Chapter 4 provided a current interpretivist overview of the financial regulations. It illustrated the difference between statutory and derived federalism and how the EU's ordoliberal approach to regulation is focused on shaping the economic order, whereas the US has a laissez faire attitude. Malta was the first to enact legislation favourable to fintech and the use of blockchain, which may just be regulatory opportunism. Data privacy is one area particularly divergent between the US and EU (GDPR, PSD2, European Data Governance Act).

Analysis of US regulations found since the turn of the century the US banking system has become two-tiered with a few major banks and a litany of smaller lending organisations. US regulation seeks to impose itself globally (Sarbanes-Oxley, FATCA), yet it is unwilling to provide reciprocal cooperation (exemption of community banks from Basel III, non-compliance with the CMAA and CRS). The US behaves as a rule-maker.

Fintech regulation in the US is a jurisdictional battle between federal and state regulators (OCC vs. CSBS) being decided in the courts. A continuing theme first discovered in the literature review is Americans tend to view cooperation as an infringement on their liberty. Financial regulation is an area where the US is continually at odds with itself. Politics plays heavily into the funding of agencies and the repeated strengthening and weakening of financial regulation.

Analysis found regtech is fintech for regulation; it aims to reduce regulators' overheads. The UK's FCA GFIN programme developed a large network of global regulators, but has achieved no results. The FSA's DRR programme had some positive results converting regulation to machine code and developing real-time global reporting systems. The DRR results found achievement of this goal will be more difficult than anticipated.

10.2.3 **Recent Fintech Developments**

Chapter 5 introduced how the GFC resulted in a loss of trust in the financial system and the advent of fintech. Fintech investment has grown, but is maturing. It determined how fintech might affect employment opportunities in financial services and illustrated the multitude of technological developments

relevant to financial services being implemented. Analysis found it is not any one technology, but rather the synergy provided by blockchain, smart contracts, IoT and machine learning (ML) that has the greatest potential to provide trust and make financial services a more automated, personalised experience. The future result likely will be fewer low and mid-level employment opportunities.

US patent application analysis found multiple examples of companies implementing blockchain, smart contracts and ML. The culmination of this is the development of decentralised systems using shared databases that provide trust without reliance on third parties.

10.2.4 Blockchain

Chapter 6 discovered exactly what blockchain is and how it functions. It determined its strengths and weaknesses and found private blockchains have the greatest potential for integration into business systems. Blockchain seeks to eliminate trusted third parties and provide trust through the use of shared databases. Unlike traditional database systems, blockchain has no present solution to the shutdown problem.

10.2.5 Smart Contracts

Chapter 7 found smart contracts are neither smart nor necessarily a contract. They are a modern iteration of the vending machine. Current regulations are considered sufficient for regulating smart contracts. Analysis of Etherisc and EFFORCE found disruptive implementation of blockchain/smart contract systems has happened. No means are available for determining their success or financial stability. Their products eliminate trusted third parties, but they provide no financial information on which to base one's trust in the companies themselves.

Hyperledger Fabric (HF) provides a scalable means for companies to integrate private blockchain systems into business applications and transition to the use of shared, decentralised databases. The purported benefits of IBM's HF blockchain product are based on optimistic values. Turnkey solutions for blockchain business use were theoretical at the beginning of the research – they are now a reality.

10.2.6 Trump Era Financial Legislation

Effects of The Tax Cuts and Jobs Act exacerbated the socioeconomic rift; the majority of benefits are for high-earners and companies. It was not a solution to the ills of globalisation and was a direct implementation of the forecast of Trump's motives by Boushey stated in the literature review. The Economic Growth, Regulatory Relief and Consumer Protection Act loosened banking regulations. The greatest example is the repeal of the Volcker Rule for community banks. This sector is now less regulated and presents an opportunity for regulatory arbitrage; the possibility for another too many to fail crisis exists.

10.2.7 **Deglobalisation 2021**

Chapter 9 provided a timely assessment of the impacts of deglobalisation. Deglobalisation has resulted in increased trade barriers. Covid-19 capital flows highlighted the velocity at which assets can move in times of distress, the continued dominance of the US dollar and how the US benefits from having high levels of its debt in circulation.

Trump's America First method of diplomacy was initially successful with the Phase One US-China trade deal. The Phase Two plan faltered due to rising geopolitical tensions. Globalisation in the form of the Regional Comprehensive Economic Partnership continued without the involvement of the US. Trump's tariff war resulted in the US recording its largest trade deficit in 12 years. The tax cuts enacted and pandemic stimulus spending caused the US debt level to explode. Trump's economic promises did not come to fruition. The US is now far greater in debt than at the beginning of his tenure.

The UK was forced to rely upon debt due to the pandemic. Its debt level also reached new records when Brexit isolated it economically. Taxes have risen in the UK. The Brexit agreement did not finalise the trade agreement for its primary service export, financial services, and resulted in the loss of passporting rights for these services in the EU. London lost its position as the trading centre of Europe, as well as thousands of jobs and billions in managed assets.

The focus on debt as a metric of the success of deglobalisation did not expect to see such stark results so quickly. Existing GFC debts coupled with new debts are an issue the UK and US must continue to manage and threaten their economic future. Research confirmed why debt avoidance is central theme of the ordoliberal policies of the EU.

Analysis of Ireland's relations with the US found its economy it is heavily dependent upon US multinational corporations resident there for advantageous taxation. The deep involvement of the US in both Ireland and the UK mean it is able to exert its control over them for its own advantage. This is possible due to the economic resources and soft and hard power of the US.

Research found the overarching outcome of the period of deglobalisation for the US and UK has been a widening of its root cause - economic inequality. Both countries are now deeper in debt, costs and taxes are rising and both are forced to deal with a bleaker economic future than they had prior to the votes for Brexit and Trump. Neoconservatism triumphed, but at a great cost to both.

10.3 Contribution to Knowledge

This thesis sought to determine the effects of deglobalisation and fintech in the UK, US and EU in regard to their interrelations and financial services.

It determined the reason for the rise of deglobalisation - the social contract has been broken. The deglobalisation movement was usurped by neoconservative politicians. Regulatory capture leads to moral hazard, financial crises and greater national debts. The votes for Brexit and Trump were cast as a rejection of the status quo. Finance has always incorporated new technology. A knowledge gap surrounding the themes of deglobalisation and fintech existed. No one had researched them in unison; both have the potential to greatly affect the financial services industry and the interrelations between the UK, US and EU.

US regulatory changes deepened the socioeconomic gap and loosened the safeguards put in place to prevent another crisis. Brexit isolated the UK and its leading service export, financial services, from its greatest market, the EU. The US and UK are now even more socio-politically divided and debt laden than before.

Fintech has the ability to automate many jobs out of existence. Its greatest potential is the simultaneous use of multiple technologies. It does not yet provide a solution to the financial system again being manipulated by those in positions of trust. Fintech is but a tool; how it is implemented is the user's discretion.

The overarching theme of the era of deglobalisation and fintech is progression towards an economically two-tiered society with fewer quality employment opportunities. Short-term satisfactions are ever easier to satisfy, long-term needs less so. The theories of Maslow and Foucault in unison indicate a less stable future where low-earners are kept sated, never reach self-actualisation and become capable of questioning the quality and motives of their governance. The division between the neoliberal UK and US versus the ordoliberal EU is now more entrenched. Deglobalisation has been by no means a solution to the broken social contract. Whether fintech will be is dependent upon how it is regulated and implemented.

10.4 A Prudent View of the Future

The expectation in 2016 for any one of the variables - Brexit, Trump or a pandemic - to happen was low. All three came true. Forecasts regarding continued deglobalisation should take this into account. These three have shown to expect the unexpected and prepare financially for worst case scenarios, while hoping for the best, like ordoliberal economic theory advocates. Constant focus on renegotiating trade deals and regulations is rent seeking behaviour and changing the rules of the game. It is a strategy for those who cannot or will not compete on equal terms and is an obstacle to international cooperation exemplified by regulatory capture. The outcomes of deglobalisation indicate consumers will continue to bear the costs of these actions in the US in the form of higher prices due to tariffs and in the UK due to reductions in regulatory harmonisation.

The outcome of Brexit and Trump has been for too many a deterioration of their future opportunities caused by self-serving introspective leaders who promised much but instead delivered mismanagement,

debt and economic isolation. The results were the opposite of the utopia promised. How financial services in the UK, US and EU now fare in a period that could be called ‘slowbalisation’ and how the rivalry between neoliberalism and ordoliberalism and the integration fintech are part of this change in the dynamics of trust are themes for continued research.

Fintech is being gradually improved and implemented and are bringing disruptive changes to the financial services industry. Blockchain, smart contracts, ML and bespoke integration of the proliferation of sensors via IoT are changing how financial services are delivered. Their synergistic use has the greatest potential for transforming how the industry functions by providing a more automated, centralised and personalised means of service.

The fintech sector will likely undergo a correction when hype meets reality due to too many market participants with unfeasible business models. Just as with the dot-com bubble, in the long-run industry will find viable utilisations for fintech that bring efficiencies, reduce costs and provide trust. In the near future this will likely be primarily through the automation of low to medium-skilled jobs. The various technologies used in combination do have the potential to reduce the role of trusted intermediaries within the financial system. The types of roles fintech has the most immediate likelihood to automate will not prevent future crises or systemic failures.

Research was initially focused just on the effects deglobalisation and fintech were having on the financial services industry. It ultimately encompassed a deeper, longer assessment of the socio-political landscape than anticipated. Regarding the volatile issues of Trump and Brexit during a pandemic, in retrospect this seems inevitable. Hopefully it is considered to be a well-versed, cohesive analysis of the question asked and the content is deemed factual, germane, informative and engaging.

In conclusion, consider what was promised, what transpired and who gained the most. Caveat emptor, cui prodest?

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Appendices: Cost Benefit Analysis Supplementary Information

Table A 1 Commercialisation Phase Costs

Schedule F	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
IBM Blockchain full development fee (F1)	$1,500,000	-	-	-	-	-
Number of IBM's thinking design workshops (F2)	2	-	-	-	-	-
IBM's Design Thinking workshop (F3)	$32,000	-	-	-	-	-
IBM Blockchain license fee (F4)	$20,000	-	-	-	-	-
Duration of the engagement (months) (F5)	12	-	-	-	-	-
Number of internal employees involved (F6)	5	-	-	-	-	-
Percent of time dedicated to commercialization effort (F7)	15%	-	-	-	-	-
IT/dev/engineering employee monthly compensation $150,000/ 12 months (F8)	$12,500	-	-	-	-	-
Cost of internal IT/developers' commercialization efforts (F5 * F6 * F7 * F8) (F9)	**$112,500**	-	-	-	-	-
Number of employees developing governance model/involved in contract negotiation (F10)	3	-	-	-	-	-
Duration of the governance model development and contract negotiation (months) (F11)	12	-	-	-	-	-
Percent of employees' time spent on the pilot (F12)	20%	-	-	-	-	-
Legal, business owners, IT management annual compensation $200,000/12 months (F13)	$16,667	-	-	-	-	-
Cost of internal governance model/legal commercialization efforts (F10 * F11 * F12 * F13) (F14)	**$120,002**	-	-	-	-	-
Number of blockchain members onboarded for commercialization (F15)	3	-	-	-	-	-
Cost of onboarding one member (F16)	$5,000	-	-	-	-	-
Cost of member onboarding (F17)	$15,000	-	-	-	-	-
Commercialized blockchain development (F1 + (F2 * F3) + F4 + F9 + F14 + F17) (F total)	**$1,831,502**	-	-	-	-	**$1,831,502**
Risk adjustment (20% increase)	20%	-	-	-	-	-
Risk adjustment amount	$366,300	-	-	-	-	$366,300
Commercialized blockchain development (risk-adjusted) (F total ra)	**$2,197,803**	-	-	-	-	**$2,197,803**

Table A 2 Sample Calculation of Ongoing Blockchain Management Costs

Schedule G	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
IBM Blockchain license fee (G1)	$20,000	$20,000	$20,000	$20,000	$20,000	-
Continued IBM blockchain software development fee (G2)	$200,000	$200,000	$200,000	$200,000	$200,000	-
Internal IT/developer resources to maintain blockchain (G3)	3	3	3	3	3	-
Percent of time to maintain blockchain (G4)	20%	20%	20%	20%	20%	-
IT/dev/engineering annual compensation (G5)	$150,000	$150,000	$150,000	$150,000	$150,000	-
Cost of internal IT/dev/engineering resources to run blockchain (G3 * G4 * G5) (G6)	$90,000	$90,000	$90,000	$90,000	$90,000	-
Number of employees developing governance model/involved in contract negotiation (G7)	1	1	1	1	1	-
Percent of employees' time spent on the governance model ongoing support (G8)	100%	100%	100%	100%	100%	-
Legal, business owners, IT management annual compensation (G9)	$200,000	$200,000	$200,000	$200,000	$200,000	-
Cost of internal governance model/ legal commercialization efforts (G7 * G8 * G9) (G10)	$200,000	$200,000	$200,000	$200,000	$200,000	-
Number of blockchain memebers onboarded for commercialization (G11)	12	12	12	12	12	-
Cost of onboarding one member (including marketing, admin, contract negotiation) G12)	$5,000	$5,000	$5,000	$5,000	$5,000	-
Cost of member onboarding (G11 * G12) (G13)	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	-
Ecosystem development (workshops, community boards, other) (G14)	$200,000	$200,000	$200,000	$200,000	$200,000	-
Blockchain ongoing management (G1 + G2 + G6 + G10 + G13 + G14) (G total)	**$770,000**	**$770,000**	**$770,000**	**$770,000**	**$770,000**	**$3,850,000**
Risk adjustment (20% increase)	20%	20%	20%	20%	20%	-
Risk adjustment amount	$154,000	$154,000	$154,000	$154,000	$154,000	$770,000
Blockchain ongoing management (risk-adjusted) (G total ra)	**$924,000**	**$924,000**	**$924,000**	**$924,000**	**$924,000**	**$4,620,000**

Table A 3 Pilot Phase Costs

Schedule H	YEAR 0
Cost of Pilot (H total)	**$470,707**
Risk adjustment (20% increase)	20%
Risk adjustment amount	$94,141
Cost of Pilot (risk-adjusted) (H total ra)	**$564,848**

Table A 4 Total Blockchain Costs

Schedule I	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Commercialized blockchain development (F total)	$1,831,502	-	-	-	-	$1,831,502
Blockchain ongoing management (G total)	$770,000	$770,000	$770,000	$770,000	$770,000	$3,850,000
Cost of Pilot (H total)	$470,707	-	-	-	-	$470,707
Total Blockchain Costs (F total + G total + H total) (I total)	**$3,072,209**	**$770,000**	**$770,000**	**$770,000**	**$770,000**	**$6,152,209**
Risk adjustment (20% increase)	20%	20%	20%	20%	20%	
Commercialized blockchain development (risk-adjusted) (F total ra)	$2,197,803	-	-	-	-	$2,197,803
Blockchain ongoing management (risk-adjusted) (G total ra)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Cost of Pilot (risk-adjusted) (H total ra)	$564,848	-	-	-	-	-
Total Blockchain Costs (risk-adjusted) (I total ra)	**$3,686,651**	**$924,000**	**$924,000**	**$924,000**	**$924,000**	**$7,382,651**

Table A 5 Total Blockchain Costs with a Five Year Depreciation of Capital Expenditure

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Blockchain ongoing management	$770,000	$770,000	$770,000	$770,000	$770,000	$3,850,000
Development + Pilot - 5 year depreciation	$460,441.88	$460,441.88	$460,441.88	$460,441.88	$460,441.88	$2,302,209.40
Total Blockchain Costs w/5yr Capital Depreciation	**$1,230,442**	**$1,230,442**	**$1,230,442**	**$1,230,442**	**$1,230,442**	**$6,152,209**
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 year depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs w/5yr Capital Depreciation	**$1,476,530**	**$1,476,530**	**$1,476,530**	**$1,476,530**	**$1,476,530**	**$7,382,651**

Table A 6 Projected Membership Revenue

Low						
Schedule Aa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
New members (Aa1) (note 1)	8	8	8	8	8	N/A
Onboarding fee (Aa2)	$5,000	$5,000	$5,000	$5,000	$5,000	N/A
Annual membership churn (Aa3)	0%	0%	0%	0%	0%	N/A
Total members (Aa4) (note 1)	8	16	24	32	40	N/A
Annual fee (Aa5)	$10,000	$10,000	$10,000	$10,000	$10,000	N/A
Membership revenue (Aa1 * Aa2) + (Aa4 * Aa5) (Aa total) (note 2)	**$120,000**	**$200,000**	**$280,000**	**$360,000**	**$440,000**	**$1,400,000**
Membership revenue as reported (Aa total X) (note 1)	$180,000	$300,000	$420,000	$540,000	$660,000	$2,100,000
Variance (Aa total - Aa total X) (note 1)	($60,000)	($100,000)	($140,000)	($180,000)	($220,000)	($700,000)
Mid-Range						
Schedule Ab	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
New members (Ab1) (note 1)	12	12	12	12	12	N/A
Onboarding fee (Ab2)	$6,000	$6,000	$6,000	$6,000	$6,000	N/A
Annual membership churn (Ab3)	0%	0%	0%	0%	0%	N/A
Total members (Ab4)	12	24	36	48	60	N/A
Annual fee (Ab5)	$12,000	$12,000	$12,000	$12,000	$12,000	N/A
Membership revenue (Ab1 * Ab2) + (Ab4 * Ab5) (Ab total) (note 1)	**$216,000**	**$360,000**	**$504,000**	**$648,000**	**$792,000**	**$2,520,000**
High-Level						
Schedule Ac	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
New members (Ac1) (note 1)	16	16	16	16	16	N/A
Onboarding fee (Ac2)	$7,500	$7,500	$7,500	$7,500	$7,500	N/A
Annual membership churn (Ac3)	0%	0%	0%	0%	0%	N/A
Total members (Ac4) (note 1)	16	32	48	64	80	N/A
Annual fee (Ac5)	$15,000	$15,000	$15,000	$15,000	$15,000	N/A
Membership revenue (Ac1 * Ac2) + (Ac4 * Ac5) (Ac total) (note 2)	**$360,000**	**$600,000**	**$840,000**	**$1,080,000**	**$1,320,000**	**$4,200,000**
Membership revenue as reported (Ac total X) (note 1)	$270,000	$300,000	$420,000	$540,000	$660,000	$2,190,000
Variance (Ac total - Ac total X)	$90,000	$300,000	$420,000	$540,000	$660,000	$2,010,000

Table A 7 Membership Revenue Variances – Low, Mid-Range and High-Level

Membership Revenue Variances - Low, Mid-Range and High-Level			
	LOW	**MID**	**HIGH**
Total members by year 5	40	60	80
Onboarding fee 1	$5,000	$6,000	$7,500
Annual fee 1	$10,000	$12,000	$15,000
Onboarding fee 2	$250,000	$300,000	$350,000
Annual fee 2	$200,000	$250,000	$300,000

Table A 8 Projected Transaction Revenue

Low						
Schedule Ba	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Number of customers (Ba1)	1,500,000	2,500,000	3,500,000	4,500,000	5,500,000	N/A
Number of annual transactions per customer (Ba2)	2	2	2	2	2	N/A
Price per transaction (Ba3)	$1.75	$1.75	$1.75	$1.75	$1.75	N/A
Original percentage of founder charge per transaction (Ba4)	18%	18%	18%	18%	18%	N/A
Decrease in founder revenue per transaction (Ba5)	100%	97%	94%	91%	88%	N/A
Founder revenue per transaction (Ba6)	18%	17.46%	16.92%	16.38%	15.84%	N/A
Transaction revenue (Ba1*Ba2*Ba3*Ba6) (Ba total)	**$945,000**	**$1,527,750**	**$2,072,700**	**$2,579,850**	**$3,049,200**	**$10,174,500**
Transaction revenue as reported (Ba total X) (note 1)	$945,000	$1,500,000	$2,100,000	$2,600,000	$3,000,000	$10,145,000
Variance (Ba total - Ba total X) (note 3)	$0	$27,750	($27,300)	($20,150)	$49,200	$29,500
Mid-Range						
Schedule Bb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Number of customers (Bb1)	1,500,000	3,000,000	4,500,000	6,000,000	7,500,000	N/A
Number of annual transactions per customer (Bb2)	4	4	4	4	4	N/A
Price per transaction (Bb3)	$2	$2	$2	$2	$2	N/A
Original percentage of founder charge per transaction (Bb4)	19%	19%	19%	19%	19%	N/A
Decrease in founder revenue per transaction (Bb5)	100%	97%	94%	91%	88%	N/A
Founder revenue per transaction (Bb6)	19%	18.43%	17.86%	17.29%	16.72%	N/A
Transaction revenue (Bb1 * Bb2 * Bb3 * Bb6) (Bb total)	**$2,280,000**	**$4,423,200**	**$6,429,600**	**$8,299,200**	**$10,032,000**	**$31,464,000**
High-Level						
Schedule Bc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Number of customers (Bc1)	1,500,000	3,000,000	4,600,000	6,300,000	8,100,000	N/A
Number of annual transactions per customer (Bc2)	6	6	6	6	6	N/A
Price per transaction (Bc3)	$2.25	$2.25	$2.25	$2.25	$2.25	N/A
Original percentage of founder charge per transaction (Bc4)	20%	20%	20%	20%	20%	N/A
Decrease in founder revenue per transaction (Bc5)	100%	96%	92%	88%	84%	N/A
Founder revenue per transaction (Bc6)	20%	19.20%	18.40%	17.60%	16.80%	N/A
Transaction revenue (Bc1 * Bc2 * Bc3 * Bc6) (Bc total)	**$4,050,000**	**$7,776,000**	**$11,426,400**	**$14,968,800**	**$18,370,800**	**$56,592,000**

Table A 9 Projected Total Revenue

TOTAL REVENUE - PROJECTED						
Low						
Schedule AaBa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Aa total)	$120,000	$200,000	$280,000	$360,000	$440,000	$1,400,000
Transaction revenue (Ba total)	$945,000	$1,527,750	$2,072,700	$2,579,850	$3,049,200	$10,174,500
Total Revenue (Aa total + Ba total) (AaBa total)	**$1,065,000**	**$1,727,750**	**$2,352,700**	**$2,939,850**	**$3,489,200**	**$11,574,500**
Mid-Range						
Schedule AbBb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ab total)	$216,000	$360,000	$504,000	$648,000	$792,000	$2,520,000
Transaction revenue (Bb total)	$2,280,000	$4,423,200	$6,429,600	$8,299,200	$10,032,000	$31,464,000
Total Revenue (Ab total + Bb total) (AbBb total)	**$2,496,000**	**$4,783,200**	**$6,933,600**	**$8,947,200**	**$10,824,000**	**$33,984,000**
High-Level						
Schedule AcBc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ac total)	$360,000	$600,000	$840,000	$1,080,000	$1,320,000	$4,200,000
Transaction revenue (Bc total)	$4,050,000	$7,776,000	$11,426,400	$14,968,800	$18,370,800	$56,592,000
Total Revenue (Ac total + Bc total) (AcBc total)	**$4,410,000**	**$8,376,000**	**$12,266,400**	**$16,048,800**	**$19,690,800**	**$60,792,000**

Table A 10 Revenue Projection Percentage Gains

Low	**Y1 to Y2**	**Y2 to Y3**	**Y3 to Y4**	**Y4 to Y5**
Membership revenue	66.67%	40.00%	28.57%	22.22%
Transaction revenue	61.67%	35.67%	24.47%	18.19%
Total revenue	62.23%	36.17%	24.96%	18.69%
Mid-Range	**Y1 to Y2**	**Y2 to Y3**	**Y3 to Y4**	**Y4 to Y5**
Membership revenue	66.67%	40.00%	28.57%	22.22%
Transaction revenue	94.00%	45.36%	29.08%	20.88%
Total revenue	91.63%	44.96%	29.04%	20.98%
High-Level	**Y1 to Y2**	**Y2 to Y3**	**Y3 to Y4**	**Y4 to Y5**
Membership revenue	66.67%	40.00%	28.57%	22.22%
Transaction revenue	92.00%	46.94%	31.00%	22.73%
Total revenue	89.93%	46.45%	30.84%	22.69%

Table A 11 Number of Customers Percentage Gains

	Y1 to Y2	Y2 to Y3	Y3 to Y4	Y4 to Y5
Low	66.67%	40.00%	28.57%	22.22%
Mid-Range	100.00%	50.00%	33.33%	25.00%
High-Level	100.00%	53.33%	36.96%	28.57%

Table A 12 Projected Total Low Revenue

Low						
Schedule AaBa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Aa total)	$120,000	$200,000	$280,000	$360,000	$440,000	$1,400,000
Transaction revenue (Ba total)	$945,000	$1,527,750	$2,072,700	$2,579,850	$3,049,200	$10,174,500
Total Revenue (Aa total + Ba total) (AaBa total)	**$1,065,000**	**$1,727,750**	**$2,352,700**	**$2,939,850**	**$3,489,200**	**$11,574,500**
5% p.a. Gain						
Schedule AaBa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Aa total)	$120,000	$126,000	$132,300	$138,915	$145,861	$663,076
Transaction revenue (Ba total)	$945,000	$992,250	$1,041,863	$1,093,956	$1,148,653	$5,221,722
Total Revenue (Aa total + Ba total) (AaBa total)	**$1,065,000**	**$1,118,250**	**$1,174,163**	**$1,232,871**	**$1,294,514**	**$5,884,797**
10% p.a. Gain						
Schedule AaBa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Aa total)	$120,000	$132,000	$145,200	$159,720	$175,692	$732,612
Transaction revenue (Ba total)	$945,000	$1,039,500	$1,143,450	$1,257,795	$1,383,575	$5,769,320
Total Revenue (Aa total + Ba total) (AaBa total)	**$1,065,000**	**$1,171,500**	**$1,288,650**	**$1,417,515**	**$1,559,267**	**$6,501,932**
15% p.a. Gain						
Schedule AaBa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Aa total)	$120,000	$138,000	$158,700	$182,505	$209,881	$809,086
Transaction revenue (Ba total)	$945,000	$1,086,750	$1,249,763	$1,437,227	$1,652,811	$6,371,550
Total Revenue (Aa total + Ba total) (AaBa total)	**$1,065,000**	**$1,224,750**	**$1,408,463**	**$1,619,732**	**$1,862,692**	**$7,180,636**

Table A 13 Projected Total Mid-Range Revenue

Mid-Range						
Schedule AbBb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ab total)	$216,000	$360,000	$504,000	$648,000	$792,000	$2,520,000
Transaction revenue (Bb total)	$2,280,000	$4,423,200	$6,429,600	$8,299,200	$10,032,000	$31,464,000
Total Revenue (Ab total + Bb total) (AbBb total)	**$2,496,000**	**$4,783,200**	**$6,933,600**	**$8,947,200**	**$10,824,000**	**$33,984,000**
5% p.a. gain						
Schedule AbBb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ab total)	$216,000	$226,800	$238,140	$250,047	$262,549	$1,193,536
Transaction revenue (Bb total)	$2,280,000	$2,394,000	$2,513,700	$2,639,385	$2,771,354	$12,598,439
Total Revenue (Ab total + Bb total) (AbBb total)	**$2,496,000**	**$2,620,800**	**$2,751,840**	**$2,889,432**	**$3,033,904**	**$13,791,976**
10% p.a. gain						
Schedule AbBb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ab total)	$216,000	$237,600	$261,360	$287,496	$316,246	$1,318,702
Transaction revenue (Bb total)	$2,280,000	$2,508,000	$2,758,800	$3,034,680	$3,338,148	$13,919,628
Total Revenue (Ab total + Bb total) (AbBb total)	**$2,496,000**	**$2,745,600**	**$3,020,160**	**$3,322,176**	**$3,654,394**	**$15,238,330**
15% p.a. gain						
Schedule AbBb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ab total)	$216,000	$248,400	$285,660	$328,509	$377,785	$1,456,354
Transaction revenue (Bb total)	$2,280,000	$2,622,000	$3,015,300	$3,467,595	$3,987,734	$15,372,629
Total Revenue (Ab total + Bb total) (AbBb total)	**$2,496,000**	**$2,870,400**	**$3,300,960**	**$3,796,104**	**$4,365,520**	**$16,828,984**

Table A 14 Projected Total High-Level Revenue

High-Level						
Schedule AcBc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ac total)	$360,000	$600,000	$840,000	$1,080,000	$1,320,000	$4,200,000
Transaction revenue (Bc total)	$4,050,000	$7,776,000	$11,426,400	$14,968,800	$18,370,800	$56,592,000
Total Revenue (Ac total + Bc total) (AcBc total)	**$4,410,000**	**$8,376,000**	**$12,266,400**	**$16,048,800**	**$19,690,800**	**$60,792,000**
5% p.a. gain						
Schedule AcBc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ac total)	$360,000	$378,000	$396,900	$416,745	$437,582	$1,989,227
Transaction revenue (Bc total)	$4,050,000	$4,252,500	$4,465,125	$4,688,381	$4,922,800	$22,378,807
Total Revenue (Ac total + Bc total) (AcBc total)	**$4,410,000**	**$4,630,500**	**$4,862,025**	**$5,105,126**	**$5,360,383**	**$24,368,034**
10% p.a. gain						
Schedule AcBc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ac total)	$360,000	$396,000	$435,600	$479,160	$527,076	$2,197,836
Transaction revenue (Bc total)	$4,050,000	$4,455,000	$4,900,500	$5,390,550	$5,929,605	$24,725,655
Total Revenue (Ac total + Bc total) (AcBc total)	**$4,410,000**	**$4,851,000**	**$5,336,100**	**$5,869,710**	**$6,456,681**	**$26,923,491**
15% p.a. gain						
Schedule AcBc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Membership revenue (Ac total)	$360,000	$414,000	$476,100	$547,515	$629,642	$2,427,257
Transaction revenue (Bc total)	$4,050,000	$4,657,500	$5,356,125	$6,159,544	$7,083,475	$27,306,644
Total Revenue (Ac total + Bc total) (AcBc total)	**$4,410,000**	**$5,071,500**	**$5,832,225**	**$6,707,059**	**$7,713,118**	**$29,733,901**

Table A 15 Projected Capital and Operating Expenditure

Low						
Schedule Ca	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Capital Expenditure Avoided (Ca1)	$2,000,000	-	-	$2,000,000	-	$4,000,000
Avoided additional infrastructure costs (taxes, transportation, special features and accessories and testing (Ca1*30%) (Ca2)	$600,000	-	-	$600,000	-	$1,200,000
Subtotal: Capital Expenditure Savings (Ca1+Ca2) (Ca3)	**$2,600,000**	**-**	**-**	**$2,600,000**	**-**	**$5,200,000**
Total Capital Expenditure costs avoided (5 year cumulative) (Ca4) (year 1 + year 4 costs avoided)	20%	20%	20%	20%	20%	100%
Operational Expenditure required as a percentage of Capital Expenditure (Ca3 * Ca4) (Ca5)	**$520,000**	**$520,000**	**$520,000**	**$1,040,000**	**$1,040,000**	**$3,640,000**
Total Capital Expenditure and Operational Expenditure Savings (Ca3 + Ca5) (Ca total)	**$3,120,000**	**$520,000**	**$520,000**	**$3,640,000**	**$1,040,000**	**$8,840,000**
Mid-Range						
Schedule Cb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Capital Expenditure Avoided (Cb1)	$5,000,000	-	-	$5,000,000	-	$10,000,000
Avoided additional infrastructure costs (taxes, transportation, special features and accessories and testing (Cb1 * 30%) (Cb2)	$1,500,000	-	-	$1,500,000	-	$3,000,000
Subtotal: Capital Expenditure Savings (Cb1 + Cb2) (Cb3)	**$6,500,000**	**-**	**-**	**$6,500,000**	**-**	**$13,000,000**
Total Capital Expenditure costs avoided (5 year cumulative) (Cb4)	20%	20%	20%	20%	20%	100%
Operational Expenditure required as a percentage of Capital Expenditure (Cb3 * Cb4) (Cb5)	**$1,300,000**	**$1,300,000**	**$1,300,000**	**$2,600,000**	**$2,600,000**	**$9,100,000**
Total Capital Expenditure and Operational Expenditure Savings (Cb3 + Cb5) (Cb total)	**$7,800,000**	**$1,300,000**	**$1,300,000**	**$9,100,000**	**$2,600,000**	**$22,100,000**
High-Level						
Schedule Cc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Capital Expenditure Avoided (Cc1)	$8,000,000	-	-	$8,000,000	-	$16,000,000
Avoided additional infrastructure costs (taxes, transportation, special features and accessories and testing (Cc1 * 30%) (Cc2)	$2,400,000	-	-	$2,400,000	-	$4,800,000
Subtotal: Capital Expenditure Savings (Cc1 + Cc2) (Cc3)	**$10,400,000**	**-**	**-**	**$10,400,000**	**-**	**$20,800,000**
Total Capital Expenditure costs avoided (5 year cumulative) (Cc4)	20%	20%	20%	20%	20%	100%
Operational Expenditure required as a percentage of Capital Expenditure (Cc3 * Cc4) (Cc5)	**$2,080,000**	**$2,080,000**	**$2,080,000**	**$4,160,000**	**$4,160,000**	**$14,560,000**
Total Capital Expenditure and Operational Expenditure Savings (Cc3 + Cc5) (Cc total)	**$12,480,000**	**$2,080,000**	**$2,080,000**	**$14,560,000**	**$4,160,000**	**$35,360,000**

Table A 16 Low Projected Streamlined Documentation

Schedule Da	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total records (Da1)	20,000	20,000	20,000	20,000	20,000	100,000
Percentage of conflicting records (Da2)	5%	5%	5%	5%	5%	5%
Number of conflicting records requiring resolution (Da3)	1,000	1,000	1,000	1,000	1,000	5,000
Average cost to resolve a dispute (Da4)	$200	$200	$200	$200	$200	$200
Projected reduction in conflicting records with blockchain (Da5)	100%	100%	100%	100%	100%	100%
Savings due to reduction in conflicting records (Da3*Da4*Da5) (Da6)	**$200,000**	**$200,000**	**$200,000**	**$200,000**	**$200,000**	**$1,000,000**
Average cost for record processing (Da7)	$20	$20	$20	$20	$20	$20
Reduction in cost per record (Da8)	25%	25%	25%	25%	25%	25%
Savings due to reduction in cost of records processing (Da1*Da7*Da8)(Da9)	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$500,000**
Savings for records processing (Da6 + Da9) (Da total)	**$300,000**	**$300,000**	**$300,000**	**$300,000**	**$300,000**	**$1,500,000**

Table A 17 Mid-Range Projected Streamlined Documentation

Schedule Db	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total records (Db1)	50,000	50,000	50,000	50,000	50,000	250,000
Percentage of conflicting records (Db2)	7%	7%	7%	7%	7%	7%
Number of conflicting records requiring resolution (Db3)	3,500	3,500	3,500	3,500	3,500	17,500
Average cost to resolve a dispute (Db4)	$250	$250	$250	$250	$250	$250
Projected reduction in conflicting records with blockchain (Db5)	100%	100%	100%	100%	100%	100%
Savings due to reduction in conflicting records (Db3*Db4*Db5) (Db6)	**$875,000**	**$875,000**	**$875,000**	**$875,000**	**$875,000**	**$4,375,000**
Average cost for record processing (Db7)	$22	$22	$22	$22	$22	$22
Reduction in cost per record (Db8)	30%	30%	30%	30%	30%	30%
Savings due to reduction in cost of records processing (Db1*Db7*Db8) (Db9)	**$330,000**	**$330,000**	**$330,000**	**$330,000**	**$330,000**	**$1,650,000**
Savings for records processing (Db6 + Db9) (Db total)	**$1,205,000**	**$1,205,000**	**$1,205,000**	**$1,205,000**	**$1,205,000**	**$6,025,000**

Table A 18 High-Level Projected Streamlined Documentation

Schedule Dc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total records (Dc1)	80,000	80,000	80,000	80,000	80,000	400,000
Percentage of conflicting records (Dc2)	9%	9%	9%	9%	9%	9%
Number of conflicting records requiring resolution (Dc3)	7,200	7,200	7,200	7,200	7,200	36,000
Average cost to resolve a dispute (Dc4)	$300	$300	$300	$300	$300	$300
Projected reduction in conflicting records with blockchain (Dc5)	100%	100%	100%	100%	100%	100%
Savings due to reduction in conflicting records (Dc3*Dc4*Dc5) (Dc6)	**$2,160,000**	**$2,160,000**	**$2,160,000**	**$2,160,000**	**$2,160,000**	**$10,800,000**
Average cost for record processing (Dc7)	$25	$25	$25	$25	$25	$25
Reduction in cost per record (Dc8)	35%	35%	35%	35%	35%	35%
Savings due to reduction in cost of records processing (Dc1*Dc7*Dc8) (Dc9)	**$700,000**	**$700,000**	**$700,000**	**$700,000**	**$700,000**	**$3,500,000**
Savings for records processing (Dc6 + Dc9) (Dc total)	**$2,860,000**	**$2,860,000**	**$2,860,000**	**$2,860,000**	**$2,860,000**	**$14,300,000**

Table A 19 Projected Reduced Legacy Systems Costs

Low						
Schedule Ea	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Legacy systems cost (Ea1)	$150,000	$150,000	$150,000	$150,000	$150,000	$750,000
Percentage of legacy systems replaced by IBM Blockchain (Ea2)	10%	50%	80%	100%	100%	N/A
Legacy systems savings (Ea1*Ea2) (Ea total)	**$15,000**	**$75,000**	**$120,000**	**$150,000**	**$150,000**	**$510,000**
Mid-Range						
Schdule Eb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Legacy systems cost (Eb1)	$200,000	$200,000	$200,000	$200,000	$200,000	$1,000,000
Percentage of legacy systems replaced by IBM Blockchain (Eb2)	10%	50%	80%	100%	100%	N/A
Legacy systems savings (Eb1*Eb2) (Eb total)	**$20,000**	**$100,000**	**$160,000**	**$200,000**	**$200,000**	**$680,000**
High-Level						
Schedule Ec	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Legacy systems cost (Ec1)	$250,000	$250,000	$250,000	$250,000	$250,000	$1,250,000
Percentage of legacy systems replaced by IBM Blockchain (Ec2)	10%	50%	80%	100%	100%	N/A
Legacy systems savings (Ec1*Ec2) (Ec total)	**$25,000**	**$125,000**	**$200,000**	**$250,000**	**$250,000**	**$850,000**

Table A 20 Low Projected Labour Costs

Schedule Fa	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Number of finance FTEs resolving conflicting records (Fa1)	4	4	4	4	4	N/A
Finance FTEs annual compensation (Fa2)	$75,000	$75,000	$75,000	$75,000	$75,000	N/A
Reduction to finance resources dedicated to resolving conflicting records from use of IBM Blockchain (Fa3)	20%	40%	60%	80%	80%	N/A
Savings due to reduction in finance FTEs (Fa1*Fa2*Fa3) (Fa4)	**$60,000**	**$120,000**	**$180,000**	**$240,000**	**$240,000**	**$840,000**
Number of legal FTEs resolving conflicting records prior to IBM Blockchain (Fa5)	3	3	3	3	3	N/A
Legal FTEs annual compensation (Fa6)	$200,000	$200,000	$200,000	$200,000	$200,000	N/A
Reduction to legal resources resolving conflicting records with IBM Blockchain (Fa7)	0%	30%	50%	70%	70%	N/A
Savings due to reduction in legal FTEs (Fa5*Fa6*Fa7) (Fa8)	**$0**	**$180,000**	**$300,000**	**$420,000**	**$420,000**	**$1,320,000**
Total labor cost savings (Fa4 + Fa8) (Fa total)	**$60,000**	**$300,000**	**$480,000**	**$660,000**	**$660,000**	**$2,160,000**

Table A 21 Mid-Range Projected Labour Costs

Schedule Fb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Number of finance FTEs resolving conflicting records (Fb1)	5	5	5	5	5	N/A
Finance FTEs annual compensation (Fb2)	$75,000	$75,000	$75,000	$75,000	$75,000	N/A
Reduction to finance resources dedicated to resolving conflicting records from use of IBM Blockchain (Fb3)	20%	40%	60%	80%	80%	N/A
Savings due to reduction in finance FTEs (Fb1*Fb2*Fb3) (Fb4)	**$75,000**	**$150,000**	**$225,000**	**$300,000**	**$300,000**	**$1,050,000**
Number of legal FTEs resolving conflicting records prior to IBM Blockchain (Fb5)	3	3	3	3	3	N/A
Legal FTEs annual compensation (Fb6)	$200,000	$200,000	$200,000	$200,000	$200,000	N/A
Reduction to legal resources resolving conflicting records with IBM Blockchain (Fb7)	0%	30%	50%	70%	70%	N/A
Savings due to reduction in legal FTEs (Fb5*Fb6*Fb7) (Fb8)	**$0**	**$180,000**	**$300,000**	**$420,000**	**$420,000**	**$1,320,000**
Total labor cost savings (Fb4 + Fb8) (Fb total)	**$75,000**	**$330,000**	**$525,000**	**$720,000**	**$720,000**	**$2,370,000**

Table A 22 High-Level Projected Labour Costs

Schedule Fc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Number of finance FTEs resolving conflicting records (Fc1)	6	6	6	6	6	N/A
Finance FTEs annual compensation (Fc2)	$75,000	$75,000	$75,000	$75,000	$75,000	N/A
Reduction to finance resources dedicated to resolving conflicting records from use of IBM Blockchain (Fc3)	20%	40%	60%	80%	80%	N/A
Savings due to reduction in finance FTEs (Fc1*Fc2*Fc3) (Fc4)	**$90,000**	**$180,000**	**$270,000**	**$360,000**	**$360,000**	**$1,260,000**
Number of legal FTEs resolving conflicting records prior to IBM Blockchain (Fc5)	4	4	4	4	4	N/A
Legal FTEs annual compensation (Fc6)	$200,000	$200,000	$200,000	$200,000	$200,000	N/A
Reduction to legal resources resolving conflicting records with IBM Blockchain (Fc7)	0%	30%	50%	70%	80%	N/A
Savings due to reduction in legal FTEs (Fc5*Fc6*Fc7) (Fc8)	**$0**	**$240,000**	**$400,000**	**$560,000**	**$640,000**	**$1,840,000**
Total labor cost savings (Fc4 + Fc8) (Fc total)	**$90,000**	**$420,000**	**$670,000**	**$920,000**	**$1,000,000**	**$3,100,000**

Table A 23 Total Projected Cost Benefits

Low						
Schedule Ga	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Ca total)	$3,120,000	$520,000	$520,000	$3,640,000	$1,040,000	$8,840,000
Savings for records processing (Da total)	$300,000	$300,000	$300,000	$300,000	$300,000	$1,500,000
Legacy systems savings (Ea total)	$15,000	$75,000	$120,000	$150,000	$150,000	$510,000
Labour cost savings (Fa total)	$60,000	$300,000	$480,000	$660,000	$660,000	$2,160,000
Total Low Cost Reductions (Ca + Da + Ea + Fa) (Ga total)	**$3,495,000**	**$1,195,000**	**$1,420,000**	**$4,750,000**	**$2,150,000**	**$13,010,000**
Mid-Range						
Schedule Gb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Cb total)	$7,800,000	$1,300,000	$1,300,000	$9,100,000	$2,600,000	$22,100,000
Savings for records processing (Db total)	$1,205,000	$1,205,000	$1,205,000	$1,205,000	$1,205,000	$6,025,000
Legacy systems savings (Eb total)	$20,000	$100,000	$160,000	$200,000	$200,000	$680,000
Labour cost savings (Fb total)	$75,000	$330,000	$525,000	$720,000	$720,000	$2,370,000
Total Mid-Range Cost Reductions (Cb + Db + Eb + Fb) (Gb total)	**$9,100,000**	**$2,935,000**	**$3,190,000**	**$11,225,000**	**$4,725,000**	**$31,175,000**
High-Level						
Schedule Gc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Cc total)	$12,480,000	$2,080,000	$2,080,000	$14,560,000	$4,160,000	$35,360,000
Savings for records processing (Dc total)	$2,860,000	$2,860,000	$2,860,000	$2,860,000	$2,860,000	$14,300,000
Legacy systems savings (Ec total)	$25,000	$125,000	$200,000	$250,000	$250,000	$850,000
Labour cost savings (Fc total)	$90,000	$420,000	$670,000	$920,000	$1,000,000	$3,100,000
Total High-Level Cost Reductions (Cc total + Dc total + Ec total + Fc total) (Gc total)	**$15,455,000**	**$5,485,000**	**$5,810,000**	**$18,590,000**	**$8,270,000**	**$53,610,000**

Table A 24 Projected Low Revenue Total Costs with Cost Benefits Included

Schedule Ma	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Ca total)	$ (3,120,000)	$ (520,000)	$ (520,000)	$ (3,640,000)	$ (1,040,000)	$ (8,840,000)
Savings for records processing (Da total)	$ (300,000)	$ (300,000)	$ (300,000)	$ (300,000)	$ (300,000)	$ (1,500,000)
Legacy systems savings (Ea total)	$ (15,000)	$ (75,000)	$ (120,000)	$ (150,000)	$ (150,000)	$ (510,000)
Labour cost savings (Fa total)	$ (60,000)	$ (300,000)	$ (480,000)	$ (660,000)	$ (660,000)	$ (2,160,000)
Total Low Cost Reductions (Ca + Da + Ea + Fa) (Ga total)	**$ (3,495,000)**	**$ (1,195,000)**	**$ (1,420,000)**	**$ (4,750,000)**	**$ (2,150,000)**	**$ (13,010,000)**
Total Blockchain Costs	$3,072,209	$770,000	$770,000	$770,000	$770,000	$6,152,209
Total Blockchain Costs with Cost Reductions Included	**$ (422,791)**	**$ (425,000)**	**$ (650,000)**	**$ (3,980,000)**	**$ (1,380,000)**	**$ (6,857,791)**
Total Blockchain Costs (20% Risk-Adjusted)	$3,686,651	$924,000	$924,000	$924,000	$924,000	$7,382,651
Total Low Cost Reductions (Ca + Da + Ea + Fa) (Ga total)	$ (3,495,000)	$ (1,195,000)	$ (1,420,000)	$ (4,750,000)	$ (2,150,000)	$ (13,010,000)
Total Blockchain Costs (20% Risk-Adjusted) with Cost Reductions Included	**$ 191,651**	**$ (271,000)**	**$ (496,000)**	**$ (3,826,000)**	**$ (1,226,000)**	**$ (5,627,349)**

Table A 25 Projected Low Revenue Total Costs with no Cost Benefits

Schedule Ga	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Ca total)	$3,120,000	$520,000	$520,000	$3,640,000	$1,040,000	$8,840,000
Savings for records processing (Da total)	$300,000	$300,000	$300,000	$300,000	$300,000	$1,500,000
Legacy systems savings (Ea total)	$15,000	$75,000	$120,000	$150,000	$150,000	$510,000
Labour cost savings (Fa total)	$60,000	$300,000	$480,000	$660,000	$660,000	$2,160,000
Total Low Cost Reductions (Ca + Da + Ea + Fa) (Ga total)	**$3,495,000**	**$1,195,000**	**$1,420,000**	**$4,750,000**	**$2,150,000**	**$13,010,000**
Total Blockchain Costs w/5yr Capital Depreciation	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$6,152,209
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 year depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs (20% Risk-Adjusted) w/5yr Capital Depreciation	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$7,382,651
Total Blockchain Costs w/5yr Capital Depreciation	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$6,152,209
Total Low Cost Reductions (Ca + Da + Ea + Fa) (Ga total)	$3,495,000	$1,195,000	$1,420,000	$4,750,000	$2,150,000	$13,010,000
Total Blockchain Costs (5 yr depreciation) with no Cost Reductions	**$4,725,442**	**$2,425,442**	**$2,650,442**	**$5,980,442**	**$3,380,442**	**$19,162,209**
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 year depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs (20% Risk-Adjusted) w/5yr Capital Depreciation	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$7,382,651
Total Low Cost Reductions (Ca + Da + Ea + Fa) (Ga total)	$3,495,000	$1,195,000	$1,420,000	$4,750,000	$2,150,000	$13,010,000
Total Blockchain Costs (20% Risk-Adjusted, 5 Year Depreciation) with no Cost Reductions	**$4,971,530**	**$2,671,530**	**$2,896,530**	**$6,226,530**	**$3,626,530**	**$20,392,651**

Table A 26 Projected Mid-Range Revenue Total Costs with Cost Benefits Included

Schedule Mb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Cb total)	($7,800,000)	($1,300,000)	($1,300,000)	($9,100,000)	($2,600,000)	($22,100,000)
Savings for records processing (Db total)	($1,205,000)	($1,205,000)	($1,205,000)	($1,205,000)	($1,205,000)	($6,025,000)
Legacy systems savings (Eb total)	($20,000)	($100,000)	($160,000)	($200,000)	($200,000)	($28,125,000)
Labour cost savings (Fb total)	($75,000)	($330,000)	($525,000)	($720,000)	($720,000)	($2,370,000)
Total Mid-Range Cost Reductions (Cb + Db + Eb + Fb) (Gb total)	**($9,100,000)**	**($2,935,000)**	**($3,190,000)**	**($11,225,000)**	**($4,725,000)**	**($31,175,000)**
Total Blockchain Costs	$3,072,209	$770,000	$770,000	$770,000	$770,000	$6,152,209
Total Blockchain Costs with Cost Reductions Included	**$ (6,027,791)**	**$ (2,165,000)**	**$ (2,420,000)**	**$ (10,455,000)**	**$ (3,955,000)**	**$ (25,022,791)**
Total Blockchain Costs (20% Risk-Adjusted)	$3,686,651	$924,000	$924,000	$924,000	$924,000	$7,382,651
Total Mid-Range Cost Reductions (Cb + Db + Eb + Fb) (Gb total)	$ (9,100,000)	$ (2,935,000)	$ (3,190,000)	$ (11,225,000)	$ (4,725,000)	$ (31,175,000)
Total Blockchain Costs (20% Risk-Adjusted) with Cost Reductions Included	**$ (5,413,349)**	**$ (2,011,000)**	**$ (2,266,000)**	**$ (10,301,000)**	**$ (3,801,000)**	**$ (23,792,349)**

Table A 27 Projected Mid-Range Revenue Total Costs with no Cost Benefits

Schedule Gb	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Cb total)	$7,800,000	$1,300,000	$1,300,000	$9,100,000	$2,600,000	$22,100,000
Savings for records processing (Db total)	$1,205,000	$1,205,000	$1,205,000	$1,205,000	$1,205,000	$6,025,000
Legacy systems savings (Eb total)	$20,000	$100,000	$160,000	$200,000	$200,000	$680,000
Labour cost savings (Fb total)	$75,000	$330,000	$525,000	$720,000	$720,000	$2,370,000
Total Mid-Range Cost Reductions (Cb + Db + Eb + Fb) (Gb total)	**$9,100,000**	**$2,935,000**	**$3,190,000**	**$11,225,000**	**$4,725,000**	**$31,175,000**
Total Blockchain Costs w/5yr Capital Depreciation	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$6,152,209
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 Year Depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs (20% Risk-Adjusted) with 5 Year Capital Depreciation	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$7,382,651
Total Blockchain Costs with 5 Year Capital Depreciation	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$6,152,209
Total Mid-Range Cost Reductions (Cb + Db + Eb + Fb) (Gb total)	$9,100,000	$2,935,000	$3,190,000	$11,225,000	$4,725,000	$31,175,000
Total Blockchain Costs (5 year depreciation) with no Cost Benefits	**$10,330,442**	**$4,165,442**	**$4,420,442**	**$12,455,442**	**$5,955,442**	**$37,327,209**
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 Year Depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs (20% Risk-Adjusted) with 5 Year Capital Depreciation	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$7,382,651
Total Mid-Range Cost Reductions (Cb + Db + Eb + Fb) (Gb total)	$9,100,000	$2,935,000	$3,190,000	$11,225,000	$4,725,000	$31,175,000
Total Blockchain Costs (20% Risk-Adjusted, 5 Year Depreciation) with no Cost Benefits	**$10,576,530**	**$4,411,530**	**$4,666,530**	**$12,701,530**	**$6,201,530**	**$38,557,651**

Table A 28 Projected High-Level Revenue Total Costs with Cost Benefits Included

Schedule Mc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Cc total)	($12,480,000)	($2,080,000)	($2,080,000)	($14,560,000)	($4,160,000)	($35,360,000)
Savings for records processing (Dc total)	($2,860,000)	($2,860,000)	($2,860,000)	($2,860,000)	($2,860,000)	($14,300,000)
Legacy systems savings (Ec total)	($25,000)	($125,000)	($200,000)	($250,000)	($250,000)	($850,000)
Labour cost savings (Fc total)	($90,000)	($420,000)	($670,000)	($920,000)	($1,000,000)	($3,100,000)
Total High-Level Cost Reductions (Cc total + Dc total + Ec total + Fc total) (Gc total)	**($15,455,000)**	**($5,485,000)**	**($5,810,000)**	**($18,590,000)**	**($8,270,000)**	**($53,610,000)**
Total Blockchain Costs	$3,072,209	$770,000	$770,000	$770,000	$770,000	$6,152,209
Total Blockchain Costs with Cost Reductions Included	**$ (12,382,791)**	**$ (4,715,000)**	**$ (5,040,000)**	**$ (17,820,000)**	**$ (7,500,000)**	**$ (47,457,791)**
Total Blockchain Costs (20% Risk-Adjusted)	$3,686,651	$924,000	$924,000	$924,000	$924,000	$7,382,651
Total High-Level Cost Reductions (Cc total + Dc total + Ec total + Fc total) (Gc total)	$ (15,455,000)	$ (5,485,000)	$ (5,810,000)	$ (18,590,000)	$ (8,270,000)	$ (53,610,000)
Total Blockchain Costs (20% Risk-Adjusted) with Cost Reductions Included	**$ (11,768,349)**	**$ (4,561,000)**	**$ (4,886,000)**	**$ (17,666,000)**	**$ (7,346,000)**	**$ (46,227,349)**

Table A 29 Projected High-Level Revenue Total Costs with no Cost Benefits

Schedule Gc	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YR TOTAL
Total Capital Expenditure and Operational Expenditure Savings (Cc total)	$12,480,000	$2,080,000	$2,080,000	$14,560,000	$4,160,000	$35,360,000
Savings for records processing (Dc total)	$2,860,000	$2,860,000	$2,860,000	$2,860,000	$2,860,000	$14,300,000
Legacy systems savings (Ec total)	$25,000	$125,000	$200,000	$250,000	$250,000	$850,000
Labour cost savings (Fc total)	$90,000	$420,000	$670,000	$920,000	$1,000,000	$3,100,000
Total High-Level Cost Reductions (Cc + Dc + Ec + Fc) (Gc total)	**$15,455,000**	**$5,485,000**	**$5,810,000**	**$18,590,000**	**$8,270,000**	**$53,610,000**
Total Blockchain Costs w/5yr Capital Depreciation	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$6,152,209
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 Year Depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs (20% Risk-Adjusted) with 5 Year Capital Depreciation	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$7,382,651
Total Blockchain Costs with 5 Year Capital Depreciation	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$1,230,442	$6,152,209
Total High-Level Cost Reductions (Cc total + Dc total + Ec total + Fc total) (Gc total)	$15,455,000	$5,485,000	$5,810,000	$18,590,000	$8,270,000	$53,610,000
Total Blockchain Costs (5 year depreciation) with no Cost Reductions	**$16,685,442**	**$6,715,442**	**$7,040,442**	**$19,820,442**	**$9,500,442**	**$59,762,209**
Total Blockchain Costs (20% Risk-Adjusted)	$924,000	$924,000	$924,000	$924,000	$924,000	$4,620,000
Development + Pilot - 5 Year Depreciation	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$552,530.26	$2,762,651.28
Total Blockchain Costs (20% Risk-Adjusted) with 5 Year Capital Depreciation	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$1,476,530	$7,382,651
Total Mid-Range Cost Reductions (Cc + Dc + Ec+ Fc) (Gc total)	$15,455,000	$5,485,000	$5,810,000	$18,590,000	$8,270,000	$53,610,000
Total Blockchain Costs (20% Risk-Adjusted, 5 Year Depreciation) with no Cost Reductions	**$16,931,530**	**$6,961,530**	**$7,286,530**	**$20,066,530**	**$9,746,530**	**$60,992,651**

Note 1: The original case study was based on a new member value of 12 for schedules Aa, Ab and Ac, but relied on a value of 8 for the low range and 16 for the high-level projections elsewhere throughout. A value of 8 for the low projection, 12 for the mid-range and 16 for the high-range projection is consistent with the membership numbers used in other tables. For this reason, the corrected values have been used for the membership and revenue analyses. The corrected values and values as reported have both been listed in the tables.

Note 2: The tables in Appendix A were constructed based on values found within the *Emerging Technology Projection: The Total Economic Impact of IBM Blockchain* report by Forrester Consulting (Forrester Consulting, 2018).