Institutional challenges, the middle-income trap and the pursuit of global economic integration in Latin America

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Prepared for a Chapter in Edmund Amann and Paulo N. Figueiredo (eds), *Innovation, Competitiveness and Development in Latin America: Lessons from the Past and Perspectives for the Future* (New York: Oxford University Press), 2024; pp 21-43; ISBN 978-0197648070

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When states pursue development that is transformational, inclusive and sustainable, the institutional context within which policies are formulated and implemented is central to understanding development outcomes. This is because, simply put, institutions are the 'rules of the game' in the economy and society (North 1990). They can be both formal and informal rules and conventions of behaviour (the definition is explored further later). Meanwhile, organisations are the formal structures created to pursue an explicit purpose and can be seen as the actors or players in the system (Edquist 1997; Edquist 2006).

Successful development often implies parallel changes in institutions and organisations to support the desired social and economic transformation. Most Latin American countries have emphatically embraced the pursuit of development in their political discourse and policy agendas. Both public and private sector decision-makers often envision development as a process of 'up-grading' and 'catching up'[1] and as such subject to changing policy objectives and outcomes over time. However, support for institutional change has been more ambiguous, especially where political and economic elites (often represented in key organisations of the public and private sectors) have been wary of losing status and influence as a consequence.

Both development and institutional change are inherently political processes. If one accepts that institutions are shaped by (previously prevailing) ideas and interests, then institutional change (whether abrupt or incremental) is shaped by evolving preferences with respect to ideas and interests. Moreover, institutional change does not occur from a *tabula rasa* starting point. If institutions are seen to reflect past and ongoing power relations, then understanding the prospects for institutional change benefits from analysing coalition formation and mobilisation capacity of the relevant organisations or actors. Thus, examining both structural factors inhibiting institutional change and opportunities for agency within existing institutions and organisations are key to understanding the challenges ahead for Latin America.

[1] 'Up-grading' in the sense of producing goods and services with increasing value added and sustained productivity growth in a context of greater domestic linkages as well as international competitiveness. 'Catching-up' in the sense of getting closer to the development, technological and income standards of the advanced economies and/or high-income countries.

Intriguingly, the academic literature has long focused on studying the successes and failures of development policies in Latin America, but has not dedicated equal effort to understanding the challenges of institutional modernisation in the region. When Latin American institutions are studied, the focus tends to be on institutional deficiencies or failures (Brinks, Levitsky & Murillo 2019). However, my research shows that at the heart of many of the development problems in Latin America lies the difficulty of not just building institutions conducive to inclusive and sustainable development, but actually over-coming the stubborn persistence and stickiness of those that block development, innovation and competitive integration (Doctor 2017). The stickiness of institutions also exposes their different purposes – not just reducing transaction costs, improving the business climate or enhancing development outcomes, but instead supporting the extraction of rents, protecting power and entrenching privileges of the few, and inhibiting the participation and voice of others.

The main puzzle that this chapter sheds light on is how and why institutions have posed an obstacle to implementing policies that support innovation and competitive integration of Latin America into the global economy? It presents an overview of the challenges to institutional change at the heart of the challenges of development, and a lens through which to understand these challenges. The chapter is presented in five sections: (i) overview of regional economic performance with a focus on levels of integration into the global economy and innovation efforts to support competitive integration; (ii) evolving approaches to development policy; (iii) theories of institutional change with a focus on the challenges facing the region; (iv) issues related to developing institutions that foster innovation and competitive integration; and (v) some lessons for escaping the middle-income trap.

Overview of Regional Economic Performance

In the past four decades, economic indicators across the board confirm that Latin America has failed to close the development gap with advanced high-income economies, notwithstanding most governments' stated objectives and initiatives since their transitions to democracy in the last two decades of the 20th century. Latin America typically performs poorly in the various global rankings that measure economic competitiveness and performance, such as the Global Competitiveness Report, the Global Innovation Index and the World Bank's Doing Business Report.[2] Unsurprisingly, there is a palpable sense of increasing frustration with the region's underperformance. Economists argue that many of the larger economies in the region (Argentina, Brazil, Chile[3], Colombia, Mexico and Peru) seem to have fallen into a middle-income trap[4], but it is comparative political economists

[2] Although there may be some methodological questions related to these rankings, the point here is that they show a broad picture of general and relative underperformance of the region.

[3] Note, although Chile is listed as a high-income country, it still has high levels of income inequality and some 30% of its population is economically vulnerable. According to the World Bank (2021), 'the existing policy framework has been insufficient to continue fostering productivity growth and economic diversification …'. In effect, it still exhibits features of the middle-income trap.

[4] The middle-income trap is a term first used in Gill and Kharas (2007), but has since been used by many development economists to refer to economies stuck in the middle income range for over four decades

that might provide additional understanding of the dilemmas faced by policy-makers in climbing out of it.

First, a quick overview of the regional economic context. One of the most outstanding features of the region is the high level of income inequality and concentration of wealth (Sanchez-Ancochea 2020; Thorpe 1998). Strikingly, many of the economies considered to be stuck in the middle-income trap have very high Gini coefficients as well as considerable issues of socio-political marginalisation experienced by their populations. The commodity boom might have briefly raised growth rates in the region, but it also exacerbated difficulties related to improving both enterprise productivity and social inclusion (Foxley & Stallings 2016). As Doner and Schneider (2016) point out, inequality makes politics more fractious and discordant, increasing the likelihood of elite capture, clientelism, and populism. These features also make institutional change for innovation and inclusion more difficult to implement and manage (as discussed later).

Although the region is well integrated into global markets mainly as a commodity supplier, it has a more modest presence as exporter of manufactured goods and services, especially in high-tech segments. Trade in Latin America and the Caribbean (LAC) represents a relatively low percentage of Gross Domestic Product (GDP) at around 45% for most years after the region's recovery from the global financial crisis in 2009. It is highest in Mexico (78.2% in 2020) followed by Costa Rica (61.3%) and Chile (57.8%), and only 32.4% in the region's largest economy, Brazil (World Bank 2022).

The region performs poorly when considering participation in global value chains (GVC). Chile has the strongest GVC links (52% of its gross exports) followed by Mexico (47%) and Costa Rica (45%) (Cadestin, Gourdon & Kowalski 2016:11; also see Blyde and Trachtenberg 2020). Enterprise upgrading to better compete was affected by firm specific factors and actions, but also by the environment within which they operated, including the pattern of value chain governance, efficiency of public-private coordination, trade regimes, intellectual property rights and innovation policy, and availability of skilled personnel (Pietrobelli and Rabelotti 2006).

The region also underperforms in terms of various science, technology and innovation (STI) indicators. The level of research and development (R&D) spending is very low in the region – only 0.56% of total regional GDP in 2019, down from 0.65% in 2013 (ECLAC 2022). Brazil R&D spending at 1.16 % of GDP is the highest in LAC, and it accounts for 62% of total R&D spending in region (N.B. Brazil, Cuba and Uruguay were the only economies with R&D spending over 0.5% of GDP in 2019). Also, most R&D spending is undertaken by public sector organisations and public universities, with the private sector rarely contributing even a third of the total. The region has an average of 1.21 researchers per 1000 population (Argentina was highest at 3/1000), with a positive feature being that 46% of researchers are women (the global average is 28%). In terms of research outputs, LAC's participation in

seemingly impeded by structural constraints related to slowdown in productivity gains, insufficient technological capabilities, low innovation activities, under-investment in developing human capital, infrastructure bottlenecks, and poor levels of competitive integration into the global economy.

global scientific publications rose from 3.85% in 2009 to 5.02% in 2019, but share of LAC residents in global patents was only 1.6% (ECLAC 2022: 25-27). Only four LAC universities feature in the top 150 universities in the QS world university rankings (QS 2022).[5]

According to the Global Innovation Index (WIPO 2021), not a single LAC economy features in the top quartile of the ranking (132 economies were assessed). The best in the region were Chile (53rd), Mexico (55th), Costa Rica (56th) and Brazil (57th). Chile and Mexico were the only two countries to score above the regional average on all six pillars of the GII. As Barceló and Higuera-Cota (2019) point out, efficiency of innovation management is a key challenge, especially the need to improve market functioning (competition, credit and investment) as well as increase knowledge absorption capacity (both human capital formation and institutional aspects).

The Economic Commission for Latin America and the Caribbean (ECLAC) noted that the Covid-19 pandemic hit the region's economies hard in 2020 (regional GDP contracted 6.8%, export earnings fell 13%, 2.7 million businesses closed, and poverty increased by 22 million to 209 million (i.e. 33% of regional population) (ECLAC 2022). The organisation argues that one of the positive outcomes of the pandemic was a greater appreciation for the importance of STI polices in achieving the United Nations' Agenda 2030/the Sustainable Development Goals, and an elevated inclination to formulate more ambitious STI strategies. However, increasing capacity to formulate and manage STI policies will require more coordination among stakeholders (government, academia, private sector and civil society) and more effective institutional arrangements (ECLAC 2022:13).

Evolving Approaches to Development

The region has been through significant shifts in its approach to development from the latter half of the twentieth century to the Covid-19 pandemic. During those seven decades, it went from reliance on commodity exports to pay for its industrial imports to import substitution industrialisation (ISI) to export oriented growth; from state-led development to market-oriented reforms to neo-structural 'new developmentalism'; from structural adjustment to sustainable development; and from economically focused measures to more inclusive and socially focused policies for development. There is a rich academic literature analysing these processes (Amann, Azzioni & Baer 2018; Birdsal, de la Torre & Calceido 2010; Bresser Pereira 2016; Evans 1979; Foxley & Stallings 2016; Huber & Stephens 2012; Kingstone 2018; Leiva 2008; Petras & Veltmeyer 2014; Sicsú, Paula & Michel 2007; Thorpe 1998; Weyland 2004).

The early stages of ISI had contributed to creating a diversified industrial park and robust growth rates (albeit with distributive inequality) in many of the larger economics of Latin America. State developmentalism was a fundamental feature of the region's industrialisation process (as it was elsewhere too), but LAC never achieved the ideal type developmental state

[5] University of Buenos Aires (69th), National Autonomous University of Mexico (=105th), University of Sao Paulo (=121st) and the Pontifical Catholic University of Chile (135th).

that Evans (1995) discusses in terms of 'embedded autonomy' or Kohli (2004) refers to as 'capital-cohesive states'. In Latin America, politicians rather than technocratic bureaucracies directed development policy-making. High dependence on foreign markets, the challenges of peripheral economic dependency and stark inequalities hampered embedding of a true developmental state (Orihuela 2019). After some successes in industrialisation and productive development, the debt crisis of the 1980s ended the state's high spending ways, which was followed by a massive restructuring of industry and deep structural reforms in the 1990s. The main feature of these two decades was a move to market-oriented Washington Consensus prescribed policy reform. It brought about macro-economic stabilisation, trade opening, and privatisation and eventually more focus on issues related to augmenting the productivity and competitiveness of enterprises.

Two main impacts of the economic reforms were: (i) the drastic narrowing of space for domestic capital and state-owned enterprise with a concomitant rise in the influence of foreign capital; and (ii) a severe drop in public spending due to the focus on macro-economic stabilisation, fiscal and monetary austerity, and balanced public accounts. The former meant the state had less control over the definition of investment strategies and decisions, many of which were now taken outside LAC, and the division in capital ownership between domestic and foreign made it more difficult to organise business collective action. The latter forced state downsizing by limiting the scope for state spending and other activities relevant to economic and social development. Shrinking the state often went hand in hand with shrinking state capacity. It also exacerbated economic marginalisation – unlike elsewhere in the world, industrialisation and urbanisation did not lead to the creation of more formal jobs in LAC, but instead resulted in a growing number and proportion of informal workers among the economically active population (often well above 50% in LAC economies).

However, even at the height of market-oriented reforms, pro-interventionist and state developmentalist elements were often represented in governments across the region. This was especially true in the case of Brazil, where it remained so even in the 1990s, but became openly acknowledged policy during the Workers' Party (PT) presidencies from 2003 to 2016. Neo-liberal market fundamentalism never held great appeal and the counter discourse of neo-structuralism soon proved much more attractive in the region (Leiva 2008). The dropping of market fundamentalist approaches to development became wide-spread during the so-called 'Pink Tide' from the early years of the 21st century (e.g. see Huber & Stephens 2012; Kapiszewski, Levitsky & Yasher 2021). Although policy-makers recognised that ISI was exhausted and the old instruments of development policy were inadequate for dealing with the challenges of the modern knowledge-based innovation-led globalised economy, many of the outdated institutional configurations seemingly survived into the 21st century, arguably slowing the region's upgrading and catching up efforts.

Two more recent approaches to development policy have gained attention in Latin America in recent years, both engaging with the issue of institutional weaknesses that inhibit good governance in the area of innovation and competitive integration into the global economy. First, an evolutionary economics approach provides valuable insights. It notes the importance of developing a national system of innovation (NSI), which is focused on innovation, learning

and capability building at the microeconomic level, and emphasises creating appropriate institutions and a role for industrial policy to foster development at the macro-economic level (Edquist 1997; Lundvall, Johnson, Anderson & Dalum 2002; Nelson & Winter 1982). The NSI involves a range of organisations, including public sector agencies, private sector firms and venture capital organisations, as well as universities and research institutes. There are three main types of innovation policy instruments (regulatory; economic and financial; 'soft instruments') and the particular mix of policies applied are typically unique to the case (Borrás & Edquist 2013).

Where does the NSI literature fit with the broader debates on development policy in LAC? There is a striking closeness in the positions of the innovation system perspective and Latin American neo-structuralism on issues of technological change and development (see Cassiolato *et. al.* (2005) for a comparison of themes related to development and innovation in the two literatures). Both emphasise non-economic factors, such as history, culture, institutions as well as position in the global hierarchy in driving technological progress and development. They also draw out the implications of the asymmetrical character of international technological development on uneven distribution of gains from new knowledge and a growing gap between the leaders and the rest. Both understand that the role of government must change from simply being a provider and regulator to that of a coordinator and facilitator of innovation and development (Borrás & Edquist 2013).

Second, the 'mission economy' approach (Mazzucato 2022), which argues that we need to re-think the role and capacities of government within the economy and society to come up with innovative, inclusive and sustainable solutions for the fundamental problems of contemporary capitalism (also see Mazzucato, Kattel and Ryan-Collins 2020). Mazzucato notes the urgent need for all stakeholders, both public and private sector, to share risks and rewards to find solutions to the most 'wicked' societal problems. She argues that success entails innovation and investment being directed in practical mission-oriented ways and 'also truly confronting the "ways of doing things" that currently exist in government' (Mazzucato 2020).

The last point reflects the importance of addressing institutional configurations and institutionalised practices that might hamper upgrading and catching up. The mission economy approach also reflects the NSI approach in the importance of identifying core problems and finding a holistic approach based on a customised mix of policy instruments to resolving them. These are the type of approaches that are gradually gaining attention in Latin American policy circles, but before examining them in more detail it is important to consider theoretical aspects and practical challenges related to institutional change.

Theories of Institutional Change

The analysis applies two complementary definitions of institutions: first, institutions are 'the formal or informal procedures, routines, norms and conventions embedded in the organisational structure of the polity or political economy' (Hall & Taylor 1996:938; also see Edquist 2006), i.e. they are the 'rules of the game' in society and the economy, also creating incentives and constraints on behaviour (North 1990). Second, political institutions refer to

'the norms that regulate the formation of binding policy decisions and the selection of the people in charge of such decisions in a polity' (Pérez-Liñán & Castañeda Angarita 2012:395). In contexts of high inequality, this often results in economic elites creating extractive institutions that secure their rents even if it undercuts programmatic politics and dilutes upgrading efforts of governments (Acemoglu & Robinson 2012; Doner & Schneider 2016). It can also result in 'institutionalised crime', i.e. corruption (Pontes & Anselmo 2022). Thus, institutional arrangements should not be seen in isolation from the political setting in which they are embedded. Instead, changes in one arena could affect ongoing processes elsewhere leading to 'unintended consequences' (Thelen 1999:382-383).

Crucially, even codified institutions retain elements of interpretation in what are 'contested settlements' (Mahoney & Thelen 2010:8). Thus, institutions relevant to the political economy are not neutral or passive coordination mechanisms. They can decide the distribution of political resources, shape incentives and behaviour among state and societal actors, and create long-term historical legacies (sometimes including unintended consequences) subject to path dependencies.

In terms of types of institutional change, Latin American countries have experienced critical junctures (Collier & Collier 1991; Mahoney 2002), serial displacement (Levitsky & Murillo 2013) as well as incremental institutional change (Mahoney & Thelen 2010; Doctor 2017). Given the high costs of abrupt institutional change, Lindblom (1959) argued that rational decision-making processes of political actors were likely to favour incremental institutional change. Some of these changes have been an outcome of shifting domestic coalitions around development objectives and policy reform, whereas others have been triggered by external shocks or contagion from international crises. Also, there tends to be a lag between changing exogenous conditions and a realisation among agents that they must act to change institutions – what March and Olsen (1996) describe as converting history into a meander.

Historical institutionalism examines institutional development with reference to the concept of critical junctures, which are seen as 'starting points' or 'bookends' explaining relatively long periods of path dependent institutional stability with brief phases of institutional flux where more dramatic changes with 'momentous impact' might occur (Capoccia & Keleman 2007: 343). Thus, a critical juncture produces a distinct legacy in terms of throwing up new actors and reorganising relationships in the political economy. For example, Mexico's announcement of a debt default in 1982 can be seen to have triggered a critical juncture, namely the Latin American debt crisis of the 1980s, which led to subsequent implementation of market liberalisation and structural reforms. The latter can be seen as path dependent outcomes of the former, albeit not the only path that could have been taken. As Mahoney (2001) notes in his study of liberalisation in Central America, critical junctures are 'choice points' where actors exercise agency, although once a policy option/response is selected, it becomes more difficult to return to the original point.

Meanwhile, incremental forms of institutional change can be conceived of in terms of four types (Streeck & Thelen 2005): displacement, layering, drift and conversion. In the first two types, old rules are replaced or new ones added respectively without removing the old, but their implementation is gradual often due to a process of resistance/contestation. In the

latter two types, there are no formal changes in the rules, but shifting conditions and interpretations respectively, which see alterations in patterns of behaviour. For example, Chile's Open Innovation Programme in Mining was part of a broader response to the *Ley Alta* of 2015, which saw a *layering* of new responsibilities on Chile's Production Development Corporation (CORFO); similarly, the Brazilian National Development Bank (BNDES) experienced a *conversion* in its mission as it shifted the focus of its credit operations from state-owned enterprises to private enterprises in the aftermath of privatisations it led and carried out in the 1990s.

When looking at institutional change, there is often an assumption that abrupt shifts triggered by exogenous shocks lead to critical junctures that are more consequential. However, this is not necessarily the case as pointed out by Mahoney and Thelen (2010). They argue that path-dependent lock-in is rare and that institutions often evolve incrementally and not via 'punctuated equilibria'. Instead, 'institutional change often occurs precisely when problems of rule interpretation and enforcement open up space for actors to implement rules in new ways' (Mahoney & Thelen 2010:4). Tensions arising from competition for resources or distributional consequences of reform suggest that the necessary 'ambiguous compromises' made initially might jeopardise self-perpetuating institutional stability in the longer run. In this sense, compliance with the rules becomes a variable.

Hence, many of the challenges of fostering innovation and creating a NSI in LAC economies stem from (i) shifting coalitions around institution creation, modification or demise, (ii) issues of rule and role interpretation, as well as (iii) development-enhancing implementation and enforcement of policies. As Mahoney and Thelen (2010:12-13) point out, ambiguity in expectations regarding compliance with codified rules allows creativity and agency as well as 'slippage' and 'expansive applications'. Levitsky and Murillo (2013) go so far as to argue that non-compliance can actually enhance institutional stability in some contexts in Latin America. Here powerful veto players are often allowed to get away with ignoring rules with impunity or threaten another instance of serial replacement. In this type of stable unstable setting, where uncertainty is a certainty, long-term investment strategies based on continuous innovation and greater integration into the global economy becomes very difficult.

Based on the above, Mahoney & Thelen present a model for institutional change in terms of character of the political context (seen in terms of veto players and veto points) and character of the institution (seen in terms of level of discretion in interpretation and/or enforcement). Displacement is a likely strategy among change agents when they face weak veto players or few veto points. Drift and layering are more promising pathways to institutional change where there are strong veto players. Conversion normally occurs where institutions allow for high levels of discretion in interpretation and there are weak veto possibilities. Drift and conversion are easier where there are situations of bureaucratic ineptitude and weak administrative capacity. Research shows that all four types of incremental institutional change feature across the economies of LAC (as discussed in the

next section). Notably, critical junctures are less likely to come into play, when creating and embedding institutions that foster innovation and integration into the global economy.

Finally, who are the agents who carry out these changes? It is too simplistic to discuss them in terms of winners and losers, since most actors are involved in more than one arena or set of institutions (possibly winning in some, losing in others). It is important to identify the actors involved and the coalitions that they form in processes of institutional transformation, especially when defining their preferences and resources. It is in this context that Mahoney and Thelen (2010) name four types of change agents (note this is a role not a fixed identity): insurrectionaries, symbionts, subversives and opportunists. Importantly, change agents rarely work alone and often ally with either institutional supporters or challengers depending on their aims. As their name suggests, insurrectionaries and subversives are most likely to ally with those who seek to change the status quo, whereas symbionts are more likely to support those who resist change (opportunists could swing either way depending on what is on offer). Keeping these roles in mind, we can now turn to identifying the political and institutional conditions where institutions for innovation and competitive integration could flourish in the region.

Institutions for Innovation and Competitive Integration in LAC

The competitive pressures of globalisation paradoxically require ever more focused national efforts for economic success, including complementary non-market-based mechanisms to deal with them. The biggest shift in development thinking required of LAC governments and business is to move from conceiving of the economy as a system of production to a system of innovation.

Innovation can be defined as the transformation of new ideas and technologies into economic and social solutions. It encompasses both new products and new processes for production and delivery of goods and services. Thus, innovation should be seen as a systemic process which involves multiple actors, institutions and inputs. From a knowledge and innovation point of view, the institutional framework is central to providing the rules of the environment within which knowledge and innovation are disseminated in an NSI. The innovation environment encompasses various aspects, including the general business environment, but also the scientific, technological, financial and regulatory environments. These environments have interconnecting impacts, which means that coordination between them is crucial for successful innovation-led growth and development.

A NSI implies state allocation of resources based on identifying national strategic priorities and not simply responding to market demands for funding. The task is made more difficult, because structural conditions in Latin America have so far discouraged the development of inter-active learning spaces or of a knowledge- and innovation-driven society (Arocena and Sutz 2000). There are also few resources tied to developing mechanisms to transfer technological innovation from research institutes/universities to the productive sector in LAC, much less to monitor its take up by the private sector e.g. researchers in the internationally respected Brazilian Agricultural Research Corporation (EMBRAPA) noted that

their research often struggled to get transferred to practical application among agriculture sector producers (dos Santos et. al. 2012).

Moreover, companies operating in the oligopolistic market conditions often found in the region have benefitted from protectionist and extractive institutions that sustained rent-seeking coalitions with political elites. Such institutions stifle local competition and global competitiveness. Additionally, the hierarchical nature of capitalism in the region throws up many further challenges related to these issues (Schneider 2013). For example, it is often linked to the lack of high skilled labour and low levels of human capital development as well as lax corporate governance institutions and weak capital markets and credit related institutions.

Also, evidence shows that success of reform policies strongly depends on 'fundamental state capabilities' (Ardanaz, Scartascini & Tommasi 2010), and the negotiating arenas (formal and informal) where key participants in the political economy interact. Innovation is a policy area that involves extensive coordination across many parts of the state, which calls for institutional arrangements that facilitate this coordination and strengthen capacity building and policy management (ECLAC 2022:33). According to ECLAC, conceiving industrial policy in terms of a mission to overcome national challenges could lead to a more holistic post-pandemic transformative recovery (some positive steps already taken include Colombia's 'Mission for the Wise' and Chile's National Green Hydrogen Strategy). This section considers some examples of how business-state relations evolved around issues of institutional innovation and reform in Latin America and how institutional change (or lack thereof) has impacted the region's competitive integration into the global economy.

As Navarro, Benavente and Crespi (2016) note, markets tend to produce a sub-optimal level of innovation, if left alone, which is why institutions to overcome coordination failures and asymmetric information are essential for tech-based entrepreneurship to flourish. Market-oriented reforms, such as privatisation, trade liberalisation or deregulation, are not enough to boost innovation. For example, the privatisation of Brazilian aircraft manufacturer, EMBRAER, opened opportunities for technology collaborations abroad and saw both product and process innovations, and these were the result of post-privatisation management's choices and strategies. Conversely, Mexico did not experience a jump in innovation from signing the North American Free Trade Agreement, because NAFTA's initial 'maquila' manufacturing model was based on cheap labour, not high technology nor innovation (Rullán & Casanova 2016). Subsequently, Mexican competitiveness did benefit from access to North American value chains, even more so in the context of rising trade tensions between the US and China. Thus, the evolutionary economics literature argues active industrial policy measures are important in fostering innovation, e.g. tax incentives for R&D, organising technology missions, supporting international technology collaborations, encouraging use of technology licensing, and fast-tracking entrepreneurial immigration (Alvarez, Benavente & Crespi 2019).

So, what are the institutions and instruments relevant to the NSI? Clearly, some can be seen as background institutions that shape the general political and economic context, whereas others directly involve instruments of innovation policy and activities. Also, institutions

could be characterised in terms of their impacts – effective or detrimental – on innovation and competitive integration of LAC into the global economy. Borrás and Edquist (2013) note that innovation institutions and instruments benefit from a holistic approach and these can occur across different levels of government. Also, there is no optimal mix, but rather it depends on the concrete problems and bottlenecks found in a particular national context. Often new policy instruments are more difficult to get off the ground than re-designing or adapting already existing ones.

There are four types of innovation system activities, including (i) provision of knowledge inputs (R&D, education and training); (ii) demand side activities (quality standards, public procurement); (iii) provision of innovation system constituents (organising networking activities; creating innovation focused organisations); and (iv) support services for innovative firms (incubation and start-up activities, financing of innovation and entrepreneurship). Some form of all these activities can be found in all the bigger economies of LAC, as discussed below. We also will see that not only the type but also the quality of institutions matters.

The cases of Brazil, Chile and Mexico are appropriate for considering the main challenges of implementing STI policies in a context of relatively inflexible and hierarchical institutions. We will also find that whereas key actors in the political economy recognise the general problem, they can be unwilling to take the necessary action because it might reduce their power and hurt their immediate short-term interests.

Brazil: Here the attitudinal and structural legacies of mature relatively successful inwardly-oriented ISI policies endured well past the market reforms and monetary stabilisation of the 1990s. Sometimes these legacies locked actors into inferior institutional arrangements that inhibited innovation and development. When President Luiz Inácio Lula da Silva (2003-2010) of the PT took office in 2003, he understood the tight macroeconomic constraints on his government and instead focused efforts on the microeconomy, putting in place institutions and policies that aimed to boost innovation. Although labels signalling industrial policy were still unfashionable, the focus on innovation was found to be acceptable. Hence, the two main policy statements emphasised innovation, technology and productivity: the *Política Industrial, Tecnológica e de Comércio Exterior*/Policy for Industry, Technology and Foreign Trade (PITCE) announced in November 2003 and the *Plano de Desenvolvimento da Produção*/Production Development Plan (PDP) announced in May 2008. They were complemented with two key pieces of legislation: *Lei de Inovação/* Innovation Law (Law 10,973/2004) and the *Lei do Bem*/The Good Law (Law 11,196/2005). The latter incentivised investment in STI and provided tax benefits and other support to encourage business innovation to increase productivity and competitiveness. These policies were backed by public financing from mainly BNDES and the Funding Authority for Studies and Projects (FINEP). During the Lula years, institutional support for innovation received strong government backing, and inter-agency coordination improved. Although the policy statements and legal instruments were new, they often made use of layering and conversion forms of institutional change to get early results (e.g. the shifting focus of BNDES and FINEP financing from public to private sector projects as well as boosting funding and capabilities in university-led R&D).

The PT governments were well aware of the need to engage potential veto players constructively to win business backing. Various consultative mechanisms and bodies were set up to create supportive coalitions around productivity- and competitiveness-enhancing objectives. Two key new state organs: the *Conselho Nacional de Desenvolvimento Industrial*/National Industrial Development Council (CNDI) and the *Conselho de Desenvolvimento Economico e Social*/ Economic and Social Development Council (CDES) were specifically set up to institutionalise arenas of public-private consultation on economic matters (Doctor 2007). In addition, the *Agência Brasileira de Desenvolvimento Industrial*/Brazilian Industrial Development Agency (ABDI) worked towards better coordination between government, business and regional trade partners. The ABDI and CNDI were particularly important in providing the necessary strategic overview and inter-bureaucratic coordination as well as establishing links within business and civil society.

With respect to identifying strategic options (software, semi-conductors, capital goods and pharmaceuticals) and key technologies of the future (bio-technology, nano-technology, renewable energy), the PITCE tried to avoid past industrial policy practice of targeting specific firms and/or picking winners. The government recognised the need to concentrate efforts on sectors that were knowledge intensive and/or could generate valuable spillovers into others of importance to economic growth and citizen welfare. For example, the capital goods and information technology sectors had clear links to infrastructure (policies for energy, logistics, telecommunications, etc.). Similarly, pharmaceuticals had important links with health policy. EMBRAPA was key to fostering innovation in and the competitiveness of Brazilian agricultural sector exports. All the same, many research institutes linked to these sectors often were not driven by market demand for their research and technological innovations, and hence often found low interest in commercialisation of their ideas and innovations (e.g. dos Santos et. al. (2012) found that for EMBRAPA Agrobiology about 40% of research demands originated in the government/public sector and only 9.1% from the market/private sector).

Brazilian business associations also took up the call for developing a NSI and encouraging technological upgrading and competitive integration, e.g. the National Confederation of Industry (CNI) periodically publishes a report comparing Brazil to some 17 other economies in terms of various measures of competitiveness (see CNI 2020). However, it would be erroneous to think that innovation and an effective NSI were a purely positive sum game. An innovation-driven industrial strategy could actually destroy some skills and competencies, aggravate income polarisation and employment problems in the short and medium term, and re-distribute power in ways that may not be perceived of as equitable by the market and/or society.

Brazil seemed to have found an attractive niche for active intervention in the area of technology development and innovation in the first decade of the 21st century (Diniz 2011). It also seemed to benefit from a history/institutional legacy of deliberative councils (Schneider 2010). However, both policies and councils often suffered from funding difficulties, personnel deficiencies and institutional coordination issues. It left them vulnerable to charges of too much rhetoric, insufficient action and paltry results. Also, given continuing low investment in

R&D, business remained far from convinced about adopting a long-term productivity and innovation-led approach. Their rather instrumental engagement in these councils and innovation-focused policies meant that once recession hit Brazil in late 2014, the many efforts towards developing a stable NSI took a backseat or were completely abandoned. Nonetheless, in the run up to the 2018 elections, the CNI (2018) published its wish-list agenda for the next government. As usual, innovation, education and training, infrastructure and competitiveness were issues that were raised in the document, but there was also emphasis on environment and sustainable development.

Here again, the state should have had a central role in minimizing the deleterious effects of these problems. However, this would require it to strengthen its institutional presence and capabilities for which there seemed neither appetite nor resources once recession hit Brazil. Moreover, entrepreneurs and enterprise managers had failed to do their part in moving towards a technological innovation inspired strategy in the boom years. It is the short-termism (of both political and economic actors) and the far from embedded nature of public-private coordination on STI issues that lie at the heart of the institutional challenges facing innovation and productivity rises in Brazil (and more widely in LAC too).

Chile: although Chile had a head-start in implementing neo-liberal reforms compared to the rest of Latin America, in many ways this hampered it developing institutions with a mindset of engaging in industrial policy. Moreover, its R&D spending and innovation profile have not fared better than elsewhere in LAC. If anything, R&D spending has remained uncomfortably stable at a low 0.4% of GDP for decades (Alvarez et. al. 2019). Also, Chile lagged in taking advantage of its competitive and dominant position in resource-based export sectors, such as copper, to develop backward and/or forward value chains. For example, it is only recently that a local mining goods and services industry is starting to take shape. The first move came from private mining company BHP, when it set up the World Class Supplier Program in 2008 (see Anzolin 2021 for details). It is only thereafter that the long-standing *Fondacion Chile*/Chile Foundation and CORFO became involved in the project with the aim of fostering innovation and exports by encouraging creation of spin-off companies to develop local mining services and equipment suppliers. The initial format of the programme left all the risk to the small firms, but in 2017 a revised version with state support required more commitment (and risk taking) from the big mining companies. This initiative became the Open Innovation Program in Mining, which also received additional support from CORFO. Subsequently, the Mining and Development Commission of Chile noted that its objective was to create 150 local suppliers in the mining sector and exports of US$ 10 billion by 2035 (Anzolin 2021). Chile's innovation agency, Innova, is also active in supporting other initiatives such as 'Start Up Chile' to fast track immigration for those bringing knowhow and boosting the domestic entrepreneurial culture.

Another bottleneck was the shortage of skilled human resources and it was clear that more needed to be done to boost supply of both specific human capital development courses at university level but also for worker vocational training. A Mining Skills Council was set up, and a general review of education policies with the aim of supporting national development needs remained high on the government agenda. The national student strikes that have

occurred repeatedly over more than a decade point to the same problem, although coming at the issue from a social justice and equitable access argument. The education system is not fit for purpose, if the purpose is sustainable and inclusive development fostered by a culture of innovation and human development.

As such, the Chilean case shows the importance of not just designing and implementing human resource related policies, but also wider complementary policies related to sector regulation, sustainability and green growth, R&D support, innovation financing, and inclusive access to technical and higher education. It also points to the importance of distributional issues in the wider economy, not least the coalitions of power that block a root and branch reform of both formal and informal institutions that need to be in place to build up the NSI. Chile's efforts to write a new constitution could be viewed as a step in the right direction.

Mexico: Government and business leaders have shown growing awareness of the importance of innovation to further Mexican competitiveness as well as successful integration into GVCs. R&D spending has remained stubbornly low at around 0.5% of GDP. After the launch of Mexico's neoliberal reform programmes in the 1980s and regional integration efforts in the 1990s, the National Council for Science and Technology (CONACYT) organised efforts at boosting innovation and the knowledge economy in Mexico. Although CONACYT was created in 1970, its modern iteration emerged after a restructuring in 2002 as part of the new Science and Technology Law. It also set up a National Conference on Science and Technology, which includes representatives of state governments working alongside CONACYT. The latter is also involved in supporting a number of research centres and has prioritised graduate programmes in engineering, science, manufacturing and construction. In 2013, it helped launch the Mexican Energy Innovation Centres (CEMIE) for R&D in bio-energy, geo-thermal, solar and wind energy.

In 2012, in recognition of the importance of boosting innovation, Mexico launched a 25-year Special Programme for STI (PECiTI). At the time, only 5% of Mexican businesses conducted any R&D activity. PECiTI is updated every three years to reflect evolving conditions in global and local markets. Run in four phases, it identified six main strategies for STI contributing to Mexico's social and economic development objectives, including raising R&D spending to 1% of GDP, improving human capital formation, better links between stakeholders in the NSI both national and local (see Rullán & Casanova 2016 for more details). The programme is presented as a horizontal industrial policy, although biosecurity is the one area that gets special mention.

Crucially, Mexico's most influential business association, the *Consejo Mexicano de Hombres de Negocios*/Mexican Council of Businessmen (CMHN), was made up of the top businesspeople representing national industry but with no representation of the many foreign investors operating in the country. The role of CMHN in policy-making is debated in the literature (Schneider 2004), but undoubtedly their connection to government, both individually and collectively, was central to ensuring only incremental institutional change in the orientation of economic policy-making. The fact it did not have representatives of transnational corporations (TNC), meant the exclusion of the very firms most likely to create

backward and forward linkages for Mexican production in GVCs. On the other end of the spectrum was the need to foster innovation in small and medium enterprises (SMEs), including potential suppliers to the TNCs. Governments increasingly recognised that local efforts fostering innovation for social inclusion and targeting SMEs were essential ingredients for success (e.g. the Innovation Incentive Programme for SMEs (PEI).

Mexico has gradually created a science and technology platform based on setting up public agencies specialised in R&D, formation of scientific communities and research centres, political institutions to coordinate and promote a NSI, legislation and regulatory structures that boost private sector STI investments. All the same, Mexico has been extremely slow in managing to boost private sector R&D efforts in collaboration with universities, leaving the nascent NSI rather lopsided. It has also much to do to establish conditions where R&D is converted into commercial applications (Feria & Hidalgo 2008), not to mention creating more good quality jobs that could support the economy's emergence from the middle-income trap.

The empirical details of the three cases allow a comparison of the institutional features of Latin American innovation systems. Typically, LAC economies take a national level and top-down approach to setting STI policies, even though research institutes might be territorially dispersed, and education and training are often in the hands of sub-national levels of government. The evidence also suggests that LAC governments are eager to develop a culture of innovation and competitive integration into the global economy with all having various STI policies to support these aims. Although they adopt the language of a 'mission approach', institutional change in STI policy has tended to be incremental with layering and conversion featuring heavily. Also, after years of neoliberal market prescriptions being hammered home, many governments remain wary about anything that could be labelled 'industrial policy'. Overcoming this mindset (partly due to a crude understanding about the NSI approach itself) is one of the biggest challenges related to innovation in the region.

LAC economies show heavy reliance on public sector resources (finance and personnel) for generating technological advances, even in a context of restricted or dwindling fiscal space. Public policies related to tax, intellectual property, research infrastructure, human resources, etc as well as bureaucratic efficiency of running these policies often are noted as weaknesses across the region. Official reports and the academic literature also suggest that problems often arise in policy execution – not just due to weak government coordination and follow up on policies, but also due to the impacts of institutions that are harmful for successful innovation, most notably corruption (sometimes even referred to as 'institutionalised crime') as well as fluid interpretation of the law (often benefiting vested interests and/or potential veto players).

The region's firms also share many features with respect to innovation. Oligopolistic market structures, strong presence of TNCs in key sectors, short-term mindset informed by a history of economic volatility as well as low business confidence also hinder firms from committing resources to investment in R&D and innovation. Extractive institutions that favour rent-seeking behaviour and informal particularistic access to the state further limit incentives for innovation. The low uptake of publicly funded research and technological development is a

puzzling feature that repeatedly shows up across LAC, where there seems to be little coordination between business innovation needs and university researchers' efforts and outputs. The triple helix discussed in the NSI literature rarely consolidates in the region. Other chapters in this volume discuss various country case studies in more detail.

Lessons for Emerging from the Middle-Income Trap

The above discussion should have called attention to the significance of these institutional failures and how some of the key issues also feed into the middle-income trap. Perhaps most important is the inadequate level of education and human capital formation, with a special focus on STI related areas. Latin America's focus on natural resource-based integration into the global economy, which requires relatively few high skilled workers, has discouraged investing in human capital development. The region's over-reliance on investment from TNCs for developing higher-tech production has seen national innovation-led activities given relatively low priority, which further reduced opportunities for higher skilled (and higher paying) jobs. The elevated levels of income inequality and minimal level of social cohesion has meant that institutions that foster inclusive development policy, although urgently needed, take a back-seat in the minds of political and economic elites.

The analysis also pointed to the issue of how institutional frameworks set up for conditions of inwardly-oriented development and pre-globalisation patterns of international trade are not conducive to managing participation in an innovation-driven and knowledge-intensive global economy. Competitive integration into global markets is most likely to drive improved outcomes in terms of rising productivity, income and standards of living and eventually to more inclusive forms of social and political engagement. However, this requires sustained investment in human capital formation as well as public-private coordination on institutions and policies that support good governance. Most multilateral development agencies pay little attention to cleavages in the business community (foreign-owned vs domestic-owned; large conglomerates vs SMEs), but these are key to understanding the potential for creation of coalitions that might support the necessary institutional change and policy reforms (Doner & Schneider 2016). The fragmented production structure also makes it difficult to create social cohesion around collective development objectives, including policies that could help LAC emerge from the middle-income trap.

Where political elites face polarised societal actors (whether divided labour or divided business sectors), they are much more able to block processes of institutional reform. It also makes it easier to entrench rent-seeking and draw on their long-standing privileges. However, their powers do not extend to control over the direction of institutional change. On the one hand, these elites struggle to keep up with the shifting coalitions and distributional negotiating strategies of often polarised societal actors. On the other hand, those favouring institutional modernisation might find that relying on modes of institutional change that do not directly challenge the status quo supporters might be the only way forward. However, relying on layering, drift and conversion in the absence of wholesale

systemic structural reform can be a highly resource-consuming (time and money) way of achieving higher productivity, better innovation and deeper global economic integration outcomes. The extensive negotiations required to win over opponents, but also ambivalent or opportunist actors, often delay change and jeopardise more inclusive and sustainable development outcomes. They also contribute to holding economies captive in the middle income trap.

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