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TRADE CREDIT IN SMEs:

EVIDENCE FROM EAST ASIA AND THE PACIFIC

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Abstract

Using a sample of 1,509 non-financial listed small and medium-sized enterprises (SMEs) from nine countries or territories located in East Asia and the Pacific – China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore, and Hong Kong - during the period from 2010 to 2016, this thesis investigates trade credit in SMEs by conducting three empirical studies.

The first study investigates whether there is a non-linear association between trade credit and profitability of SMEs. The result reveals that trade credit has an inverted U-shaped relationship with profitability. That is, there is an optimal level of trade credit where firms can maximise profitability. Moreover, the study examines whether the optimal level of trade credit varies according to the level of financial constraints of SMEs. The finding indicates that less financially constrained firms have a higher optimal level than more financially constrained firms.

The second study examines the role of national culture – an important informal institution – in the variations in trade credit usage of SMEs across different countries. This study finds that Hofstede's cultural dimension of collectivism has a positive association with trade credit receivable and a negative association with trade credit payables. Besides, uncertainty avoidance has a negative association with trade credit receivable and trade credit payable. Moreover, ability of access to short-term bank credit and level of cash holdings are more important for trade credit decisions in countries with a high level of collectivism and a low level of uncertain avoidance.

The third study investigates whether there is an association between trade credit provision and inventory investment. This study finds evidence that trade credit provision has a negative relationship with inventory investment. Moreover, the study shows that the strength of this association varies according to firms' characteristics, namely changes in sales, market power and financial constraints.

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Publications and Conferences

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CHAPTER 1 - INTRODUCTION

1.1. Background

Working capital management, which is an important aspect of corporate finance, focuses on short-term financial decisions. In particular, it is concerned with the management of the balance between current assets and current liabilities of an enterprise in order to ensure that it has sufficient cash flow to meet its short-term debt and operating expenses (Haley & Schall, 1977; Pass & Pike, 1984; Van Horne & Wachowicz, 2008). Hence, the efficiency of working capital management is a challenge for firms' day-to-day operations and also needs to be carefully analysed because these short-term decisions affect profitability, risk and the success of firms (Smith, 1980; Filbeck & Krueger, 2005).

The importance of working capital management has been investigated in financial literature by demonstrating the influence of working capital management on firm performance (Jose et al., 1996; Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Ebben & Johnson, 2011; Nobanee et al., 2011; Baños-Caballero et al., 2012; Knauer & Wöhrmann, 2013; Baños-Caballero et al., 2014; Enqvist et al., 2014; Ukaegbu, 2014; Wasiuzzaman, 2015; Afrifa, 2016). In general, most of those studies analyse the efficiency of working capital management by using the cash conversion cycle (CCC), which is measured by the difference between current assets and current liabilities, in which accounts payable are particularly relevant to current liabilities, while accounts receivable and inventory typically constitute a vital proportion of current assets. This ratio reflects how long firms take to convert inventories, accounts receivable and accounts payable into liquid cash (Mutua Mathuva, 2014). A shorter CCC indicates higher efficiency of working capital management because it reflects that the firms are collecting receivables as quickly as possible and delaying payments to suppliers as much as possible (Nobanee et al., 2011). In this sense, previous studies consider working capital as an important component of cash flow from operations. Hence, they evaluate the efficiency

of working capital management based on analysing its liquidity rather than focusing on the efficiency of investment in its individual aspects, such as accounts receivable, inventories and accounts payable.

Among the three components of working capital management, accounts receivable and accounts payable account for a large portion of firms' assets and liabilities respectively (Preve & Sarria-Allende, 2010). For example, by using 1986 Compustat data, Mian and Smith (1992) show that accounts receivable make up 21 percent of total assets of U.S corporations. Recently, Molina and Preve (2009) report that the ratio of accounts receivable to assets is 18 percent by using a sample from Compustat that covers the 1978-2000 period. Deloof (2003) also reports that 17 percent of total assets of Belgian firms is accounts receivable. A research study by García-Teruel and Martínez-Solano (2007) also found that current asset made up 69 percent of Spanish firms' total assets, while their current liabilities represent more than 52 percent of total liabilities. Accordingly, a high proportion of both accounts receivable and accounts payable in relation to total assets and total liabilities means that management of these two accounts is very important in working capital management.

The definition of accounts receivable and accounts payable stems from the transactions of firms (Preve & Sarria-Allende, 2010). Firms usually allow their customers to delay payment by selling their products on trade credit rather than require immediate payment for delivered goods and services (El Ghoul & Zheng, 2016). When a firm is viewed as a buyer, trade credit represents accounts payable or trade credit payable which is a source of financing borrowing from its supplier that is classed under current liabilities on the balance sheet (García-Teruel & Martínez-Solano, 2010a). Meanwhile, when a firm is viewed as a seller, trade credit represents an investment in accounts receivable or trade credit receivable (García-Teruel & Martínez-Solano, 2010a) . That is, trade credit is provided by firms to their customers.

The literature explains the advantages of the use of trade credit for sellers and buyers from operational, commercial and financial perspectives. First, from an operational perspective, trade credit reduces transaction costs and provides more flexibility to respond to variations in demand (Ferris, 1981; Emery, 1987). Second, from a commercial perspective, trade credit can be used as a mechanism of price discrimination in order to stimulate sales by modifying the period of credit or the discount for prompt payment (Brennan et al., 1988; Petersen & Rajan, 1997). Moreover, it allows firms to maintain long-term relationships with customers (Ng et al., 1999) and to offer quality guarantees to buyers by giving them time to assess product quality before paying (Smith, 1987; Lee & Stowe, 1993; Long et al., 1993). Finally, as regards a financial perspective, firms with difficulty accessing bank financing have greater access to funds from firms with better access to the credit market and with lower costs, as a result of the commercial creditor's comparative advantages in the evaluation and control of credit risk (Schwartz, 1974; Emery, 1984; Mian & Smith, 1992). Furthermore, trade credit transmits information about the borrower's creditworthiness to the credit institution, and hence it helps firms to obtain bank financing (Biais & Gollier, 1997). In this sense, trade credit may be used by less creditworthy and constrained firms to mitigate moral hazard problems (Burkart & Ellingsen, 2004), acquire reputation and alleviate adverse selection (Petersen & Rajan, 1997).

Trade credit is particularly important for small and medium-sized enterprises (SMEs), which have limited access to the capital market, low market share, less bargaining power (Petersen & Rajan, 1997; Martínez-Sola et al., 2014). They need to use trade credit in order to overcome financial constraints, to stimulate sales and to guarantee the quality of the products they sell (García-Teruel & Martínez-Solano, 2010c). Previous studies have shed light on the importance of trade credit for SMEs because it impacts their performance and survival. Using data for 11,337 Spanish SMEs during 2000-2007,

Martínez-Sola et al. (2014) show that granting trade credit increases their profitability. Recently, McGuinness et al. (2018), using data for 202,696 SMEs across 13 European countries over the period 2003- 2012, find that receipt of more trade credit has a positive association with the survival of SMEs because it decreases the likelihood of financial distress for these firms significantly. More importantly, trade credit helps many financially constrained SMEs survive during the post-crisis year.

Moreover, numerous studies show that trade credit is an important source of finance of SMEs because it helps them to deal with their financial problems, especially in periods of crisis. Nilsen (2002) shows that small firms increased trade credit as a substitute and less desirable alternative when banks restricted loans over the severe 1979-1982 recession in the USA. Carbó-Valverde et al. (2016), based on use a sample of Spanish SMEs provide evidence that credit-constrained SMEs depend on trade credit, but not bank loans, and that the intensity of this dependence increased during the financial crisis. That is, Spanish SMEs suffered from a significant credit crunch during the crisis, and hence those firms used more trade credit as an alternative source of external finance. Moreover, McGuinness and Hogan (2016) also confirm that trade credit acted as a substitute for bank finance in Irish SMEs, in the aftermath of the financial crisis of 2008. With regards to cross-country studies, Casey and O'Toole (2014) have found that credit-rationed SMEs were more likely to apply for trade credit in the period between 2009 and 2011 across 11 European countries. Recent, a study by Palacín-Sánchez et al. (2019) suggests a substitutive relationship between trade credit and bank credit in SMEs operating across 12 countries of the European Union over the period 2008-2014. This finding explains that SMEs can solve a fall in bank credit by obtaining more financing from suppliers. In addition to reliance on trade credit increasing when firms face difficulties in obtaining bank financing, Agostino and Trivieri (2014), based on micro-data for Italian SMEs in the years 1998-2006, find that the availability of suppliers' credit might be crucial to

boosting access to bank financing for SMEs. Indeed, trade credit can provide information content for banks, especially when the latter do not have adequate information on SMEs in the early stages of bank-firm relationships.

From the studies cited above, the majority of studies on the importance of trade credit in SMEs focus on countries in the USA, and countries in Europe, while the research of this sort for countries in East Asia and the Pacific is more scant. According to Asian Development Bank (2014), East Asia and the Pacific experienced rapid economic growth. In particular, the GDP growth of this region was 4.198 % in 2018 compared to other regions, such as Europe and Central Asia (2.138 %), Middle East and North Africa (1.482%), and Latin America and Caribbean (0.499 %) (The World Bank, 2018a). Second, East Asia and the Pacific has the highest number of SMEs compared to other regions. For example, in the developing world, this region has the highest number of formal SMEs with 11.2 to 13.7 million in 2011, followed by Sub-Saharan Africa with 3.5-4.3 million, Latin America and the Caribbean with 3.1-3.7 million, Europe and Central Asia with 2.8 - 3.4 million, and Middle East and North Africa with 1.9-2.3 million (Stein et al., 2013). The number of SMEs in East Asia and the Pacific is higher than other regions because of the reformation of business enabling environment in this region (BEE). According to The Donor Committee for Enterprise Development (DCED, 2008), the BEE was an interplay of policy, legal, institutional, regulatory and physical conditions to create a more effective environment for investment and business development. For example, the system of business licensing is a major entry barrier for SME in many countries (Abe, 2012). As licensing is a key potential bottleneck in starting a business, the gains from licensing reforms stand to be significant. Singapore is one of the Asia-Pacific countries have greatly benefited from resolving with this bottleneck. In particular, this country further reforms the business environment by making an easier process of operating and starting a business

and improving the banking system and permit attainment procedures (Abe, 2012). They conduct the online procedures for the business start-up to reduce the process to three days.

Third, importantly, SMEs have constrained access to external financing and hence they face a lack of finance for their growth (García-Teruel & Martínez-Solano, 2007). This financial constraint stems from the asymmetric information between the firm and the capital markets (Banos-Caballero et al., 2014). Insufficient information lowers the market's assessment of firms and hence, it raises the firms' credit rationing. SMEs face great hurdles in accessing formal finance in economies around the world, but the challenge is the greatest in East Asia and the Pacific. According to Stein et al. (2013), 17 million formal SMEs worldwide reported that their demand for financial access was underserved or unserved by the formal financial sector in 2011, with 8 million of these located in East Asia and the Pacific. Recently, SME Finance Forum (2018) also indicates that the number of financially constrained SMEs in East Asia and the Pacific in 2018 is the highest with 8.2 million, while those in European and Central Asia, Latin America and Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa are 0.2 million, 0.14 million, 0.02 million, 0.44 million, and 0.46 million respectively. Accordingly, the demand for financing in SMEs in East Asia and the Pacific is very large and hence trade credit could be an important source of finance of SMEs in this region. According to Enterprise Surveys (2015), SMEs in East Asia and the Pacific use trade credit provided by suppliers as one of the important sources of finance for investment projects. In particular, the proportion of purchases of fixed assets financed by suppliers' credit was 2.2% in 2015 while proportion of purchases of fixed assets financed from bank loans was 6.2%. Thus, management of trade credit is essential for SMEs in this region.

Given the discussion above, it is interesting to examine the context of trade credit in SMEs in East Asia and the Pacific in this thesis.

1.2. Research Questions

This thesis carries out three empirical studies. First, this study starts with demonstrating the association between trade credit and firm profitability. The previous literature indicates that trade credit has a linear association with firm profitability (Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Kestens et al., 2012; Martínez-Sola et al., 2014; Abuhommous, 2017). However, evidence on this linearity can be divided into two opposite camps. One camp shows that trade credit and firm profitability has a positive association, while the other indicates that this association is negative. This suggests that trade credit has a non-linear rather than a linear relationship with firm profitability. Some existing studies are demonstrating a non-linear relationship between firms' investment in working capital and firm profitability (Baños-Caballero et al., 2012; 2014; Mun & Jang, 2015; Afrifa & Padachi, 2016). However, those studies only concentrate on working capital management in general, rather than emphasizing individual components of working capital management. According to Deloof (2003) who indicates three individual components of working capital management, including account receivables, account payables, and inventory, this study will focus on the first two components.

To the best of the author's knowledge, no study has demonstrated the non-linear association between trade credit and firm profitability in the East Asia and Pacific context. In contrast, only a few studies on this non-linear association have been undertaken in developed countries, such as Spain (Martínez-Sola et al., 2013b), Portugal (Pais & Gama, 2015), and Norway (Lyngstadaas & Berg, 2016). Those studies also show some limitations. Martínez-Sola et al. (2013b) demonstrate the U-shaped relationship between trade credit and firm value rather than firm profitability. Moreover, their research only focuses on large firms rather than SMEs. However, trade credit is of particular importance to SMEs because they have constrained access to external finance (Petersen & Rajan, 1997). The use of trade credit allows SMEs greater access to funds because of the

comparative advantage of commercial creditors in the control and evaluation of credit risk (Schwartz, 1974; Emery, 1984). Thus, financial constraints faced by SMEs play a key role in trade credit investment decisions. Furthermore, a study by Martínez-Sola et al. (2013b) only focuses on investment in accounts receivable, and neglect accounts payable. Pais and Gama (2015) and Lyngstadaas and Berg (2016) indicate a non-linear relationship between trade credit and SMEs' profitability but their research suggests that the association between these two variables is convex rather than concave. Given the limitation of previous studies, the first empirical study aims to address those limitations by considering the following research questions:

- Is there a U-shaped relationship between trade credit receivable and SMEs profitability?
- Is there a U-shaped association between trade credit payable and SMEs' profitability?
- Is there the level of financial constraints of SMEs affect the U-shaped association between trade credit receivable and SMEs' profitability?
- Is there the level of financial constraints of SMEs affect the U-shaped relationship between trade credit payable and SMEs' profitability?

Second, after demonstrating the relationship between trade credit and firms' profitability, the second empirical study investigates the determinants of trade credit in SMEs across different countries. Some previous studies focus on the firm-level factors that impact trade credit in SMEs, such as cash flow, leverage, assets turnover, profitability, among others (Huyghebaert, 2006; Niskanen & Niskanen, 2006; Rodriguez-Rodriguez, 2006; García-Teruel & Martínez-Solano, 2010a; 2010b; 2010c). Meanwhile, others emphasise country-specific factors, especially the institutional differences among countries in terms of the development level of the banking system and the legal infrastructure (Demirgüç-Kunt & Maksimovic, 2001; Andrieu et al., 2018). However, those factors do not fully explain the variation in trade credit among countries.

There is an important "missing piece" that needs to be considered, namely national culture. According to institutional theory, groups or organizations conform to the rules and norms of the institutional environment to better secure their positions and legitimacy (Meyer & Rowan, 1977). In this theory, culture is considered as an institution that shapes appropriate actions for organizations (Bruton et al., 2010; Lee & Kramer, 2016a). In this sense, DiMaggio and Powell (1983) state that organizations become similar to the national culture in which they are embedded – and to one another as a result – as they seek legitimacy in a given cultural environment. In the line with institutional theory, the previous studies (Hofstede, 1980; Schneider & De Meyer, 1991; Johns, 2006) emphasize the constraining forces that national cultures impose on organizational cultures, and hence between-cultural variance should be considered as a determinant of organizational culture. These arguments focus on institutions, processes, forces that are external to the organization and which may demand policies leading toward strict alignment of organizational culture to the national culture through transmission, resistance, and maintenance to change (Zucker, 1977). According to Schwartz (1994) and Hofstede (2001), national culture involves a set of beliefs and the attitudes of all organizational members. Also, it shapes the behaviour of individuals within organizations, including entrepreneurs who are key decisions makers and orient the strategy of SMEs (Kreiser et al., 2010). Hence, cultural differences among societies could impact managerial decisions making.

In line with the fundamental role of culture, Williamson (2000) proposes a four-level framework of economic and social analysis in which informal institutions national culture, including norms and customs, form the first tier of the informal institutions. The formal institutions such as creditor rights in tier 2, corporate governance structure in tier 3, and actual firms' decisions in tier 4. Based on this framework, creditor rights at tier 2 can impact on the firm decisions, namely trade credit at tier 4. According to Houston et al.

(2010), strong creditor rights grant more power to creditors in bankruptcy, which allow them to grant more credit. This factor is considered in a study by Demirgüç-Kunt and Maksimovic (2001), who find that in countries with strong creditor rights, financial intermediaries are more willing to provide financing to firms, which are, in turn, able to offer trade credit to their customers and decrease the use of trade credit from suppliers. Moreover, according to framework of Williamson (2000), the national culture at the highest level impose constrains top-down, which implies that culture has direct and indirect impact on firms' decision-making. Thus, the second empirical study answers the following questions:

- Is there a direct influence of the national culture on the variations in trade credit usage of SMEs across countries?
- Is there an indirect effect of the national culture on the variations in trade credit usage of SMEs across countries?

Finally, the extensive studies about trade credit provision in SMEs have focused on two main perspectives. One explains the influence of trade credit provision on the profitability of SMEs (Fisman & Love, 2003; Hill et al., 2012; Kestens et al., 2012; Ferrando & Mulier, 2013; Martínez-Sola et al., 2013b; Hoang et al., 2019). The other attempts to provide empirical evidence on the determinants of trade credit extension in SMEs (Nadiri, 1969; Long et al., 1993; Petersen & Rajan, 1997; Ng et al., 1999; Ono, 2001; Cheng & Pike, 2003; Summers & Wilson, 2003; Pike et al., 2005; Huyghebaert, 2006; Niskanen & Niskanen, 2006; Ge & Qiu, 2007; García-Teruel & Martínez-Solano, 2010b). In general, although the previous empirical literature demonstrates the importance of trade credit extended to customers in the operations of firms, there has been little discussion about the influence of trade credit extension on inventory management. A few papers tried to link these two variables by demonstrating the effect of inventories on trade credit provision (Bougheas et al., 2009; Mateut et al., 2015). Their findings

support the view that firms with higher inventories have a stronger incentive to enhance their sales by selling their goods on trade credit. In other words, the findings consider trade credit as a tool to promote more sales. However, trade credit also brings an advantage to the seller in inventory management from providing trade credit to buyers. In particular, the benefit is that selling firms may extend trade credit to customers to minimise inventory costs. Hence, the first research question of the third empirical study is presented as follows:

- Is there an influence of the trade credit provision on inventory investment in SMEs?

Moreover, Petersen and Rajan (1997) and Martínez-Sola et al. (2014) indicate that offering trade credit to customers depends on three main characteristics of firms, namely changes in sales, market power, and ability of access to financial markets. Thus, the third study links those characteristics with the association between trade credit provision and inventory management through the following questions:

- Is there an influence of changes in sales on the association between trade credit provision and inventory investment in SMEs?
- Is there an impact of market power on the relationship between trade credit provision and inventory investment in SMEs?
- Is there an influence of ability of access to financial markets on the association between trade credit provision and inventory investment in SMEs?

1.3. Methodology

This research uses panel data analysis or longitudinal analysis to test the relationship between the various variables. This is a form of multivariate analysis that allows investigation of more than one unit (individual, company, country, etc.) over different periods (days, weeks, months, or years). This study uses panel data analysis because of its benefits. Hsiao (1986) points out the following advantages of this method.

First, panel data gives the researcher a larger number of data points (observations), which increases the efficiency of the econometric estimations as well as the degree of freedom and reduces the collinearity between the explanatory variables (Hsiao, 1986). Second, panel data allows researchers to construct and test more complicated models. Baltagi (2008) states other advantages of panel data analysis. First, panel data gives more informative data, more variability, more efficiency, and more degrees of freedom. Second, it controls for heterogeneity. Third, it helps to eliminate the biases of aggregation by gathering in micro-units such as individuals, firms and countries. Brooks (2008) lists two advantages of the use of panel data. First, panel data combines time-series and cross-sectional data, and hence, it will increase the degrees of freedom and enhance the power of the test. Moreover, by the combination of time series and cross-sectional data, panel data reduce multicollinearity between variables. Second, the panel models can help researchers to remove the effect of omitted variables bias from the regression results. Gujarati (2003) indicates the benefits of panel data. Panel data will increase the efficiency, reduce the collinearity, increase the degree of freedom, and make the data more informative because it combines time-series and cross-sectional data. It is better for measuring and detecting the effects of research variables compared to cross-sectional data.

1.4. Key findings and Research Contribution

As explained above, this research includes three empirical studies in order to shed light on the area of trade credit in SMEs and to provide further insight to fill the gaps in extant literature. Hence, it enhances the literature and provides implications for practitioners. The first empirical study (Chapter Two) examines whether there is a non-linear relationship between trade credit and profitability of SMEs and whether the financial constraints of SMEs impact this association. This study confirms that both aspects of trade credit, including trade credit receivable and trade credit payable, have an inverted U-shaped relationship with SMEs' profitability. This means that there is an

optimal level of trade credit where firms can attain a balance between benefits and costs to maximise their profitability. Moreover, the financial constraints of SMEs significantly influence the U-shaped relationship between trade credit and profitability. In particular, our empirical results provide evidence that less financially constrained firms have a higher optimal level of trade credit than more financially constrained firms. These findings of this study contribute to the existing literature as follows. First, it offers new evidence that the influence of trade credit on firms' profitability is non-linear rather than linear. Besides, this study demonstrates this association for both aspects of trade credit, namely trade credit receivable and trade credit payable. Finally, this study suggests that the relationship between trade credit and SMEs' profitability differs between less financially constrained firms and more financially constrained ones.

The second empirical study (Chapter Three) examines whether cultural difference can directly influence variations in trade credit usage of SMEs across different countries and whether national culture can indirectly influence variation in trade credit receivable and trade credit payable across countries through the use of short-term bank credit and cash holdings. By employing Hofstede's culture dimensions, the findings of this study affirm that two dimensions of national culture, namely collectivism and individualism, have a significant and direct association with the use of trade credit of SMEs across countries. Besides, these two dimensions also have effects on trade credit through their effects on short-term bank credit and cash holdings. These findings of this study make a number of contributions to the existing literature on trade credit as follows. First, this study suggests that national culture is an important determinant of variation in trade credit in SMEs across countries. Second, this study extends the literature about the impact of national culture on financial decision-making in SMEs by providing evidence of the impact of national culture on trade credit. Third, this study extends the study by El Ghoul and Zheng (2016) by demonstrating the relationship between national culture and trade

credit in SMEs and considering their trade credit under two aspects, namely, provision of trade credit (suppliers) and receipt of trade credit (customers). Finally, this study shows that national culture not only has a direct effect on trade credit but also has an indirect effect on trade credit through its influence on short-term bank credit and cash holdings.

The third empirical study (Chapter Four) examines whether the influence of trade credit provision on inventory management in SMEs and whether the characteristics of the SMEs, namely changes in sales, market power and ability's access to financial markets, impact on this association. The finding of this study shows that trade credit provision has a negative association with inventory investment in SMEs. In particular, SMEs will decrease inventories when they offer more trade credit to customers. Moreover, firms with a high change in sales, a high market power and a low level of financial constraints will receive more benefits from trade credit provision than their counterparts because trade credit helps the former to decrease inventories more. The findings of this study provide a number of contributions to the existing literature as follows. First, this study provides evidence that trade credit provision can be seen as an important factor that impacts on inventory investment. Second, this study supports the study by Emery (1986) who follows a transaction costs approach to develop a theory of passing trade credit to customers in inventory investment but does not provide empirical evidence to demonstrate this association in SMEs. Third, to the best of the author's knowledge, this study contributes to previous studies on trade credit in SMEs by demonstrating the important role of provision of trade credit to inventory management in SMEs. Finally, this study demonstrates that the association between trade credit provision and inventory management varies according to characteristics of firms, namely the changes in sales, market power and ability to access the capital market.

1.5. Outline of the Thesis

The structure of this thesis is organised as follows:

Chapter Two is titled *Trade credit, corporate profitability, and financial constraints*. Using a sample of 1,509 non-financial listed SMEs from nine countries or territories located in East Asia and the Pacific – China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore, and Hong Kong- over the period from 2010 to 2016, the study documents a concave relationship between trade credit and firm profitability. Moreover, it highlights the change of this association according to the level of financial constraints of SMEs.

Given that the important role of trade credit in firms' profitability is shown by the findings from Chapter Two, Chapter Three examines what determines trade credit in SMEs. In particular, this chapter investigates the influence of national culture on variations in trade credit across countries. Like Chapter Two, this chapter uses a sample of 1,509 non-financial listed SMEs from nine countries or territories in East Asia and the Pacific – China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore, and Hong Kong- in the period from 2010 to 2016. It shows that cultural difference among countries not only impacts directly trade credit in SMEs but also impacts on trade credit indirectly through use of short-term bank credit and cash holdings. The title of this chapter is *The influence of national culture on trade credit in SMEs.*

While Chapter Two shows evidence of the existence of an optimal trade credit level where SMEs can maximise their profitability and Chapter Three shows that the cultural difference among countries is an important factor that impacts on the trade credit in SMEs across countries, Chapter Four considers the relationship among components of working capital. Specifically, we study whether trade credit provision influences inventory management in SMEs. Using a sample of 1,509 non-financial listed SMEs from nine countries or territories in East Asia and the Pacific – China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore, and Hong Kong- in the period from 2010 to 2016, this chapter shows the relationship between trade credit provision and

inventory management. Moreover, this association is changeable according to firms' characteristics, namely changes in sales, market power and level of financial constraints. The title of this chapter is *trade credit and inventory management in SMEs: The role of changes in sales, market power, and financial constraints.*

Finally, Chapter Five concludes with a summary of the results of the three empirical studies, identifies implications and limitations and provides suggestions for future research.

CHAPTER 2 - TRADE CREDIT, CORPORATE PROFITABILITY, AND FINANCIAL CONSTRAINTS.

2.1. Introduction

Trade credit is an important part of working capital management and is seen as an essential component of business life within most firms (Cheng & Pike, 2003; Lin & Chou, 2015). Providing trade credit to customers represents as a means to promote firm sale (Smith, 1987; McMillan & Woodruff, 1999; Hill et al., 2012). On the other hand, receipt of trade credit representing deferred payment to suppliers is an essential source of short-term finance for most firms (Mian & Smith, 1992; 1994; Ng et al., 1999; Wilner, 2000; Fisman & Love, 2003). If a firm operates in an economy where there are no transaction costs, perfect substitutes for all products, and a competitive product and financial market, it does not need to offer trade credit to its customers because it does not receive any competitive advantage (Blazenko & Vandezande, 2003b). In such an economy, a firm also does not need a source of the fund from a supplier because it can borrow at competitive rates in the financial market (Blazenko & Vandezande, 2003b). To put it another way, under certainty and competitive environment with complete markets, trade credit decisions do not influence on firm performance (Lewellen et al., 1980). However, the real-world markets are imperfect where the environment is uncertain, and the credit evaluation process involves costs. Hence, the efficiency of trade credit management is essential in corporate financing policy because it impacts on risks and performance of firms (Lewellen et al., 1980; Hill et al., 2012).

A wealth of empirical studies explore the vital role of trade credit control through demonstration of its impacts on firms' profitability (Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Kestens et al., 2012; Martínez-Sola et al., 2014; Abuhommous, 2017). In general, the findings of those studies show the existence of a linear correlation between the two variables, but this linearity divides researchers into two opposing camps.

According to the view of one camp, a firm will improve its profitability if it steps up investment in trade credit. Kestens et al. (2012) examine the relationship between companies' trade credit receivable and their profitability for a sample of listed and unlisted Belgian firms between 2006 and 2009. They find that, compared to the pre-crisis periods, firms will generate relatively higher profits if they increase the trade credit extended to customers during a financial crisis. Moreover, Abuhommous (2017) analyses a sample of large Jordanian companies for the period 1999 to 2015, and their finding supports the claim that firms could increase profitability by offering more trade credit to customers. Instead of only focusing on large firms, as in the studies by Kestens et al. (2012) and Abuhommous (2017), Martínez-Sola et al. (2014) focus on demonstrating the impact of trade credit receivable on SMEs' profitability. A sample of 11,337 Spanish SMEs in the manufacturing sector has been used to conduct this research objective. They find that SMEs have higher profitability if they invest more in accounts receivable. Although these studies relate to different countries, they reach a common result, that high investment in trade credit will obtain high profitability.

However, the opposite camp maintains that high investment in trade credit is related to high risk of revenue loss or high financial costs and hence reduces firm profitability (Deloof, 2003; García-Teruel & Martínez-Solano, 2007). Deloof (2003), in a sample of 1009 large Belgian firms in the period 1992 – 1996, and find that a decrease in trade credit receivable and trade credit payable enhances firm profitability. Moreover, García-Teruel and Martínez-Solano (2007) find similar results in a sample of 8,872 Spanish SMEs between 1996 and 2002. In particular, firms need to limit the provision of trade credit to their customers to increase their profitability. They pay attention to the risk of higher costs associated with extending trade credit because sellers might incur additional administrative costs (Mian & Smith, 1992). The marginal benefit of granting trade credit from additional sales may also decline while the risk of nonpayment may rise

at a higher debt level. There might, therefore, be a trade credit level at which offering higher trade credit to customers negatively impacts firm profitability.

These controversial findings of previous studies suggest that trade credit may have a non-linear rather than a linear relationship with firm profitability. If so, there may exist an optimal trade credit level which maximizes corporate profitability. Some existing studies on working capital management reveal evidence of a non-linear relationship between firms' investment in working capital and their profitability (Baños-Caballero et al., 2012; 2014; Mun & Jang, 2015; Afrifa, 2016; Afrifa & Padachi, 2016). For instance, by using the cash conversion cycle as a measure of working capital, Baños-Caballero et al. (2012) and Afrifa and Padachi (2016) point toward the existence of a concave relationship between these two variables in Spain and the UK, respectively. However, the limitation of those studies is that they only refer to working capital management in general, rather than focus on individual components of working capital, such as trade credit receivable (TCR) and trade credit payable (TCP). Understanding the roles of these individual components is a step worth pursuing.

To the best of the author's knowledge, only a few studies so far have investigated a potential non-linear connection between trade credit and firm performance, but none in the East Asia and Pacific context (Martínez-Sola et al., 2013b; Pais & Gama, 2015; Lyngstadaas & Berg, 2016). Although their findings are quite insightful, these studies have some limitations. Martínez-Sola et al. (2013b) provide evidence to support an inverted U-shaped association between these two variables in Spain, but their study concerns firm value rather than firm profitability. In particular, they use a sample of 54 large Spanish firms for five consecutive years from 2001 to 2007 to find the shape of the association between trade credit receivable and firm value. Their results indicated that investment in trade credit is related to benefits and costs for firm value. Hence, there is an inverted U-shaped relationship between accounts receivable and the firm value

measured by Tobin's Q. This means that firms attain high value at the low level of trade credit investment, but they will reach low value at a high level of trade credit investment. In other words, a firm has an optimal point of trade credit at which it maximises value.

Furthermore, the study of Martínez-Sola et al. (2013b) pays particular attention to investment in accounts receivable while leaving out accounts payable. Nevertheless, the usage of trade credit is twofold (Petersen & Rajan, 1997). A firm can be viewed as a customer, and hence its account payable (TCP) is a proxy for how much it borrows from its suppliers. In contrast, a firm is also a supplier and its accounts receivable (TCR) represents its lending to customers (Petersen & Rajan, 1997). Both aspects of trade credit are important to firm performance and are interlinked with the necessity to finance production (Ferrando & Mulier, 2013). Consequently, this study treats the firm first as a supplier (lender) and then as a customer (borrower) to evaluate the critical role of trade credit to its profitability.

Moreover, Martínez-Sola et al. (2013b) focus on large firms rather than small and medium-sized enterprises (SMEs). However, trade credit is of particular importance to SMEs (Petersen & Rajan, 1997). According to García-Teruel and Martínez-Solano (2007), these firms have constrained access to external financing, so they face a lack of finance for their growth. This difficulty stems from the asymmetry of information between the firm and the capital market. Insufficient information decreases the market's ability to assess the firm's projects and raises the cost of external financing (Baños-Caballero et al., 2014). The use of trade credit allows SMEs greater access to funds because of the comparative advantage of commercial creditors in the control and evaluation of credit risk (Schwartz, 1974; Emery, 1984). Thus, financial constraints faced by SMEs play a key role in trade credit investment decisions. Recently, Pais and Gama (2015) and Lyngstadaas and Berg (2016) overlook this crucial feature when they demonstrate a non-linear relationship between trade credit and profitability of SMEs in Portugal and Norway,

respectively. Their results nevertheless suggest that the relationship between these two variables is convex rather than concave.

To fill the gaps discussed above, the objective of this study is to investigate whether there is a non-linear relationship between trade credit and profitability of SMEs, with both aspects of trade credit, namely trade credit receivable (TCR) and trade credit payable (TCP) considered. Besides, given that financial constraints of SMEs play a crucial role in trade credit investment decisions, this study investigates whether the possible influence of their financing constraints on the above relationship.

For these purposes, this paper uses a sample of 1,509 non-financial listed SMEs from nine countries or territories located in East Asia and the Pacific – China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore, and Hong Kong. This region is selected for several reasons. The East Asia and Pacific region consist of 38 countries, but only these nine countries or territories have well-developed public equity markets for SMEs (The World Bank, 2018b). Although some other nations in this area also have SME boards, the number of listed firms is too small. For example, the Cambodia Securities Exchange (CSX) was established in 2011 but had only two companies listed in total (Asian Development Bank, 2015). The situation is similar in Philippine where only two companies have been listed in the Small, Medium and Emerging Board (SME Board) created by the Philippine Stock Exchange (PSE) (Asian Development Bank, 2015). Finally, SMEs in these countries have shown a rising trend in both TCR and TCP from 2010 to 2016. Figure 2.1 demonstrates that the TCR reached approximately 39 % in 2011 from 25% in 2010. It decreased to 27% in 2012 before recovering steadily afterwards. The figure also shows that TCP remained quite stable and stayed below bank loans from 2010 to 2014. Since then, it increased significantly, exceeding the latter after 2015. Such change offers us an excellent opportunity to examine our objectives set out above.

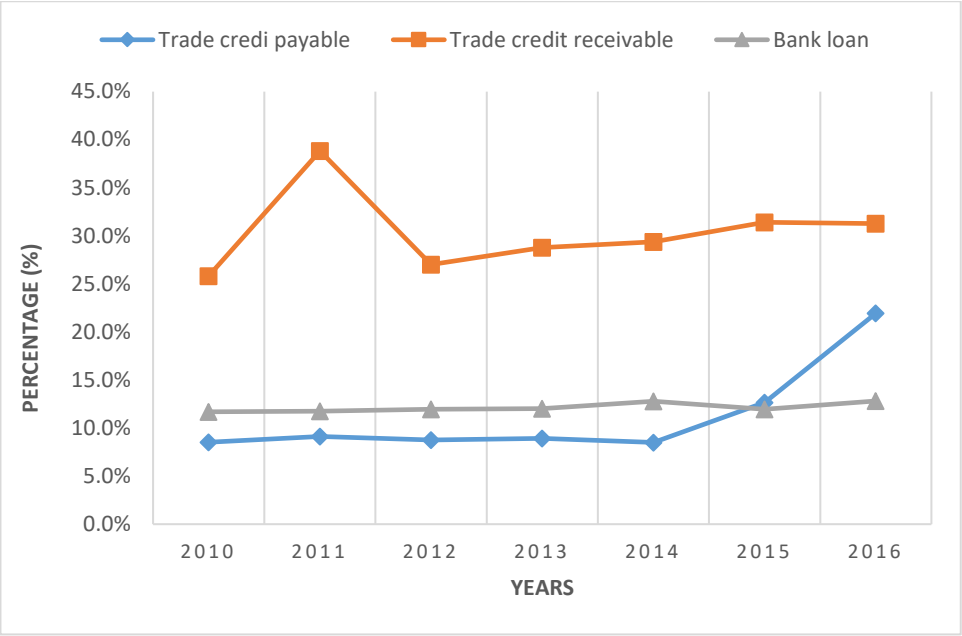

Figure 2.1: Evolution of trade credit in SMEs in East Asia and the Pacific from 2010 to 2016.

Findings of this study indicate that TCR and TCP have an inverted U-shaped relationship with SMEs' profitability in the countries or territories examined. That is, investment in trade credit has a positive relationship with firm profitability at lower levels of trade credit, but this association becomes negative at higher levels. Consequently, there exists an optimal trade credit level at which SMEs can maximize profitability. In addition, when firms are classified into two groups according to their cash flow and external financing cost, taken to represent the level of financial constraints, this study finds that both less and more financially constrained firms face a concave association between trade credit and profitability, but their optimal levels of trade credit differ. In particular, the less financially constrained firms have a higher optimal level than the more financially constrained firms.

A number of contributions that this study makes to the existing literature are presented as follows. First, the study offers new evidence on the influence of trade credit on firms' profitability, by taking account of the possible existence of a concave association between trade credit and profitability. This is largely overlooked by the

existing empirical literature. Second, this study considers both aspects of trade credit, including TCR and TCP. Third, this study investigates how the relationship between trade credit and SMEs' profitability varies according to their financial constraints.

The remainder of this chapter is organised into five sections. Section 2.2 contains theoretical foundations and hypothesis development; Section 2.3 describes the data and regression models; Section 2.4 carries out the analyses and provides an explanation of the empirical results and Section 2.5 reports robustness checks. Section 2.6 is the conclusion.

2.2. Theoretical Foundations and Hypothesis Development

2.2.1. Trade credit and firm profitability

Trade credit is a commercial credit that occurs when a vendor sells his merchandise on credit, instead of requiring immediate payment (Preve & Sarria-Allende, 2010). Firms have the motivation to offer more trade credit to their customers, mainly because it may increase firms' sales, and can consequently lead to higher profitability (Martínez-Sola et al., 2014).

Furthermore, the incentive of firms to hold positive TCR arises from a number of advantages. First, trade credit reduces the information asymmetry about product quality between suppliers and buyers (Smith, 1987; Long et al., 1993). In particular, customers are enabled to evaluate the quality of products before making a payment to firms. If they are not satisfied with the quality, they can return the products without payment (Smith, 1987). This is particularly essential for customers who buy products or service that need longer time to verify their quality (Smith, 1987). Usually, it is considered as a device that customers use to control and manage the quality of items purchased (Long et al., 1993). In this sense, trade credit can also be presented as a quality guarantee to customers (Smith, 1987; Lee & Stowe, 1993; Long et al., 1993; Deloof & Jegers, 1996; Pike & Cheng, 2001). Accordingly, trade credit helps firms to maintain a long-term relationship with their customers (Ng et al., 1999; Wilner, 2000).

Second, trade credit can also be considered as a pricing policy in which firms can change the period of credit or the discount for prompt payment to sell their merchandise at various prices in order to stimulate their sale (Martínez-Sola et al., 2014). For example, a firm can reduce the price of products for its customers by lengthening the credit period or raising a cash discount in economic terms (Cheng & Pike, 2003). Depending on the different elasticities of demand of customers for the products of firms, firms can offer different credit terms to manipulate the price. In particular, some customers may receive standard credit terms from firms, but some selected customers are allowed to pay late without penalty or outside the agreed terms (Cheng & Pike, 2003). Hence, firms can see trade credit as a flexible approach to pricing. Third, trade credit reduces the storage costs for supplier firms because it encourages customers to acquire more products (Ferris, 1981). Finally, firms can treat trade credit receivable as an investment tool (Cheng & Pike, 2003). By generating an implicit interest income for delayed payment and offering long credit terms, firms can charge their customers a high price. At this time, the cost of capital such as credit screening and monitoring costs is lower than the present value of revenue (Neale & Shipley, 1985). Hence, firms will obtain high revenue from the provision of trade credit (Kim & Atkins, 1978)

As a consequence of these benefits from the provision of trade credit to a customer, this study expects that firms will increase their profitability if they increase trade credit receivable. However, high accounts receivable also links to possible adverse effects, which may lower firm profitability. According to Petersen and Rajan (1997), if firms grant more trade credit to customers, they will meet the financial risks of no payment or late payment from customers. This could create potential costs of financial distress, damaging to the growth of firms. In order to limit this problem, the firm will incur high administrative costs for assessing credit risk and structuring delayed payment contracts (Kim & Atkins, 1978; Sartoris & Hill, 1981; Emery, 1984). Moreover, a high provision

of trade credit locks up a large amount of money in accounts receivable (Nadiri, 1969). Firms will forgo interest which could be earned from the funds that they have used to grant credit on sales (Nadiri, 1969). Moreover, high investment in trade credit receivable might hamper firms' ability to take up value-enhancing investment projects because of insufficient funds. In this case, the firm may be forced to obtain additional funds at extra costs from the capital market (Watson & Head, 2010). Based on the above discussions, it might be argued that the costs of investment in accounts receivable outweigh its benefits, and hence, if a firm keeps high levels of receivables, it will receive lower profit.

The conflicting views on trade credit decision suggest that the decision on trade credit may involve a cost-benefit trade-off. The theoretical basis for building the hypothesis is based on trade credit literature which suggests the presence of an optimal account receivable (Nadiri, 1969; Lewellen et al., 1980; Emery, 1984). In this sense, Nadiri (1969) develops a model to select the optimal trade credit in order to maximize net profit. Afterwards, Emery (1984) states that when the marginal revenue of trade credit lending firms equals the marginal costs, there is the existence of an optimal level of accounts receivable. Hence, this study might expect a nonlinear relationship between trade credit and firm profitability determined by a trade-off between costs and benefits of providing trade credit, where there is existence of an optimal trade credit level which maximises firm profitability. The hypotheses are presented as follows:

Hypothesis 1: Extending trade credit to customers has an inverted U-shaped relationship with SMEs' profitability.

Hypothesis 1A: Extending trade credit will positively impact on SMEs' profitability at lower levels of trade credit granted.

Hypothesis 1B: Extending trade credit will negatively impact on SMEs' profitability at higher levels of trade credit granted.

Not only do firms grant trade credit to customers, but they also have demand for trade credit from suppliers, generally by stretching payments (Deloof & Jegers, 1996; Berger & Udell, 1998; Wilner, 2000). By doing this, a firm might take full advantage of a better cash flow position for its operation (Petersen & Rajan, 1997). For SMEs, trade credit from suppliers is widely used and presented as an essential portion of their finance (Demirgüç-Kunt & Maksimovic, 1999; Cunat, 2006). The reason is that these firms often have limited access to credit from traditional banks, and therefore, they tend to depend on trade credit payable as a substitute for bank loans (Berger et al., 2001; Fisman & Love, 2003; Love et al., 2007).

Apart from the access constraint, SMEs may have incentives to receive trade credit from suppliers because of its benefits. According to Van Horne and Wachowicz (2008), trade credit is readily available without a formal arrangement or contract. Besides, it is a flexible means of finance because firms do not need to pledge collateral, sign a note or adhere to a strict payment schedule on a note (Huyghebaert, 2006; Van Horne & Wachowicz, 2008). From this perspective, a supplier's requirements are less strict than those of a bank or other financial institution. The availability and flexibility of trade credit from suppliers offer SMEs more scope for expanding and investing in the high-value project (Cheng & Pike, 2003). Finally**,** trade credit can decrease payment transaction costs by separating the exchange of the product from the immediate use of money (Ferris, 1981). This can help firms to decrease precautionary cash holdings because they can anticipate their cash flow for payment and can manage their financial resources more efficiently.

From the above discussion, the receipt of trade credit from suppliers helps SMEs to overcome their financial constraints. It guarantees that SMEs have enough cash flow for their operations. Thus, more trade credit payable will increase firm profitability. Nevertheless, stretching payment may also damage the long-term relationship between buyers and suppliers, and a firm may incur extra cost to find alternative suppliers (Cunat,

2006). If the firm habitually fails to make a payment on time or stretches its payable excessively, its suppliers will rate its creditworthiness as low. As a result, it will face difficult barriers to accessing the financial market in the future (Van Horne & Wachowicz, 2008). In the event of late payment, a supplier can stop the supply of the common good and raise the terms of trade credit contracts to disrupt the firm's business operation (Cunat, 2006).

Moreover, Ng et al. (1999) also argue that firms stretching payment might not only lose discount for early payment but also pay the highest rate of interest for the use of these funds. Take, for example, a common "2/10 net 30" trade credit policy. With that, suppliers give customer firms 30 days after the invoice date to make full payment and provide a 2 percent discount on the price agreed for payment within ten days of delivery (Van Horne & Wachowicz, 2008). Otherwise, if a firm wants to use these funds for an additional 20 days after delivery, the approximate annual interest rate of this contract is 37.2%, which is extremely high compared with the market rate that a bank would charge for a similar type of loan (Van Horne & Wachowicz, 2008). As a result, trade credit is an expensive form of finance, and the usage of it for short-term finance might lead to reduced firm profitability. (Petersen & Rajan, 1997; Wilner, 2000)

Given the costs and benefits of trade credit payable, this study proposes that receipt of trade credit has a non-linear relationship with firm profitability. In particular, it proposes the following hypotheses:

Hypothesis 2: Receipt of trade credit by SMEs from their suppliers has an inverted U-shaped relationship with their profitability.

Hypothesis 2A: Receipt of trade credit will positively impact SMEs' profitability at lower levels of trade credit received.

Hypothesis 2B: Receipt of trade credit will negatively impact SMEs' profitability at higher levels of trade credit received.

2.2.2. Investment in trade credit and financial constraints

Given that restriction on access to finance is a more severe problem for SMEs, this study expects that the optimal level of trade credit will change according to different levels of financing constraints faced by firms. According to Kim and Chung (1990), investment in accounts receivable is highly associated with the financing condition of firms. In this line, Petersen and Rajan (1997) show that the provision of trade credit is positively related to a firm's ability to access finance. Accordingly, firms with financial stability are inclined to offer more trade credit to their customers than firms suffering from financial constraints (Schwartz, 1974). Similarly, Meltzer (1960) indicates that firms with a larger capacity to generate internal cash flow and better access to capital market tend to offer more trade credit to their customers. Conversely, firms in financial distress will keep a lower level of trade credit provision (Molina & Preve, 2009). The reason is that such firms experience restricted access to the capital market and pay higher costs for raising external funds. In such a situation, accounts receivable is seen as a cash management tool. Thus, more financially constrained firms may have a higher propensity to save cash from operating cash flows to ensure an available source of internal finance for their investment opportunities, while less financially constrained firms do not (Acharya et al., 2007). Based on the above discussion, this study proposes the following hypothesis:

Hypothesis 3: More financially constrained companies will have a lower optimal level of trade credit receivable than less financially constrained companies.

In addition, Carbó-Valverde et al. (2016) suggest that receipt of trade credit is also sensitive to the financial constraints facing SMEs. A firm with the availability of cash flow often does not face financial constraints because it is less dependent on external funding (Afrifa & Padachi, 2016). However, if the available cash flow is not sufficient to finance production, the firm must rely on external finance. Bank loans and trade credit

are the two main alternatives of external funding, of which trade credit from suppliers is more expensive (Ng et al., 1999; Psillaki & Eleftheriou, 2015; Carbó-Valverde et al., 2016). More financially constrained firms tend to employ a higher degree of trade credit from suppliers by postponing payment for raw materials (Petersen & Rajan, 1997). This leads to an increase in financial costs, and hence, those firms experience decreased profitability. Conversely, the availability of cash flow allows unconstrained firms to pay their suppliers in advance. This not only helps the firms to enhance the business relationship with their creditors but also gives them opportunities to benefit from discount policies in the future (Ng et al., 1999). Thus, unconstrained firms will enjoy more advantages of trade credit from creditors to improve their performance than financially constrained firms. From this discussion, this paper expects the following:

Hypothesis 4: More financially constrained companies will have a lower optimal level of trade credit payable than less financially constrained companies

2.3. Data and Methodology

2.3.1. Data

This study utilises panel data of SMEs for the seven-year period from 2010 to 2016. During this time, liquidity and financial constraints were raised amongst the SMEs in the aftermath of the 2008 financial crisis (Martínez-Sola et al., 2014). Such constraints should make the efficiency of trade credit management even more critical. The selection of SMEs is based on the following criteria. First, these firms must be listed on the SME board of a public equity market in the East Asia - Pacific region. This sample covers nine countries or territories, including China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong. The selection of listed SMEs as a focus is because their financial statements are more accurate and more reliable than those of their non-listed counterparts. Secondly, these firms must meet the definition of small- and medium-sized enterprises (SMEs) set by each country (see Appendix A).

In addition to those selection criteria, this study applies a series of filters based on earlier studies (Pais & Gama, 2015; Lyngstadaas & Berg, 2016). Specifically, firms with anomalies in their accounting data are excluded. For instance, firms are excluded if their total assets, sales, trade credit receivable and trade credit payable have negative values and if their total assets differ from total liabilities and equity. Financial firms are excluded from the sample because these firms have very different accounting requirements and asset structures from non-financial ones. The final sample consists of 1,509 non-financial listed SMEs, which amounts to an unbalanced panel of 10,537 firm-year observations (Table 2.1).

Country	SMEs market	Listed of companies
China	ChiNext	276
Vietnam	HNX	130
Malaysia	ACE market	71
Thailand	MAI	68
Japan	JASDAQ	220
	MOTHER	26
South Korea	KOSDAQ	353
Taiwan	GreTai	164
Singapore	SGX Catalist	125
Hong Kong	GEM	76
Total		**1,509**

Table 2.1: The number of SMEs selected for Chapter Two

The required financial and accounting firm-level data is retrieved from Bloomberg and DataStream Thomson One. Meanwhile, the country-level data, such as Gross Domestic Product (GDP) growth is gathered from the World Bank database, but that of Taiwan is collected from National Statistics (2018). The base currency used for the data

analyzed is in terms of the US dollar. Further, both dependent and independent variables are winsorized at 5% and 95% to overcome the influence of outliers.

2.3.2. Variables

This study starts with choosing the dependent variables to measure firm profitability. Based on the previous studies by Deloof (2003) and Baños-Caballero et al. (2012), this research will use the gross operating income (PRO_1) and the net operating income (PRO_2) as two proxies to measure the profitability of firms, where, PRO_1 is measured as sales minus costs of goods sold and is divided by total assets, and PRO_2 is calculated as sales minus costs of goods sold minus depreciation and amortisation and is divided by total assets (Deloof, 2003; Baños-Caballero et al., 2012). These two ratios are used because gross profit is the cleanest profitability (Novy-Marx, 2010).

This study will analyse the impact of trade credit on firm profitability, considering the provision of trade credit (i.e. accounts receivable) and the receipt of trade credit (i.e. accounts payable). Hence, the two main independent variables used in this study are trade credit receivable (TCR), and trade credit payable (TCP). As regards TCR, while some researchers used the ratio of accounts receivable to total assets as the measurement of TCR (Hill et al., 2012; Martínez-Sola et al., 2014; Abuhommous, 2017), others have measured TCR by using the ratio of accounts receivable to total sales (Ferrando & Mulier, 2013). Although different authors measured trade credit receivable (TCR) in a variety of ways, this study prefers the ratio of accounts receivable to total sales because it reflects a percentage of sales as trade credit offered to their customers (Petersen & Rajan, 1997; Ferrando & Mulier, 2013). Firms retain a high amount of trade credit on total sales, which means that they offer a higher proportion of trade credit to their customers. Moreover, this study includes the square of trade credit receivable (TCR^2) in order to test for non-linearity. This study expects a positive association between trade credit receivable (TCR) and firm profitability (PRO_1 and PRO_2) at lower levels of trade credit receivable. At the

same time, the relationship between trade credit receivable (TCR) and firm profitability (PRO_1 and PRO_2) is negative at higher levels of trade credit receivable. Therefore, this study expects a positive sign for the variable TCR and a negative one for TCR^2.

The second ratio, trade credit payable (TCP) is measured by accounts payable to total assets. While Ferrando and Mulier (2013) used accounts payable to total sales, Fisman and Love (2003) and Deloof and Jegers (1999) used accounts payable to total assets. In this study, the ratio of accounts payable to total assets is an appropriate ratio to reflect the important role of accounts payable in the financing of the firm (Deloof & Jegers, 1999). It presents the ability of firms to rely on trade credit rather than institutional financing to finance their current assets and investment. Also, the square of this variable (TCP^2) is included to check for non-linearity. In this study, the association between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2) is expected to be positive at lower levels of trade credit payable. Similarly, trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2) have a negative relationship at higher levels of trade credit payable. Therefore, this study expects a positive sign for variable TCP and a negative one for TCP^2.

Besides the two main independent variables, this study also includes control variables that could influence firm profitability, such as financial leverage (LEV), cash ratio (CASH), liquidity ratio (LIQ), assets tangibility (ATAN), sales growth (GROWTH), firm size (SIZE), industry deviation (INDUST) and the growth rate of Gross Domestic Product (GDP) (Deloof, 2003; Baños-Caballero et al., 2012; Martínez-Sola et al., 2014).

Following the previous studies by Baños-Caballero et al. (2012) and Martínez-Sola et al. (2014), financial leverage (LEV) is measured as the ratio of total debt to total assets. Debt is considered as the cheapest resource of finance because its cost of capital is lower than the cost of equity. Moreover, firms also use it to create tax shields (Modigliani & Miller, 1963). However, for SMEs, creditors often require higher payments for borrowing

than larger firms because they have greater informational opacity, greater information asymmetries and a greater possibility of bankruptcy (Berger & Udell, 1998; Jordan et al., 1998). This may obstruct a company's ability to undertake valuable investments, and therefore, it damages the profitability of firms (Benito & Vlieghe, 2000). This study expects that a priori sign of this association might be ambiguous.

Moreover, Cash ratio (CASH) is defined by cash and cash equivalents divided by total assets. There is no consensus about cash holding and firm profitability. For example, Mikkelson and Partch (2003) found that the level of cash holdings impacts positively on firm performance, while Kalcheva and Lins (2007) find a negative relation. Higher cash holdings can reduce the dependence of firms on costly external financing and increase the likelihood of undertaking value-enhancing projects (Chen, 2008). However, this will raise opportunity cost, because the return of these assets is lower than other investments at the same level of risk.

Liquidity ratio (LIQ) is measured by the ratio of current assets to current liabilities. A high level of liquidity can help firms to avoid the use of costly external finance (Afrifa & Padachi, 2016). According to The Perking Order Theory (POT), firms prefer to use internally generated finance to external one for financial demand because the firm can minimise the costs associated with asymmetric information, and hence the cost of the former is cheaper than the later (Myers & Majluf, 1984). Sufficient liquidity can not only save the cost of capital from the use of external financing but also allow the firm to invest in worthwhile projects. This will improve the profitability of firms. Hence, there is expected to be a positive relationship between liquidity ratio and firm profitability.

Assets tangibility (ATAN) is measured by the ratio of fixed assets to total assets. As regards SMEs, because of the severe information asymmetry, those firms meet financing difficulty with financial institutions. Thus, collateralised lending is particularly crucial to SMEs (Degryse et al., 2012). Firms holding more tangible assets can gain easy

access to external finance from banks and other financial institutions for their operation because those assets can be provided as good collateral (Titman & Wessels, 1988; Rajan & Zingales, 1995; Himmelberg et al., 1999). This allows firms to take advantage of profitable opportunities because of their ability to secure external finance. Hence, asset tangibility is expected to be positively correlated with firm profitability.

Sales growth (GROWTH) is calculated as the annual growth of sales between year t-1 and year t. According to Brush et al. (2000), a firm with high sales growth will fully utilise its capitalization to create more revenue, which results in higher profitability. Similarly, high sales growth will provide a high market share, which can increase firm profitability (Varaiya et al., 1987). Thus, this ratio is expected to have a positive relationship with firm profitability.

Firm size (SIZE) is measured as the natural logarithm of total assets of the firm, which is a fundamental variable in explaining the profitability of firms. While Singh and Whittington (1975) and Berger and Ofek (1995) showed the positive impact of firm size on profitability, Yang and Chen (2009) found a negative correlation between those two variables. Theoretically speaking, firms with large size can receive more benefits from economies of scale, which results in reducing the unit cost of production (Hardwick, 1997). On the other hand, those firms may incur higher management costs as well as agency problems due to inefficiencies in internal communication and higher executive pay (Pi & Timme, 1993). Hence, this study expects the relationship between firm size and profitability could be in either direction.

Beside firm characteristics, country-level variables are included in this study. Gross Domestic Product (GDP) growth is calculated by the annual change in the Gross Domestic Product (GDP) between year t-1 and year t. Economic conditions impact positively on firm performance. In particular, firms will significantly increase their profitability when they operate in countries with good economic conditions (Niskanen &

Niskanen, 2006). Hence, this study expects that economic growth has a positive effect on the profitability of firms.

2.3.3. Methodology

This study used panel data analysis as the main methodology, comprising three alternative panel data models: Pooled Ordinary Least Squares Model (Pooled OLS), Fixed Effect Model (FEM) and Random Effect Model (REM). The reason why this study uses panel data has been presented in Chapter One. Pooled OLS often pools all of the databases together and run an OLS regression; this approach is concerned about the difference of unit-specific effects. Thus, this method is straightforward to estimate and interpret. However, each entity will have different characteristics (Brooks, 2008). If this is not taken into consideration, the results will be unrealistic and restrictive because these characteristics will impact on the predictor variables and could lead to bias in the results. Consequently, controlling for those characteristics is critical. This problem has been solved by the Fixed Effect Model (FEM) and Random Effect Model (REM) (Brooks, 2008).

Three models, namely, the Pooled OLS, the FEM, and the REM, have been applied then this study will check which of them is most appropriate. As the discussion in Chapter One, the Breusch-Pagan Lagrange multiplier (LM) test can be used to choose between the REM and the Pooled OLS. The LM test is conducted with a null hypothesis that there is no variation across entities (Greene & McKenzie, 2012). This means that there is an insignificant difference across units. In the case, if the null hypothesis is rejected, the study prefers the REM to the Pooled OLS because individual-specific effects across the units are not captured in the Pooled OLS.

Next, this study will use Hausman (1978) test to choose between the FEM and REM under the null hypothesis of a correlation between the error term and regressors. If such a correlation exists, the REM is not preferred while the FEM will be consistent (Brooks,

2008). In the case of the FEM applied for this study, a joint test of time effects will be performed to choose either one-way or two-way fixed effect estimation; the latter considers the time effect in the model, while the former does not (Wooldridge, 2010). If these effects are not jointly significant, it might suggest that each model should not include a set of time indicator variables and therefore, a one-way Fixed Effect Model will be chosen (Baum, 2006). For the FEM, the Woodridge test and modified Wald test will be used to check autocorrelation and heteroscedasticity (Brooks, 2008). If there is the presence of autocorrelation and heteroscedasticity, the model with be estimated with cluster-robust standard error.

2.3.4. Research models

2.3.4.1. The nonlinear relationship between trade credit and firm profitability

This study investigates whether or not the relationship between trade credit and firm profitability is non-linear by building quadratic models according to the previous studies by Baños-Caballero et al. (2012). These models are presented as follows:

Pooled Ordinary Least Square model (Pooled OLS)

$$PRO_{it} = \beta_0 + \beta_1 TCR_{it} + \beta_2 TCR_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + u_{it} \quad (1)$$

$$PRO_{it} = \beta_0 + \beta_1 TCP_{it} + \beta_2 TCP_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + u_{it} \quad (2)$$

Fixed Effects Model (FEM):

$$PRO_{it} = \beta_0 + \beta_1 TCR_{it} + \beta_2 TCR_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (3)$$

$$PRO_{it} = \beta_0 + \beta_1 TCP_{it} + \beta_2 TCP_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (4)$$

Random Effects Model (REM):

$$PRO_{it} = \beta_0 + \beta_1 TCR_{it} + \beta_2 TCR_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (5)$$

$$PRO_{it} = \beta_0 + \beta_1 TCP_{it} + \beta_2 TCP_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (6)$$

where firm profitability (PRO) is measured by two ratios, namely the gross operating income (PRO_1) and the net operating income (PRO_2). Following Deloof (2003) and Baños-Caballero et al. (2012), this study uses these proxies because they are the cleanest profitability measure. Moreover, two different measures of firm profitability are used in order to ascertain the robustness of the results.

The main independent variables are the trade credit receivable (TCR), and trade credit payable (TCP) in which TCR is defined by the ratio of accounts receivable to total sales and TCP is defined by the ratio of accounts payable to total assets. The square of trade credit receivable (TCR^2), and that of trade credit payable (TCP^2) are included in all equations as independent variables to test for non-linearity. Moreover, this study also includes control variables that impact on firm profitability based on earlier studies (Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Baños-Caballero et al., 2012; Martínez-Sola et al., 2014; Afrifa & Padachi, 2016). These include financial leverage (LEV), cash ratio (CASH), liquidity ratio (LIQ), assets tangibility (ATAN), sales growth (GROWTH), firm size (SIZE), industry deviation (INDUST) and the growth rate of Gross Domestic Product (GDP). To control for various industries, the variable INDUST is included in the model (Martínez-Sola et al., 2018). The parameter η_i is the unobservable individual effect of the firms; λ_t is a time dummy variable. Finally, u_{it} and ε_{it} are random disturbance. Table 2.2 shows the expected relationship between each of these variables and firm profitability and how all variables used in this study were measured.

From equations (1) – (6), an optimal point is obtained by taking a derivative of firm profitability (PRO) with respect to the trade credit variables (TCR and TCP) and setting this derivative to zero.

For the trade credit receivable (TCR):

$$dPRO / dTCR = \beta_1 + 2\,\beta_2 * TCR$$

The optimal point: $$TCR^{*} = - \beta_1 / (2\,\beta_2) \quad (7)$$

For the trade credit payable (TCP):

$$dPRO / dTCP = \beta_1 + 2\,\beta_2 * TCP$$

The optimal point: $$TCP^{*} = - \beta_1 / (2\,\beta_2) \quad (8)$$

The study expects that firms will have an optimal level of trade credit where they can maximise their profitability. From equations (7) and (8), the level of trade credit only attains the optimal level only if $2\beta_2$ is negative, leading to β_2 should be negative. Hence, this study expects that TCR and TCP will have a positive sign ($\beta_1 > 0$) and TCR^2 and TCP^2 will have a negative sign ($\beta_2 < 0$).

2.3.4.2. Financial constraints impact on the relationship between trade credit and firm profitability

This section will check whether or not the status of SMEs' financial constraints impacts on their optimal level of trade credit. Following Baños-Caballero et al. (2014) and Afrifa (2016), cash flow ratio is used as a proxy for the existence of financial constraints and to distinguish firms that are suffering from financial constraints from those that are not. This ratio reflects the ability of firms to generate internal resources (Afrifa, 2016). When a firm has cash flow below the sample median, it is expected to be more likely to face financing constraints. Consistent with Baños-Caballero et al. (2014), this ratio is calculated as the ratio of earnings before interest and tax plus depreciation to total assets.

For this purpose, the model is represented as follows:

For the trade credit receivable (TCR);

$$PRO_{it} = \beta_0 + (\beta_1 + \alpha_1 FC_{it})TCR_{it} + (\beta_2 + \alpha_2 FC_{it})TCR_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it,} \quad (9)$$

For the trade credit payable (TCP);

$$PRO_{it} = \beta_0 + (\beta_1 + \alpha_1 FC_{it})TCP_{it} + (\beta_2 + \alpha_2 FC_{it})TCP_{it}^2 + \beta_3 LEV_{it} + \beta_4 CASH_{it} + \beta_5 LIQ_{it} + \beta_6 ATAN_{it} + \beta_7 GROWTH_{it} + \beta_8 SIZE_{it} + \beta_9 INDUST_{it} + \beta_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (10)$$

where all independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints. It separates between firms less likely to face financing constraints and those that are more likely to face financing constraints. In particular, if firms are more financing constraints, the FC variable will take a value of 1. Otherwise, its value is zero. The optimal level of the trade credit of less financially constrained firm is $- \beta_1 / 2 * \beta_2$ while that of more financially constrained firms is defined as $-(\beta_1 + \alpha_1) / 2 * (\beta_2 + \alpha_2)$.

2.3.4.3. Firms' profitability when the level of trade credit is below or above optimal level.

As discussed in the previous section, the research models from (1) to (6) check whether or not the relationship between trade credit and firm profitability is an inverted U-shape. If there is a presence of a non-linear relation, firms will attain an optimal level of trade credit where they can maximise their profitability. This means that firms' profitability will decrease as their level of trade credit moves away from this optimal point. However, firms often cannot accurately estimate their optimal trade credit level because of the effects of some factors that change over time, such as opportunity cost of capital,

the rate of customer default, or bad debt on their trade credits (Nadiri, 1969). Consequently, firms may estimate the trade credit level below or above their optimal point.

In this study, a robustness check will be conducted to identify how the deviations on both sides of the optimal trade credit level impact on firm profitability. If there is an optimal point, any above-optimal or below- optimal deviation from this point will reduce the profitability of firms. Following on the previous studies by Tong (2008) and Baños-Caballero et al. (2012), this study employs a two-stage methodology as follows to test for robustness:

Stage 1: Based on the previous studies of García-Teruel and Martínez-Solano (2010b) and García-Teruel and Martínez-Solano (2010c), this study starts by identifying the determinants of both trade credit receivable (TCR) and trade credit payable (TCP). All regression models are presented as follows:

For trade credit receivable (TCR):

$$TCR^*_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 GROWTH_{it} + \beta_3 STDEBT_{it} + \beta_4 TURN_{it} + \beta_5 CFLOW_{it} + \beta_6 GROF_{it} + \eta_i + \lambda_t + v_{it} \quad (11)$$

For trade credit payable (TCP):

$$TCP^*_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 GROWTH_{it} + \beta_3 STDEBT_{it} + \beta_4 LTDEBT_{it} + \beta_5 TURN_{it} + \beta_6 CFLOW_{i,t} + \beta_7 CASH_{it} + \eta_i + \lambda_t + v_{it} \quad (12)$$

where TCR* is the optimal trade credit receivable, which is measured as accounts receivable ÷ sales. TCP* is the optimal trade credit payable, which is calculated as accounts payable ÷ total assets. Firm size (SIZE) is the natural logarithm of total assets. Sales growth (GROWTH) is measured as $(Sales_t - Sales_{t-1}) \div Sales_{t-1}$. Short-term finance (STDEBT) is calculated as short-term financial debt ÷ total assets. Long-term finance (LTDEBT) is calculated as long-term debt ÷ total assets. Product quality (TURN) is measured by total sales ÷ (total assets - accounts receivable). Cash flow (CFLOW) is calculated as (net income + depreciation) ÷ total sales. Cash ratio (CASH) is calculated

as (cash + cash equivalents) ÷ total assets. Profit margin (GROF) is calculated by gross profit ÷ sales. The parameter η_i is unobservable heterogeneity. λ_t controls for time effects and v_{it} is random disturbance.

Stage 2: From equations (11) and (12), residuals are obtained and considered as a proxy for the deviations from the optimal point. These residuals are defined as DEVIATION_TCR for trade credit receivable and DEVIATION_TCP for trade credit payable. Both variables are included in equations (3) and (4) after excluding TCR, TCR^2, TCP, and TCP^2 to investigate how these deviations from the optimal trade credit level impact on firms' profitability. Two models are built as follows:

For trade credit receivable (TCR):

$$PRO_{it} = \alpha_0 + \alpha_1 DEVIATION\_TCR_{it} + \alpha_2 LEV_{it} + \alpha_3 CASH_{it} + \alpha_4 LIQ_{it} + \alpha_5 ATAN_{it} + \alpha_6 GROWTH_{it} + \alpha_7 SIZE_{it} + \alpha_8 INDUST_{it} + \alpha_9 GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (13)$$

For trade credit payable (TCP):

$$PRO_{it} = \alpha_0 + \alpha_1 DEVIATION\_TCP_{it} + \alpha_2 LEV_{it} + \alpha_3 CASH_{it} + \alpha_4 LIQ_{it} + \alpha_5 ATAN_{it} + \alpha_6 GROWTH_{it} + \alpha_7 SIZE_{it} + \alpha_8 INDUST_{it} + \alpha_9 GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (14)$$

where all independent variables and dependent variables are defined in Table 2.2. In equations (13) and (14), it is expected that the value of α_1 is below zero as deviations from the optimum negatively affect firm profitability.

This study further analyses the influence of both deviations, including below and above optimal trade credit level, on firm profitability. In order to fulfil this purpose, the paper identifies the variable INTERACT_TCR for trade credit receivable and INTERACT_TCP for trade credit payable and adds them to equations (13) and (14). The equations are formulated as follows:

For trade credit receivable (TCR):

$$PRO_{it} = \alpha_0 + \alpha_1 DEVIATION\_TCR_{it} + \alpha_2 INTERACT\_TCR_{it} + \alpha_3 LEV_{it} + \alpha_4 CASH_{it} + \alpha_5 LIQ_{it} + \alpha_6 ATAN_{it} + \alpha_7 GROWTH_{it} + \alpha_8 SIZE_{it} + \alpha_9 INDUST_{it} + \alpha_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (15)$$

For trade credit payable (TCP):

$$PRO_{it} = \alpha_0 + \alpha_1 DEVIATION\_TCP_{it} + \alpha_2 INTERACT\_TCP_{it} + \alpha_3 LEV_{it} + \alpha_4 CASH_{it} + \alpha_5 LIQ_{it} + \alpha_6 ATAN_{it} + \alpha_7 GROWTH_{it} + \alpha_8 SIZE_{it} + \alpha_9 INDUST_{it} + \alpha_{10} GDP_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (16)$$

where INTERACT_TCR is DEVIATION_TCR * above-optimal deviation, and INTERACT_TCP is DEVIATION_TCP * above-optimal deviation. The above-optimal deviation is a dummy variable, and it takes a value of 0 for negative residual and 1 otherwise. In equations (15) and (16), α_1 and $(\alpha_1 + \alpha_2)$ represent the impact of below-optimal deviation and above-optimal deviation on firm profitability respectively. If the actual trade credit level is lower than the optimal, the above-optimal deviation will be equal to 0 and α_1 accounts for its effect on firm profitability. Otherwise, the above-optimal deviation will be equal to 1, and $(\alpha_1 + \alpha_2)$ accounts for the effect. When a firm has an optimal point of trade credit, both above-optimal and below-optimal deviations decrease the firm profitability. Therefore, the study expects the values of both α_1 and $(\alpha_1 + \alpha_2)$ to be negative.

Variables	Acronym	Measurement
Gross operating income	PRO_1	(Sales – costs of sales) ÷ total assets
Net operating income	PRO_2	(Sales – costs of sales – depreciation and amortization) ÷ total assets
Trade credit receivable	TCR	The ratio of accounts receivable to total sales
Trade credit payable	TCP	The ratio of accounts payable to total assets
Financial leverage	LEV	The ratio of total debt to total assets
Cash ratio	CASH	The ratio of cash and cash equivalents to total assets
Liquidity ratio	LIQ	The ratio of current assets to current liabilities
Assets tangibility	ATAN	The ratio of fixed assets to total assets
Sales growth	GROWTH	$(Sales_t – Sales_{t-1}) ÷ Sales_{t-1}$
Firm size	SIZE	The natural logarithm of total assets in $US millions
Industry deviation	INDUST	The absolute value of the difference between the firm cash holding and the industry mean.
Annual GDP growth	GDP	$(GDP_t – GDP_{t-1}) ÷ GDP_{t-1}$

Table 2.2: Definition of dependent and independent variables in Chapter Two.

2.4. Results and Analysis

2.4.1. Descriptive analysis

The descriptive analysis of all variables used in this study is presented in Table 2.3. As can be seen, the mean and median of PRO_1 (Gross operating income) are 20.73%, and 17.09%, respectively, which are smaller than those of Spanish SMEs in the study by Baños-Caballero et al. (2012) who found that Gross operating income is 56.03 % on average, with a median of 51.89%. This ratio ranged from a minimum of 0% to a maximum of 58.8%. For PRO_2 (Net operating income), means and median are 17.97% and 14.42% respectively, which are lower than the value in the study of Baños-Caballero et al. (2012), who found an average value of 51.61% and a median value of 47.68%.

For independent variables, trade credit receivable (TCR) has an average of about 0.2487. This variable ranges from a minimum of 0.0077 to a maximum of 0.7671. Moreover, the trade credit payable (TCP) of firms in this sample has a mean value and median value of 0.0805 and 0.0566, respectively. For these firms, the amount of accounts payable to total assets varies from 0 to 0.2688. With the mean value of TCR and TCP, this implies that SMEs on average are more likely to extend rather than receive trade credit.

For control variables, financial leverage (LEV) has a minimum of 0.0488 and a maximum of 0.7508. In particular, SMEs in the East Asia and Pacific region kept LEV at a mean value of 0.3532. Moreover, firms in this research also have an average cash-to-total assets ratios of 0.2028, which accounts for one-fifth of total assets. Also, the average liquidity ratio (LIQ) is 3.3811, which means that SMEs listed in this region are highly liquid. SMEs' average debt level (LEV) is low, and they tend to hold a high levels of cash (CASH) and liquid assets (LIQ), all pointing to the presence of financial constraints. They also have a low average fixed asset (ATAN) by 0.2064 hence low capacity to borrow, which perhaps explains their low debt level.

The Sales growth (GROWTH) ratio ranges from -0.4318 to 0.9176. The mean and median of this ratio are 0.1077 and 0.0513, respectively. The mean value is higher than the median value of sales growth, which indicates that the distribution of sales growth is a right-skewed distribution. The mean value of the GROWTH variable is higher than that of Spanish SMEs in Martínez-Sola et al. (2014) (0.0882). The size of firms used in this study has a mean value of 3.1281 and a median of 3.3372, which is considerably lower than those of Spanish SMEs (7.0826 for mean value and 7.0493 for median value (Martínez-Sola et al., 2014). The GDP growth of countries in the East Asia and Pacific region is 0.0445 for mean value and 0.0368 for median value. The large standard

deviation arise from the fact that these firms are drawn from different countries or territories which have different definitions of SMEs.

Variable	Observation	Mean	Median	Std. Dev	Min	Max
PRO_1	10,537	0.2073	0.1709	0.1550	0.0119	0.5840
PRO_2	10,537	0.1797	0.1442	0.1530	-0.0207	0.5502
TCR	10,537	0.2487	0.2014	0.1959	0.0077	0.7671
TCP	10,537	0.0805	0.0566	0.0766	0.0000	0.2688
LEV	10,537	0.3532	0.3320	0.2063	0.0488	0.7508
CASH	10,537	0.2028	0.1467	0.1780	0.0063	0.6230
LIQ	10,537	3.3811	2.2014	3.1127	0.4643	12.463
ATAN	10,537	0.2064	0.1510	0.1901	0.0000	0.6384
GROWTH	10,537	0.1077	0.0513	0.3206	-0.4318	0.9176
SIZE	10,537	3.1281	3.3372	1.3416	0.1463	5.1720
INDUST	10,537	0.0753	0.0508	0.0698	0.0046	0.2582
GDP	10,537	0.0445	0.0368	0.0273	0.0081	0.1063

Notes: All independent and dependent variables are defined in Table 2.2

Table 2.3: Summary statistics of all variables in Chapter Two.

2.4.2. Pearson correlation analysis

The purpose of a Pearson correlation analysis is to identify the presence of multi-collinearity in regression analysis. While a high correlation between the independent variable and the dependent variable does not show the presence of multi-collinearity, high correlation coefficients among independent variables indicate that the model is suffering from multi-collinearity (Brooks, 2008). When an independent variable is very highly correlated with one or more other independent variables, it will increase the standard error and make the estimates unstable (Allen, 1997). Although the regressions "look good" as a whole, the individual variables will be insignificant (Brooks, 2008). This is due to the high correlation between the independent variable, the contribution of each variable to the overall fit of the regression is very difficultly to observe (Brooks, 2008). Also, the presence of multi-collinearity increases the sensitivity to change of the regression. Thus, adding or removing any independent variables to or from the model also leads to change

in the significance or the coefficient value of the other variables. Besides, that problem will widen confidence intervals for the parameters, leading to inappropriate conclusions (Brooks, 2008). According to Field (2009), multi-collinearity is a problem in regression analysis that occurs when the correlation coefficient between independent variables is higher than 0.80 or 0.90. From the result presented in Table 2.4, the correlation coefficients among independent variables do not exceed these values, so multi-collinearity does not influence in the multiple regression analysis.

As can be seen in Table 2.4, most of the correlation coefficients between independent variables and dependent variables in this research are very low. Gross operating income (PRO_1) and Net operating income (PRO_2) have a negative correlation with trade credit receivable (TCR) but positive relationship with trade credit payable (TCP). This implies that offering more trade credit will lead to lower profitability while receiving more trade credit from creditors will increase profitability. Moreover, financial leverage (LEV) and cash holding (CASH) are positively correlated with firm profitability (PRO_1 and PRO_2). This indicates that SMEs will increase their profitability when they retain high liabilities and cash of total assets. However, the relationship of liquidity ratio (LIQ) with firm profitability is negative, which indicates that a firm with a low proportion of liquidity will have higher profitability. Fixed assets (ATAN) correlate positively with the profitability of firms. This implies that high investment in fixed assets leads to higher profitability. Furthermore, sales growth (GROWTH) is correlated positively with firm profitability, implying that a firm with high sales growth will attain high profitability. This study shows that firm size (SIZE) has a negative correlation with profitability. Finally, GDP growth (GDP) is correlated negatively with firm profitability.

	PRO_1	PRO_2	TCR	TCP	LEV	CASH	LIQ	ATAN	GROWTH	SIZE	INDUST	GDP
PRO_1	1.00											
PRO_2	0.98***	1.00										
TCR	-0.20***	-0.19***	1.00									
TCP	0.16***	0.17***	0.11***	1.00								
LEV	0.06***	0.04***	-0.03**	0.43***	1.00							
CASH	0.21***	0.24***	0.02	-0.10***	-0.34***	1.00						
LIQ	-0.03**	-0.005	0.09***	-0.34***	-0.66***	0.52***	1.00					
ATAN	0.08***	0.05***	-0.07***	0.05***	0.09***	-0.16***	-0.12***	1.00				
GROWTH	0.09***	0.11***	0.07***	0.05***	0.04***	0.02**	-0.01	-0.0006	1.00			
SIZE	-0.19***	-0.16***	0.27***	-0.02*	0.03***	0.08***	0.09***	0.0045	0.16***	1.00		
INDUST	0.24***	0.19***	-0.12***	-0.03***	0.003	0.11***	0.03***	-0.03***	-0.01	-0.32***	1.00	
GDP	-0.08***	-0.06***	0.23***	-0.01	-0.17***	0.08***	0.08***	0.04***	0.21***	0.01	-0.04***	1.00

Notes: All independent and dependent variables are defined in Table 2.2. The symbols *, **, and ******* indicate significance at the 10, 5, and 1 percent levels respectively.

Table 2.4: Pearson Correlation Matrix.

2.4.3. The non-linear relationship between trade credit and firm profitability

This study starts with presenting a preliminary idea of the relationship between trade credit receivable and firm profitability which is measured by the gross profit income (PRO_1) and the net profit income (PRO_2). Figure 2.2 indicates the mean value of the gross profit income (PRO_1) for each decile of the variable TCR. The number of trade credit receivable (TCR) is ranked from the smallest to the largest, then divided into ten equal deciles. As can be seen in Figure 2.2, when SMEs increase trade credit receivable (TCR) rises from the first decile (0-10) to the second (10-20), their profitability also raises significantly. The optimal profit that companies achieved is close to 27%. However, if those firms continue to offer more trade credit to their customers (i.e. trade credit receivable), their profitability will drop below 27%. Thus, this figure suggests that there is a non-linear relationship between trade credit receivable (TCR) and gross profit income (PRO_1).

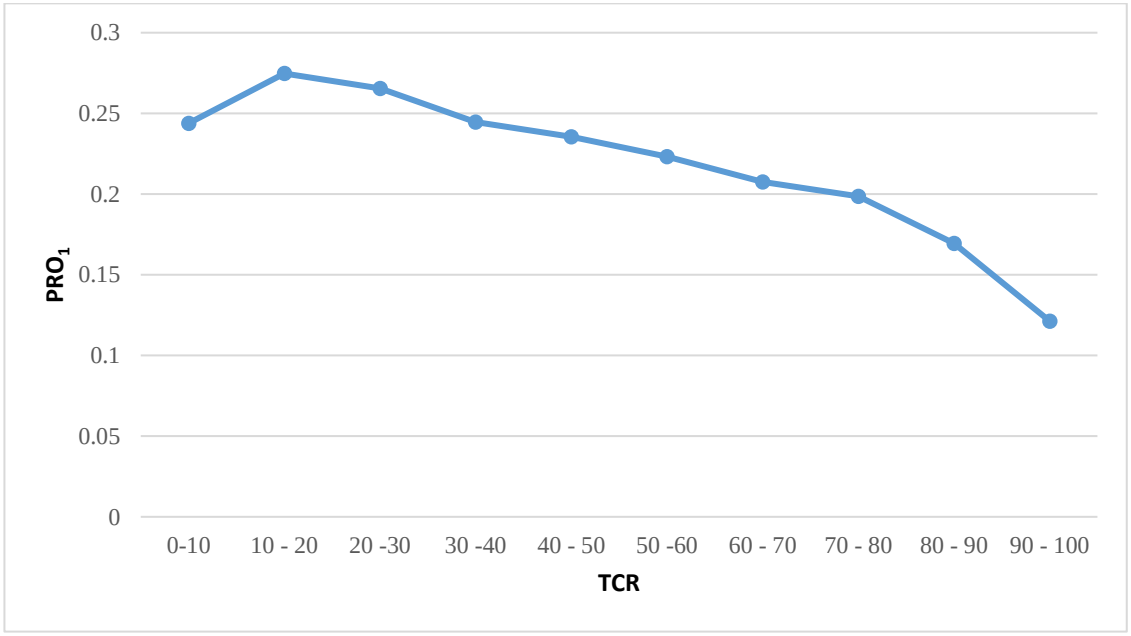

Figure 2.2: Mean value of gross profit income (PRO_1) for each decile of trade credit receivable (TCR).

Similarly, Figure 2.3 exhibits the average value of the net profit income (PRO_2) for each decile of trade credit receivable (TCR). In general, the trend of this figure is very

similar to Figure 2.2, but its optimal profit is lower than 25%. This figure also indicates that the relationship between trade credit receivable (TCR) and net profit income (PRO_2) is non-linear.

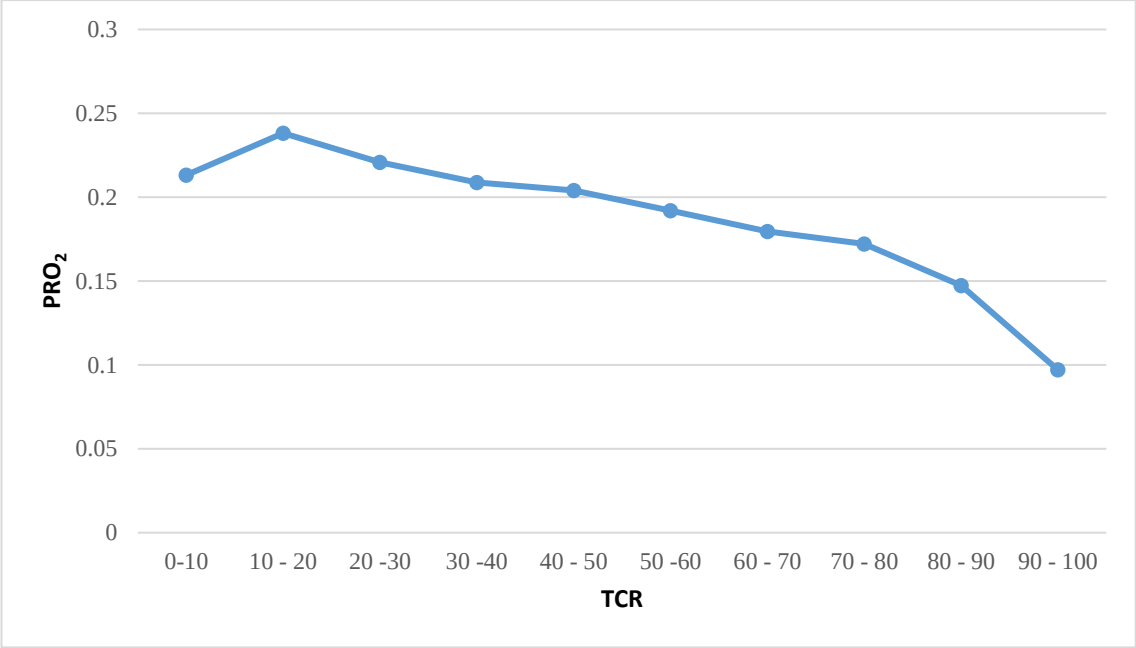

Figure 2.3: Mean value of net profit income (PRO_2) for each decile of trade credit receivable (TCR).

However, the evidence provided by both figures is not sufficient to demonstrate the non-linear relationship between trade credit receivable (TCR) and firm profitability (PRO_1 and PRO_2), because control variables have not been taken into account. Thus, further analyses have been conducted to verify the suggestions of both figures.

Table 2.5 shows the results of the non-linear relationship between trade credit receivable (TCR) and firm profitability (PRO_1 and PRO_2) under three models, namely the Pooled Ordinary Least Squares Model (Pooled OLS), the Fixed Effect Model (FEM), and the Random Effect Model (REM). We have included eight control variables for each model, namely financial leverage (LEV), cash ratio (CASH), liquidity ratio (LIQ), assets tangibility (ATAN), sales growth (GROWTH), firm size (SIZE), industry deviation (INDUST) and the growth rate of Gross Domestic Product (GDP).

In general, in the results of the three models, the association between trade credit receivable (TCR), the square of trade credit receivable (TCR^2) and firm profitability (PRO_1 and PRO_2) are significant. Moreover, trade credit receivable (TCR) has a positive association with firm profitability (PRO_1 and PRO_2) while the square of trade credit receivable (TCR^2) has a negative relationship. All of the control variables of the three models are significant at either the 1 percent or 5 percent level. Next, this study needs to conduct diagnostic tests to identify which model is the most appropriate to apply.

Variables	PRO_1			PRO_2		
	Pooled OLS	FEM	REM	Pooled OLS	FEM	REM
	(1)	(2)	(3)	(4)	(5)	(6)
TCR	0.0644**	0.206***	0.185***	0.042*	0.183***	0.160***
	(0.010)	(0.000)	(0.000)	(0.074)	(0.000)	(0.000)
TCR^2	-0.221***	-0.320***	-0.311***	-0.189***	-0.293***	-0.280***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LEV	0.053***	0.098***	0.102***	0.047***	0.088***	0.091***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CASH	0.265***	0.110***	0.134***	0.278***	0.112***	0.138***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.0047***	0.0007	0.0004	-0.0046***	0.0006	0.0001
	(0.000)	(0.227)	(0.494)	(0.000)	(0.297)	(0.778)
ATAN	0.0874***	0.111***	0.106***	0.060***	0.081***	0.076***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GROWTH	0.063***	0.057***	0.058***	0.066***	0.059***	0.060***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	-0.019***	-0.003*	-0.008***	-0.016***	-0.005***	-0.008***
	(0.000)	(0.083)	(0.000)	(0.000)	(0.001)	(0.000)

Variables	PRO_1			PRO_2		
	Pooled OLS	FEM	REM	Pooled OLS	FEM	REM
	(1)	(2)	(3)	(4)	(5)	(6)
INDUST	0.337***	0.359***	0.359***	0.228***	0.299***	0.294***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP	-0.411***	0.299***	0.121***	-0.363***	0.308***	0.160***
	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)
Constant	0.184***	0.068***	0.092***	0.161***	0.064***	0.082***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LM test			0.000***			0.000***
Hausman		0.000***			0.000***	
Modified Wald		0.000***			0.000***	
Wooldridge		0.000***			0.000***	
Joint test		0.000***			0.000***	
R-squared	0.195	0.198	0.1945	0.171	0.174	0.171
Observation	10,537	10,537	10,537	10,537	10,537	10,537

Notes: In Columns (1), (2) and (3), the dependent variable is gross operating income (PRO_1). In Columns (4), (5) and (6), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. LM test is the p-value of the Breusch-Pagan Lagrange multiplier (LM) test used to choose between Random Effect Model (REM) and Pooled Ordinary Least Squares model (Pooled OLS) . Hausman is the p-value of the Hausman (1978) test used to choose between Fixed Effect Model (FEM) and Random Effect Model (REM). Modified Wald is the p-value of the Modified Wald test for heteroscedasticity. Wooldridge is the p-value of the Wooldridge test for autocorrelation. Joint test is the p-value of a Joint test for time-fixed effects. The p-value in parentheses; ***, **, *** i**ndicates significance at the 10, 5, 1 percent level.

Table 2.5: Regression results on the impact of trade credit receivable on firm profitability.

In order to decide whether the Pooled OLS model will be used or not, the Breusch-Pagan Lagrange multiplier (LM) test is conducted to select between Random Effect Model (REM) and Pooled Ordinary Least Squares Model (Pooled OLS). According to the result of this test presented in columns (3) and (6) of Table 2.5, the p-value of this test is 0.000, which is less than 0.01. This implies that the null hypothesis of no variation across entities will be rejected (Greene & McKenzie, 2012). Hence, these studies will select REM.

Next, the choice between the Fixed Effect Model (FEM) and Random Effect Model (REM) is made by using the Hausman (1978) test. This test checks the correlation between the intercept term and one or more of the explanatory variables. In the case, if this test yields a significant result, it implies that the intercept term correlates with one or more of the explanatory variables (Brooks, 2008). This conflicts with the assumption of the REM in which the intercept term and any explanatory variable do not correlate together. Thus, if the p-value of the Hausman test is significant, the FEM will be appropriate rather than the REM (Brooks, 2008). According to the columns (2) and (5) of Table 2.5, the p-value of the Hausman test is significant at the 1 percent level so the FEM will be an appropriate model for this study.

From the result of the Hausman test, the FEM is used in this study. Next, two diagnostic tests are conducted, namely, the Modified Wald test for heteroscedasticity, and Wooldridge test for autocorrelation in the FEM. The results of these two tests are presented in Table 2.5. Since the p-value of both tests is less than 0.01, which indicates that heteroskedasticity and autocorrelation occur in the FEM. Hence. we control these two issues by using the FEM with cluster-robust standard errors (Greene, 2012). The inclusion of robust standard errors is to control for heteroscedasticity which could arise from the cross-sectional and time-series nature of the data (Petersen, 2009).

After choosing the FEM with cluster-robust standard errors, another diagnostic test is conducted to decide whether one-way or two-way fixed effect estimation will be used, where the latter considers the time effect in the model while the former does not (Wooldridge, 2010). If these effects are not jointly significant, it might suggest that each model should not include a set of time indicator variables and therefore, a one-way fixed effect (i.e. no time fixed effects) will be chosen (Baum, 2006). As can be seen in columns (2) and (5), the p-value of a joint test for time-fixed effects is lower than 0.01; hence, time-fixed effects are needed in the FEM.

Table 2.6 presents the estimated results of quadratic function (3) to check for a non-linear relationship between trade credit receivable (TCR) and firm profitability in the FEM. The dependent variable in column (1) is gross operating income (PRO_1), and that in column (2) is net operating income (PRO_2). The signs of TCR and TCR^2 are unchanged when using two alternative proxies of firm profitability. Specifically, the coefficient of TCR is positive and significant at the 1 percent level in both columns (1) and (2), while that of TCR^2 is negative and significant at the 1 percent level. This finding is consistent with the expectation that TCR has an inverted U-shaped relationship with firm profitability. This means that there exists an optimal level of TCR at which SMEs can balance between costs and benefits to maximize their profitability. When using gross operating income (PRO_1), the coefficient of TCR has a value of 0.187, and the coefficient of TCR^2 is -0.292. According to formula (7), the optimal TCR is (-0.187)/2 x (-0.292) = 0.320. When gross operating income (PRO_1) is replaced by net operating income (PRO_2), the coefficient of TCR has a value of 0.167, and the coefficient of TCR^2 is -0.268. This study finds that the optimal TCR is (-0.167)/ 2 x (-0.268) = 0.312 based on formula (7). The optimal TCR changes only slightly from 0.320 to 0.312 when using two alternative proxies of firm profitability. These findings indicate that high investment in TCR up to

this optimal point increases sales, and thereby increases profitability. After this point, profitability decreases with TCR because of the adverse effect of financial risk.

For control variables, the signs of all control variables are unchanged when the study uses two alternative proxies of firm profitability. Financial leverage (LEV) has a significant and positive association with firm profitability. This finding shows that firms can improve firm profitability by using debt to create tax shields (Modigliani & Miller, 1963). Moreover, cash ratio (CASH) is positively and significantly associated with firm profitability (PRO_1 and PRO_2). Consistent with Chen (2008), firms with higher cash holdings can increase their profitability because they can reduce dependence on costly external financing and increase ability to take on value-enhancing projects. This study finds that the impact of liquidity ratio (LIQ) and firm size (SIZE) on firm profitability is insignificant. Assets tangibility (ATAN) has a positive and significant association with firm profitability (PRO_1 and PRO_2). This finding indicates that firms with high tangible assets can gain easy access to external finance from financial institutions for their operation because those assets can be provided as good collateral (Titman & Wessels, 1988; Rajan & Zingales, 1995; Himmelberg et al., 1999). This allows firms to undertake profitable opportunities in order to improve their profitability. Besides, sales growth (GROWTH) is positively associated with the two proxies of firm profitability and significant at the 1 percent level, which is consistent with previous studies (Baños-Caballero et al., 2012; Martínez-Sola et al., 2014). This means that firms with high sales growth will attain a high market share, which can increase firm profitability (Varaiya et al., 1987). Finally, this study finds a positive and significant association between GDP growth (GDP) and firm profitability (PRO_1 and PRO_2) at the 1 percent level. This implies that economic conditions impact positively on firm performance. In particular, firms will increase their profitability significantly when they operate in countries with good economic conditions (Niskanen & Niskanen, 2006). Those control variables used in this

study are based on the previous studies (Deloof, 2003; Baños-Caballero et al., 2012; Martínez-Sola et al., 2014). This study does not use the book-to-market value as an explanatory variable because this ratio reflects stock returns (Griffin & Lemmon, 2002). In this sense, low book-to-market stocks, referred as growth stocks, earn significant negative excess returns while high book-to-market stock, referred as value stocks, earn significant positive excess returns (Cakici & Topyan, 2014). Hence, Fama and French (1992) and Lakonishok et al. (1994) state that book-to-market ratio is strongly associated with the stock's future performance and highlight it as a popular return predictor.

Variables	PRO_1	PRO_2
	(1)	(2)
TCR	0.187***	0.167***
	(0.000)	(0.000)
TCR^2	-0.292***	-0.268***
	(0.000)	(0.000)
LEV	0.084***	0.076***
	(0.000)	(0.000)
CASH	0.098***	0.101***
	(0.000)	(0.000)
LIQ	-0.000021	-0.000027
	(0.978)	(0.972)
ATAN	0.102***	0.074***
	(0.000)	(0.000)
GROWTH	0.061***	0.062***
	(0.000)	(0.000)
SIZE	0.001	-0.001
	(0.689)	(0.674)
INDUST	0.357***	0.297***
	(0.000)	(0.000)
GDP	0.326***	0.301***
	(0.000)	(0.001)
Constant	0.060***	0.060***
	(0.000)	(0.000)
R-squared	0.221	0.192
Observations	10,537	10,537

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In Column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. All models are estimated with robust standard errors. Time dummies are included in model. P-value in parentheses. ***, **, *** i**ndicates significance at the 10, 5, 1 percent level.

Table 2.6: The non-linear relationship between trade credit receivable and firm profitability in FEM.

Next, the association between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2) is described in Figures 2.4 and 2.5 below. In particular, Figure 2.4 shows the mean value of gross profit income (PRO_1) for each decile of the TCP variable, and Figure 2.5 represents the mean value of net profit income (PRO_2) for each decile of the TCP variable. We can see that the two figures show the relationship between TCP

and firm profitability is concave. In Figure 2.4, firms attain optimal gross profit income (PRO_1) at the seventh decile (60-70) where their PRO_1 is approximately 24%. After this decile, firms will decrease their profitability to 16% when they receive more trade credit from creditors.

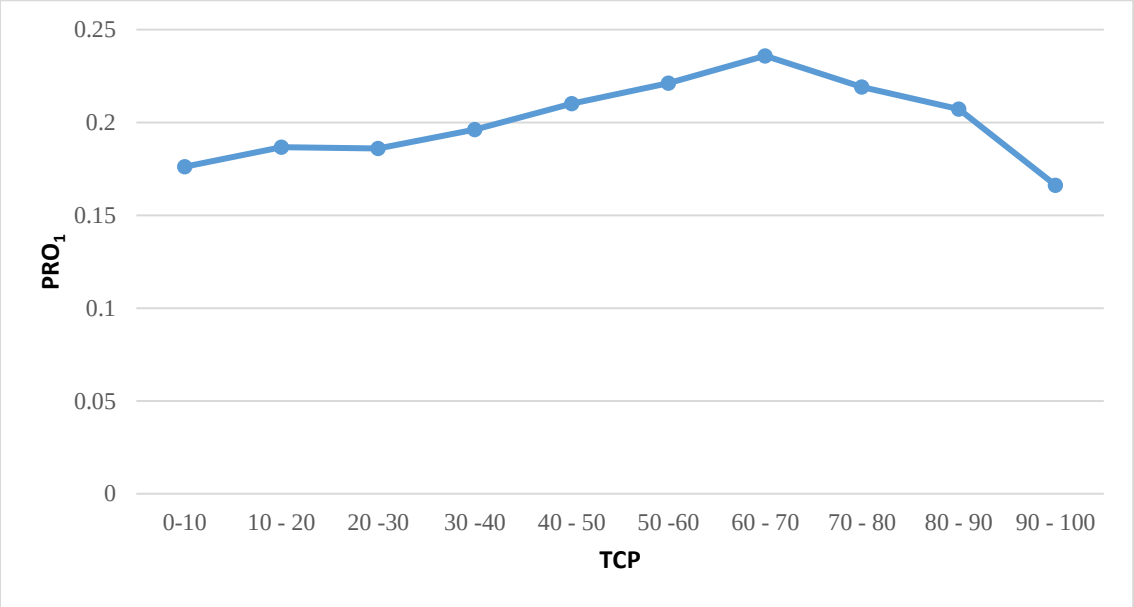

Figure 2.4: Mean value of gross profit income (PRO_1) for each decile of trade credit payable (TCP).

Similarly, Figure 2.5 also indicates that firms attain the highest net profit income (PRO_2) about 20% when their decile of TCP is at 60-70. Firms' net profit income will decrease subsequently. This figure also suggests that TCP has a non-linear association with firm profitability.

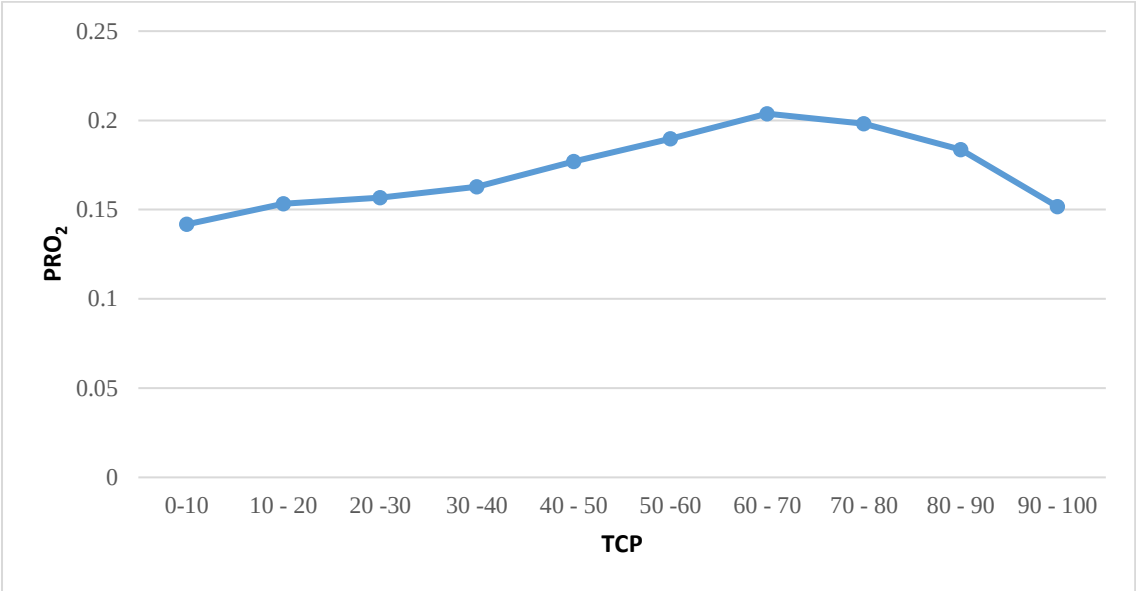

Figure 2.5: Mean value of net profit income (PRO2) for each decile of trade credit payable (TCP).

Nevertheless, the results of both figures are not sufficient to describe a nonlinear relation between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2), because these two figures only describe the trend of the average value of firm profitability for each decile of trade credit payable, without taking into account control variables. Hence, it is necessary to conduct further analyses.

Table 2.7 provides the results regarding the non-linear relationship between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2) under three models: the Pooled Ordinary Least Squares Model (Pooled OLS), the Fixed Effect Model (FEM), and the Random Effect Model (REM). Moreover, this study regresses trade credit payable (TCP) on firm profitability (PRO_1 and PRO_2) including eight control variables such as financial leverage (LEV), cash ratio (CASH), liquidity ratio (LIQ), assets tangibility (ATAN), sales growth (GROWTH), firm size (SIZE), industry deviation (INDUST) and the growth rate of Gross Domestic Product (GDP).

All three models show the same sign of trade credit payable (TCP) and the square of trade credit payable (TCP^2). In particular, the coefficients of TCP are positive and significant at the 1 percent level, while the coefficients of TCP^2 are negative and

significant at the 1 percent level as well. This finding shows that there is an inverted U-shaped association between trade credit payable and firm profitability. However, diagnostic tests are conducted to check whether the results of the models are biased or not, from which, this study will identify the most appropriate model to demonstrate the non-linear relationship between those variables.

This study starts by recognising whether the Pooled OLS model will be used or not, the Breusch-Pagan Lagrange multiplier (LM) test is conducted to select between Random Effect Model (REM) and Pooled Ordinary Least Squares Model (Pooled OLS). According to the result of this test presented in columns (3) and (6) of Table 2.7, the p-value of this test is 0.000, which is less than 0.01. This implies that the null hypothesis of no variation across entities will be rejected (Greene & McKenzie, 2012). Hence, this study will select REM rather than Pooled OLS.

Next, the Hausman (1978) test is used to choose between the Fixed Effect Model (FEM) and the Random Effect Model (REM). From the results presented in columns (2) and (5) of Table 2.7, the p-value of this test is significant at the 1 percent level and hence the FEM will be an appropriate model for this study. Besides, two diagnostic tests are used, namely, the Modified Wald test for heteroscedasticity, and Wooldridge test for autocorrelation in the FEM. From the results of these two tests presented in columns (2) and (5) of Table 2.7, their p-value is lower than 0.01, which indicates that heteroscedasticity and autocorrelation occur in the FEM. Hence. this study controls two issues by using the FEM with cluster-robust standard errors (Greene, 2012).

Variables	PRO_1			PRO_2		
	Pooled OLS	FEM	REM	Pooled OLS	FEM	REM
	(1)	(2)	(3)	(4)	(5)	(6)
TCP	0.805***	1.009***	0.987***	0.740***	0.929***	0.908***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TCP^2	-2.044***	-2.614***	-2.567***	-1.674***	-2.331***	-2.255***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LEV	0.014	0.069***	0.071***	0.003	0.060***	0.058***
	(0.143)	(0.000)	(0.000)	(0.773)	(0.000)	(0.000)
CASH	0.256***	0.112***	0.134***	0.269***	0.113***	0.138***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.003***	0.002***	0.002***	-0.003***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
ATAN	0.092***	0.108***	0.104***	0.065***	0.078***	0.074***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GROWTH	0.064***	0.057***	0.059***	0.066***	0.059***	0.060***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	-0.022***	-0.005***	-0.011***	-0.019***	-0.008***	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Variables	PRO_1			PRO_2		
	Pooled OLS	FEM	REM	Pooled OLS	FEM	REM
	(1)	(2)	(3)	(4)	(5)	(6)
INDUST	0.358***	0.346***	0.352***	0.251***	0.287***	0.287***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP	-0.684***	0.266***	0.074*	-0.628***	0.275***	0.112**
	(0.000)	(0.000)	(0.093)	(0.000)	(0.000)	(0.011)
Constant	0.168***	0.053***	0.076***	0.144***	0.050***	0.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LM test			0.000***			0.000***
Hausman		0.000***			0.000***	
Modified Wald		0.000***			0.000***	
Wooldridge		0.000***			0.000***	
Joint test		0.000***			0.000***	
R-squared	0.200	0.218	0.215	0.179	0.193	0.191
Observation	10,537	10,537	10,537	10,537	10,537	10,537

Notes: In Columns (1), (2) and (3), the dependent variable is gross operating income (PRO_1). In Columns (4), (5) and (6), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. LM test is the p-value of the Breusch-Pagan Lagrange multiplier (LM) test used to choose between Random Effect Model (REM) and Pooled Ordinary Least Squares model (Pooled OLS) . Hausman is the p-value of the Hausman (1978) test used to choose between Fixed Effect Model (FEM) and Random Effect Model (REM). Modified Wald is the p-value of the Modified Wald test for heteroscedasticity. Wooldridge is the p-value of the Wooldridge test for autocorrelation. Joint test is the p-value of a Joint test for time-fixed effects. The p-value in parentheses; ***, **, *** i**ndicates significance at the 10, 5, 1 percent level.

Table 2.7: Regression results between trade credit payable and firm profitability.

For the FEM with cluster-robust standard errors, another diagnostic test is conducted to decide between one-way and two-way fixed effect estimation, where the latter considers the time effect in the model while the former does not (Wooldridge, 2010). If these effects are not jointly significant, it might suggest that each model should not include a set of time indicator variables and therefore, a one-way fixed effect (i.e. no time fixed effects) will be chosen (Baum, 2006). From columns (2) and (5) of Table 2.7, the p-value of these two tests is lower than 0.01. This shows that time-fixed effect has to be included in the FEM. From the above argument, this study uses the FEM with cluster-robust standard error as the main research model to check the U-shaped relationship between TCP and firm profitability.

The results of the influence of TCP on firm profitability are presented in Table 2.8. When using two alternative proxies of firm profitability, the signs of TCP and TCP^2 are unchanged. The coefficient of TCP is statistically significant and positive and its square is statistically significant and negative at the 1 percent level. This finding confirms that there is an inverted U-shaped relationship between TCP and firm profitability, which is consistent with the expectation. In other words, there is an optimal level of TCP where firms can balance between costs and benefits in order to maximize their profitability. At a low level of TCP, firms will improve their profitability because of the benefits of receipt of trade credit from suppliers over its costs. However, when firms' TCP is above this optimum, the financial costs of using trade credit impact negatively on firm profitability. Hence, the relationship between TCP and firm profitability is negative. From column (1) of Table 2.8, the coefficient of TCP has a value of 0.919 and the coefficient of TCP^2 is -2.361 when gross operating income (PRO_1) is used as a proxy for firm profitability. According to formula (8), the optimal level of TCP is (-0.919)/ 2 x (-2.361) = 0.195. In column (2), when net operating income (PRO_2) is used in place of gross operating profit (PRO_1), the coefficient of TCP has a value of 0.853, and the coefficient of TCP^2 is -2.115.

This study finds that the optimal TCR is (-0.853)/ 2x (-2.115) = 0.202. These findings show that there are two optimal points when using two different proxies of firm profitability. Below these points, the benefits of receipt of trade credit outweigh the costs; hence, TCP impacts positively on firms' profitability. Conversely, when firms have trade credit level above these optimums, the effects of financial costs outweigh the benefits, and therefore, TCP has a negative effect on profitability.

As regards the control variables, this study shows a significant and positive association between financial leverage (LEV) and firm profitability (PRO_1 and PRO_2). This means that firms use debt to create tax shields, and hence they can improve their profitability (Modigliani & Miller, 1963). Furthermore, cash ratio (CASH) is positively and significantly associated with firm profitability (PRO_1 and PRO_2). Firms with higher cash holdings are less depended on costly external finance and have greater ability to undertake value-enhancing projects (Chen, 2008). This increases firm profitability. Liquidity ratio (LIQ) has a significantly positive relationship with firm profitability (PRO_1 and PRO_2). Assets tangibility (ATAN) has a significantly positive association with firm profitability (PRO_1 and PRO_2). This finding is consistent with the expectation that firms with high tangible assets can gain easy access to external finance from financial institutions. This helps them to undertake profitable opportunities in order to improve their profitability. Besides, sales growth (GROWTH) is found to be positively associated with the two proxies of firm profitability and significant at the 1 percent level. Consistent with previous studies (Baños-Caballero et al., 2012; Martínez-Sola et al., 2014), this finding indicates that firms with high sales growth will attain a high market share, which can increase firm profitability (Varaiya et al., 1987). This study does not find an association between firm size (SIZE) and firm profitability (PRO_1 and PRO_2). Finally, this study finds a positive and significant association between GDP growth (GDP) and firm profitability (PRO_1 and PRO_2) at the 1 percent level. This implies that economic

conditions impact positively on firm performance. In particular, firms will significantly increase their profitability when they operate in countries with good economic conditions (Niskanen & Niskanen, 2006).

Variables	PRO_1	PRO_2
	(1)	(2)
TCP	0.919***	0.853***
	(0.000)	(0.000)
TCP^2	-2.361***	-2.115***
	(0.000)	(0.000)
LEV	0.058***	0.050***
	(0.000)	(0.001)
CASH	0.101***	0.104***
	(0.000)	(0.000)
LIQ	0.002**	0.001*
	(0.048)	(0.067)
ATAN	0.100***	0.072***
	(0.000)	(0.000)
GROWTH	0.060***	0.061***
	(0.000)	(0.000)
SIZE	-0.001	-0.004
	(0.710)	(0.207)
INDUST	0.346***	0.286***
	(0.000)	(0.000)
GDP	0.268***	0.245***
	(0.002)	(0.006)
Constant	0.050***	0.049***
	(0.000)	(0.000)
R-squared	0.238	0.208
Obs	10,537	10,537

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. All models are estimated with robust standard errors. Time dummies are included in the model. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.8: The non-linear relationship between trade credit payable and firm profitability in FEM.

2.4.4. Trade credit and firm profitability under financial constraints

As discussed in the above sections, SMEs have an optimal point of trade credit receivable (TCR) and trade credit payable (TCP) where they can balance between benefits and costs to maximise their profitability. However, SMEs face restrictions on access to finance because of greater information asymmetry between them and the capital market (Baños-Caballero et al., 2014). Their information is insufficient or lower than the requirements of the market assessment (Hill et al., 2010; Baños-Caballero et al., 2014). Thus, this section will verify whether or not the optimal level of trade credit differs according to different levels of financing constraints faced by firms.

Table 2.9 shows the regression results of the association between trade credit receivable (TCR) and firm profitability (PRO_1 and PRO_2) for less and more financially constrained firms categorized according to cash flow. The results show a non-linear relationship between trade credit and profitability for both more and less financially constrained firms for the two alternative proxies of firm profitability. The less financially constrained firms (FC = 0) have a positive and significant coefficient of TCR ($\beta_1 > 0$) at the 1 percent level, and their coefficient of TCR^2 is negative and significant ($\beta 2 < 0$) at the 1 percent level. The results show the presence of a concave relationship between trade credit and profitability for these firms. On the other hand, for more financially constrained firms (FC = 1), while their coefficient of TCR is still positive ($(\beta_1 + \alpha_1) > 0$), that of TCR^2 is negative ($(\beta_2 + \alpha_2) < 0$). Moreover, this study also includes an F-test in order to check whether the coefficient of TCR variable is significant for more financially constrained firms. In particular, the F_1 test shows whether the coefficient of TCR (i.e. $(\beta_1 + \alpha_1)$) is significant, while the F_2 test investigates whether the coefficient of TCR^2 (i.e. $(\beta_2 + \alpha_2)$) is significant. As can be seen in Table 2.9, the F_1 tests for the coefficients of TCR and F_2 tests for the coefficients of TCR^2 are most significant, confirming the concave relationship for the more financially constrained firms.

When comparing the optimal TCR level between less financially constrained firms and more financially constrained ones, the optimal TCR level of the latter is lower than that of the former. Specifically, with gross operating income (PRO_1) as the dependent variable and cash flow used as a proxy for financial constraints, the coefficient of TCR has a value of 0.307, and that of TCR^2 is -0.328 for less financially constrained firms. Hence, the optimal TCR of less financially constrained firms (FC = 0) is (-0.307)/ 2 x (-0.328) = 0.468. For more financially constrained firms (FC = 1), the value of the coefficient of TCR is 0.307 + (-0.246) = 0.061 and that of the coefficient of TCR^2 is (-0.328) + 0.143 = (-0.185). Based on formula (7), the optimal TCR for those firms is (-0.061)/ 2 x (-0.185) = 0.165. Similarly, for less financially constrained firms (FC = 0), when using net operating income (PRO_2**)**, the coefficient of TCR has a value of 0.282, and that of TCR^2 is -0.301. Thus, the optimal TCR of those firms is (-0.282) / 2 x (-0.301) = 0.468. For more financially constrained firms (FC = 1), the value of the coefficient of TCR is 0.282 + (-0.240) = 0.042 and that of the coefficient of TCR^2 is (-0.301) + 0.139 = (-0.162). Based on formula (7), the optimal TCR for those firm is (-0.042) / 2 x (-0.162) = 0.130. Hence, consistent with expectation, this study indicates that less financially constrained firms have a higher level of optimal trade credit receivable than more financially constrained ones.

Variables	PRO_1	PRO_2
	(1)	(2)
TCR	0.307***	0.282***
	(0.000)	(0.000)
TCR * FC	-0.246***	-0.240***
	(0.000)	(0.000)
TCR^2	-0.328***	-0.301***
	(0.000)	(0.000)
TCR^2 * FC	0.143***	0.139***
	(0.000)	(0.000)
LEV	0.090***	0.083***
	(0.000)	(0.000)
CASH	0.091***	0.095***
	(0.000)	(0.000)
LIQ	0.0002	0.0002
	(0.774)	(0.783)
ATAN	0.103***	0.074***
	(0.000)	(0.000)
GROWTH	0.050***	0.051***
	(0.000)	(0.000)
SIZE	0.001	-0.0014
	(0.705)	(0.64)
INDUST	0.346***	0.286***
	(0.000)	(0.000)
GDP	0.282***	0.258***
	(0.001)	(0.003)
Constant	0.059***	0.058***
	(0.000)	(0.000)
F_1	0.06*	0.00***
F_2	0.00***	0.00***
R-squared	0.278	0.249
Observations	10,537	10,537

Note: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All models are estimated with robust standard errors. Time dummies are included in the model. F_1 is the p-value of an F-test for the linearrestriction test under the following null hypothesis H_0 : $(\beta_1+\alpha_1) = 0$. F_2 is the p-value of an F-test for the linear restriction test under the following null hypothesis H_0 : $(\beta_2+\alpha_2) = 0$. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.9: The impact of financial constraints on the relationship between trade credit receivable and firm profitability in FEM.

Table 2.10 shows the regression results of the association between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2) for less and more financially constrained firms categorized according to cash flow. When using two alternative proxies of firm profitability, this study indicates that trade credit payable has a non-linear association with profitability for both more and less financially constrained firms. The less financially constrained firms (FC = 0) have a positive coefficient of TCP ($\beta_1 > 0$) and significant at the 1 percent level. Moreover, those firms have a negative coefficient of TCR^2 ($\beta 2 < 0$) and significant at the 1 percent level. Hence, the association between trade credit payable and profitability is concave for less financially constrained firms. When considering more financially constrained firms (FC = 1), the coefficient of TCP is still positive ($(\beta_1 + \alpha_1) > 0$) and that of TCP^2 is negative ($(\beta_2 + \alpha_2) < 0$). An F-test is conducted in order to check whether the coefficient of the TCP variable is significant for more financially constrained firms. As a result of this test presented in Table 2.10, the F_1 test for the coefficient of TCP (i.e. $(\beta_1 + \alpha_1)$) and F_2 test for the coefficient of TCP^2 (i.e. $(\beta_2 + \alpha_2)$) are most significant. This confirms that more financially constrained firms have a concave relationship between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2).

Next, this study compares the optimal TCP level between less financially constrained firms and more financially constrained ones. In column (1), when using gross operating income (PRO_1) as the dependent variable, the coefficient of TCP of less financially constrained firms (FC = 0) has a value of 0.788 and their coefficient of TCP^2 is -0.888. According to formula (8), the optimal of TCP is (-0.788) / 2 x (-0.888) = 0.444 for less financially constrained firms (FC = 0). Similarly, for more financially constrained firms (FC = 1), the value of the coefficient of TCP is 0.788 + (-0.657) = 0.131 and that of the coefficient of TCP^2 is (-0.888) + 0.604 = (-0.284). From these values, the optimal TCP of more financially constrained firms (FC = 1) is (-0.131) / 2 x (-0.284) = 0.231.

When net operating income (PRO_2) is used as a profit proxy, the coefficient of TCP of less financially constrained firms (FC = 0) is 0.776, and that of TCP^2 is -0.838. Thus, the optimal TCP of those firms is (-0.776) / 2 x (-0.838) = 0.463. For more financially constrained firms, the value of the coefficient of TCP is 0.776 + (-0.642) = 0.134 and that of the coefficient of TCP^2 is (-0.838) + 0.580 = (-0.258). The optimal TCP of those firms is (-0.134) / 2 x (-0.258) = 0.260. Hence, this study indicates that less financially constrained firms have a higher level of optimal trade credit payable than the more financially constrained ones. This finding is consistent with the expectation.

Variables	PRO_1	PRO_2
	(1)	(2)
TCP	0.788***	0.776***
	(0.000)	(0.000)
TCP * FC	-0.657***	-0.642***
	(0.000)	(0.000)
TCP^2	-0.888***	-0.838***
	(0.000)	(0.000)
TCP^2 * FC	0.604***	0.580***
	(0.000)	(0.000)
LEV	0.071***	0.061***
	(0.000)	(0.000)
CASH	0.093***	0.096***
	(0.000)	(0.000)
LIQ	0.0014*	0.0013*
	(0.077)	(0.090)
ATAN	0.107***	0.078***
	(0.000)	(0.000)
GROWTH	0.049***	0.050***
	(0.000)	(0.000)
SIZE	0.001	-0.0018
	(0.694)	(0.530)
INDUST	0.334***	0.274***
	(0.000)	(0.000)
GDP	0.233***	0.209**
	(0.007)	(0.017)
Constant	0.055***	0.059***
	(0.000)	(0.000)
F_1	0.01	0.01
F_2	0.03	0.04
R-squared	0.290	0.261
Observations	10,537	10,537

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All models are estimated with robust standard errors. Time dummies are included in the model. F_1 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_1+\alpha_1) = 0$. F_2 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_2+\alpha_2) = 0$. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.10: The impact of financial constraints on the relationship between trade credit payable and firm profitability in FEM.

2.5. Robustness Checks

2.5.1. Deviation from the optimal trade credit level

The above results show the existence of an optimal level of trade credit which maximizes the profitability of SMEs. In other words, trade credit has a concave relationship with firm profitability. This means that firms' profitability will decrease when their level of trade credit moves away from the optimal point. Hence, this study will conduct a robustness check in order to verify the presence of optimal trade credit by investigating how deviations on both sides of the optimal trade credit level impact on firms' profitability.

Table 2.11 displays the change of firm profitability when trade credit receivable deviates from the optimal level. Columns (1) and (3) display the effect of deviations from the optimum on firm profitability, without considering the differing effects of below- and above-optimum. The coefficient of DEVIATION_TCR is negative and statistically significant at the 1 percent level ($\alpha_1 < 0$) when using two alternative measures of firm profitability. This finding is consistent with the expectation that deviations from optimal trade credit decrease firm profitability. In columns (2) and (4), this study represents the influence of below- and above- optimum deviations, respectively, on the firm's profitability. The coefficient of DEVIATION_TCR is negative and significant, while INTERACT_TCR is statistically insignificant. According to Martínez-Sola et al. (2013a), INTERACT_TCR could be negative or positive. However, the most important point here is that the sum of the coefficients $\alpha_1 + \alpha_2$ remains negative and statistically significant. According to the results presented in columns (2) and (4), the sum of coefficients of DEVIATION_TCR and INTERACT_TCR is (-0.07) + (-0.011) = (-0.081) when using gross operating income (PRO_1) and this value is (-0.066) + (-0.01) = (-0.076) when using net operating income (PRO_2). Moreover, an F-test is conducted to investigate whether the sum of these two coefficients is statistically significant. As can be seen in columns (2)

and (4), the p-value of the F-test is lower than 0.01, indicating that the sum of these two coefficients is statistically significant. Hence, this finding is consistent with the expectation that above-optimal and below-optima deviations decrease firm profitability.

	PRO_1		PRO_2	
Variables	(1)	(2)	(3)	(4)
DEVIATION_TCR	-0.059***	-0.07*	-0.061***	-0.066*
	(0.000)	(0.089)	(0.000)	(0.097)
INTERACT_TCR		-0.011		-0.01
		(0.822)		(0.835)
LEV	0.095***	0.123***	0.086***	0.103***
	(0.000)	(0.000)	(0.000)	(0.000)
CASH	0.102***	0.106***	0.105***	0.116***
	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	0.0003	0.0004	0.0002	0.0004
	(0.731)	(0.682)	(0.757)	(0.638)
ATAN	0.106***	0.070***	0.077***	0.085***
	(0.000)	(0.000)	(0.000)	(0.000)
GROWTH	0.064***	0.070***	0.065***	0.073***
	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.0033	-0.0012	0.0003	-0.004
	(0.274)	(0.765)	(0.929)	(0.310)
INDUST	0.362***	0.232***	0.301***	0.299***
	(0.000)	(0.000)	(0.000)	(0.000)

Variables	PRO_1		PRO_2	
	(1)	(2)	(3)	(4)
GDP	0.332***	0.390***	0.307***	0.329***
	(0.000)	(0.000)	(0.001)	(0.003)
Constant	0.064***	0.083***	0.063***	0.069***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test		0.000***		0.000***
R-squared	0.213	0.175	0.186	0.160
Observations	10,537	10,537	10,537	10,537

Notes: In columns (1) and (2), the dependent variable is gross operating income (PRO_1). In columns (3) and (4), the dependent variable is net operating income (PRO_2). DEVIATION_TCR is the residuals from optimal level of trade credit receivable. INTERACT_TCR isDEVIATION_TCR* above-optimal. The above optimal is a dummy variable that takes 0 for negative residuals and 1otherwise. All control variables are defined in Table 2.2. All models are estimated with robust standard errors. Time dummies are included in all regressions. F-test is the p-value of an F-test for the null hypothesis that the sum of the coefficients of deviation and interact is zero. P-value in parentheses. *, **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.11: The relationship between deviations from optimal trade credit level and firm profitability in FEM.

Table 2.12 displays the change of firm profitability when trade credit payable deviates from the optimal level. In columns (1) and (3), the coefficient of DEVIATION_TCP is negative and statistically significant at the 1 percent level ($\alpha_1 < 0$) when using two alternative measures of firm profitability, namely, the gross operating income (PRO_1) and net operating income (PRO_2). This finding is consistent with the expectation that firm profitability will decrease when the level of trade credit payable deviates from the optimal trade credit payable. In columns (2) and (4), this study shows the influence of below- and above- optimum deviations of trade credit payable, respectively, on the firm's profitability. In particular, the coefficient of DEVIATION_TCP is negative and significant at the 1 percent level, while that of INTERACT_TCP is positive and significant at the 1 percent level. Although the sign of these two variables is different, the most important point here is that the sum of the coefficients of these variables remains negative and statistically significant. From columns (2) and (4) of Table 2.12, the sum of the coefficients of DEVIATION_TCP and INTERACT_TCP is (-0.707) + 0.601 = (-0.106) when using gross operating income (PRO_1) and this value is (-0.656) + 0.559 = (-0.097) when using net operating income (PRO_2). Moreover, an F-test is conducted to investigate whether the sum of these two coefficients is statistically significant. As can be seen in columns (2) and (4), the p-value of the F-test is lower than 0.10, indicating that the sum of these two coefficients is statistically significant. Hence, this finding is consistent with the expectation that above-optimal and below-optimal deviations decrease firm profitability.

	PRO_1		PRO_2	
Variables	(1)	(2)	(3)	(4)
DEVIATION_TCP	-0.253***	-0.707***	-0.233***	-0.656***
	(0.000)	(0.000)	(0.000)	(0.00)
INTERACT_TCP		0.601***		0.559***
		(0.000)		(0.000)
LEV	0.132***	0.125***	0.118***	0.111***
	(0.000)	(0.000)	(0.000)	(0.000)
CASH	0.127***	0.133***	0.132***	0.138***
	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.0002	-0.0008	-0.0002	-0.0008
	(0.855)	(0.343)	(0.841)	(0.365)
ATAN	0.118***	0.121***	0.089***	0.092***
	(0.000)	(0.000)	(0.000)	(0.000)
GROWTH	0.069***	0.0681***	0.073***	0.072***
	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	-0.0022	-0.0023	-0.005	-0.005
	(0.580)	(0.561)	(0.197)	(0.186)
INDUST	0.375***	0.362***	0.299***	0.287***
	(0.000)	(0.000)	(0.000)	(0.000)

Variables	PRO_1		PRO_2	
	(1)	(2)	(3)	(4)
GDP	0.378***	0.385***	0.329***	0.335***
	(0.000)	(0.000)	(0.003)	(0.002)
Constant	0.063***	0.052***	0.064***	0.054***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test		0.050		0.078
R-squared	0.189	0.195	0.160	0.165
Observations	10,537	10,537	10,537	10,537

Notes: In columns (1) and (2), the dependent variable is gross operating income (PRO_1). In columns (3) and (4), the dependent variable is net operating income (PRO_2). DEVIATION_TCP is the residuals from optimal level of trade credit receivable. INTERACT_TCP is DEVIATION_TCP * above-optimal. The above optimal is a dummy variable that takes 0 for negative residuals and 1 otherwise. All control variables are defined in Table 2.2. All models are estimated with robust standard errors. Time dummies are included in all regressions. F-test is the p-value of an F-test for the null hypothesis that the sum of the coefficients of deviation and interact is zero. P-value in parentheses. *, **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.12: The relationship between deviations from optimal trade credit level and firm profitability in FEM.

2.5.2. Endogeneity problem

Previous studies indicate that the problem of potential endogeneity could seriously impact on the estimation outcomes hence financial decisions (Pais & Gama, 2015; Lyngstadaas & Berg, 2016). This problem arises because the association between investment in trade credit and firm profitability may reflect a bi-directional influence between profitability and trade credit investment. To control for this problem, this study resorts to the instrumental variables method to estimate equations (3), (4), (9) and (10). In particular, the first lag of the independent variables TCR and TCP is used as instrumental variables. In general, the instrumental variable estimation results do not alter the earlier conclusion that there exists an inverted U-shaped relationship between trade credit and SMEs' profitability, although the sizes of the coefficients do change a little.

As shown in Table 2.13, the coefficients of TCR is positive and significant ($\beta_1 > 0$) while that of TCR^2 is negative and significant ($\beta_2 < 0$) for the two alternative proxies of firm profitability, namely, gross operating income (PRO_1) and net operating income (PRO_2). This finding confirms that there is an inverted U-shaped association between TCP and firm profitability, which is consistent with expectation. This study also finds the optimal level of TCR. From column (1) of Table 2.16, the coefficient of TCR has a value of 0.131 and the coefficient of TCR^2 is -0.406 when gross operating income (PRO_1) is used as a proxy for firm profitability. According to formula (7), the optimal level of TCP is (-0.131)/ 2 x (-0.406) = 0.161. In column (2), **w**hen net operating income (PRO_2) is used in place of gross operating income (PRO_1), the coefficient of TCR has a value of 0.117, and the coefficient of TCR^2 is -0.375. This study finds that the optimal TCR is (-0.117)/ 2x (-0.375) = 0.156. This finding confirms that there is a optimal level of TCR where firms can balance between costs and benefits in order to maximize firm profitability. Below this point, the benefits of provision of trade credit outweigh its costs**;** hence, TCR impacts positively on firms' profitability. Conversely, when firms have a

trade credit level above this optimum, the effects of financial costs outweigh the benefits, and therefore, TCR has a negative impact on profitability.

Variables	PRO_1	PRO_2
	(1)	(2)
TCR	0.131***	0.117**
	(0.009)	(0.018)
TCR^2	-0.406***	-0.375***
	(0.000)	(0.000)
LEV	-0.029***	-0.025**
	(0.009)	(0.024)
CASH	0.234***	0.251***
	(0.000)	(0.000)
LIQ	-0.008***	-0.007***
	(0.000)	(0.000)
ATAN	0.051***	0.031***
	(0.000)	(0.000)
GROWTH	0.059***	0.061***
	(0.000)	(0.000)
SIZE	-0.023***	-0.019***
	(0.000)	(0.000)
INDUST	0.202***	0.101***
	(0.000)	(0.000)
GDP	-0.406***	-0.440***
	(0.000)	(0.000)
Constant	0.245***	0.212***
	(0.000)	(0.000)
R-squared	0.184	0.160
Observations	9,025	9,025

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In Column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. All models are estimated with robust standard errors. Time dummies are included in model. P-value in parentheses. *, **, *** indicate significance at the 10, 5, 1 percent level.

Table 2.13: The non-linear relationship between trade credit receivable and firm profitability in 2SLS estimation.

From Table 2.14, the coefficients of TCP are positive and significant ($\beta_1 > 0$), while that of TCP^2 is negative and significant ($\beta_2 < 0$) for the two alternative proxies of firm profitability. These findings indicate that TCP has a concave relationship with firm profitability. This is consistent with the expectation. In Column (1), the coefficient of TCP is 1.658 and that of TCP^2 is -5.466. According to formula (8), the optimal level of TCP is (-1.658) / 2x(-5.466) = 0.152. In Column (2), the coefficient of TCP is 1.647 and that of TCP^2 is -5.240. Hence, the optimal level of TCP is (-1.647) / 2x (-5.240) = 0.157. This finding shows that there is an optimal point of TCP where firms can balance between costs and benefits to maximize their profitability. Firms will receive more benefits of receipt of trade credit from suppliers over its costs when their TCP level is below the optimal point. Hence, they can improve their profitability. Conversely, when firms have a trade credit level above this optimum, the effects of financial costs outweigh the benefits, and therefore, TCR has a negative impact on profitability.

Variables	PRO_1	PRO_2
	(1)	(2)
TCP	1.658**	1.647**
	(0.025)	(0.018)
TCP^2	-5.466*	-5.240*
	(0.063)	(0.057)
LEV	-0.043**	-0.045***
	(0.015)	(0.008)
CASH	0.227***	0.242***
	(0.000)	(0.000)
LIQ	-0.004**	-0.003*
	(0.041)	(0.091)
ATAN	0.067***	0.046***
	(0.000)	(0.000)
GROWTH	0.061***	0.063***
	(0.000)	(0.000)
SIZE	-0.027***	-0.023***
	(0.000)	(0.000)
INDUST	0.244***	0.147***
	(0.000)	(0.000)
GDP	-1.166***	-1.169***
	(0.000)	(0.000)
Constant	0.193***	0.158***
	(0.000)	(0.000)
R-squared	0.171	0.150
Observations	9,025	9,025

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In Column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. All models are estimated with robust standard errors. Time dummies are included in model. P-value in parentheses. *, **, *** indicates significance at the 10, 5, 1 percent level.

Table 2.14: The non-linear relationship between trade credit payable and firm profitability in 2SLS estimation.

Table 2.15 shows that less and more financially constrained firms have significant and positive coefficients of TCR while their coefficients of TCR^2 are negative and significant. Hence, the results again confirm that these firms have a concave relationship between trade credit and firm profitability.

Next, this study will compare the optimal point of TCR between less and more financially constrained firms. When gross operating income (PRO_1) is used as a proxy for firm profitability, the coefficient of TCR is 0.809 and that of TCR^2 is -1.075 for less financially constrained firms (FC = 0). The optimal point of these firms is (-0.809)/2 x (-1.075) = 0.376. On the other hand, for more financially constrained firms (FC = 1), the coefficient of TCR is 0.809 + (-0.577) = 0.232 and that of TCR^2 is (-1.075) + 0.189 = (-0.886). Hence, the optimal point of more financially constrained firms is (-0.232) / 2x (-0.886) = 0.131. When using net operating income (PRO_2), the coefficient of TCR is 0.752 and that of TCR^2 is -1.005 for less financially constrained firms (FC = 0). Thus, their optimal point is (-0.752) / 2 x (-1.005) = 0.374. For more financially constrained firms, the coefficient of TCR is 0.752 + (-0.536) = 0.216 and that of TCR^2 is (-1.005) + 0.177 = (-0.828). Hence, the optimal point of TCR is (-0.216)/ 2 x (-0.828) = 0.13. Consequently, this finding shows that more financially constrained companies have a lower optimal level of TCR than less financially constrained ones.

Variables	PRO_1	PRO_2
	(1)	(2)
TCR	0.809***	0.752***
	(0.000)	(0.000)
TCR * FC	-0.577***	-0.536***
	(0.000)	(0.000)
TCR^2	-1.075***	-1.005***
	(0.000)	(0.000)
TCR^2 * FC	0.189***	0.177***
	(0.000)	(0.000)
LEV	0.009	0.0104
	(0.423)	(0.344)
CASH	0.232***	0.249***
	(0.000)	(0.000)
LIQ	-0.006***	-0.006***
	(0.000)	(0.000)
ATAN	0.030***	0.011
	(0.000)	(0.186)
GROWTH	0.032***	0.036***
	(0.000)	(0.000)
SIZE	-0.025***	-0.021***
	(0.000)	(0.000)
INDUST	0.190***	0.090***
	(0.000)	(0.001)
GDP	-0.650***	-0.666***
	(0.000)	(0.000)
Constant	0.213***	0.181***
	(0.000)	(0.000)
F_1	0.00	0.00
F_2	0.00	0.00
R-squared	0.172	0.146
Observations	9,025	9,025

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All models are estimated with robust standard errors. Time dummies are included in the model. F_1 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_1+\alpha_1) = 0$. F_2 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_2+\alpha_2) = 0$. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.15: The impact of financial constraints on the relationship between trade credit receivable and firm profitability in 2SLS estimation.

Table 2.16 shows that less and more financially constrained firms have significant and positive coefficients of TCP. Meanwhile, their coefficients of TCP^2 are negative and significant. Thus, the results again confirm that these firms have a concave relationship between trade credit and firm profitability.

Next, this study identifies difference in optimal level between less financially constrained firms and more financially constrained ones. In column (1) of Table 2.16, for less financially constrained firms, the coefficient of TCP is 1.931 and that of TCP^2 is -5.779 when using gross operating income (PRO_1) as a proxy for firm profitability. Based on formula (8), the optimal point of TCP is (-1.931) / 2 x (-5.779) = 0.167. On the other hand, for more financially constrained firms, the coefficient of TCP is 1.931 + (-1.725) = 0.206 while the coefficient of TCP^2 is (-5.779) + 2.780 = (-2.999). Thus, the optimal point of TCP is (-0.206) / 2 x (-2.999) = 0.034. Similarly, when using net operating income (PRO_2), the coefficient of TCP of less financially constrained firms is 1.811 while these firms' coefficient of TCP^2 is -5.190. The optimal point of these firms is (-1.811) / 2 x (-5.190) = 0.174. For more financially constrained firms, the coefficient of TCP is 1.811 + (-1.578) = 0.233 and the coefficient of TCP^2 is (-5.190) + 2.560 = (-2.630). According to formula (8), the optimal point of TCP level is (-0.233) / 2 x (-2.630) = 0.044. Thus, more financially constrained companies have a lower optimal level of trade credit payable (TCP) than less financially constrained ones. In general, all results are consistent with those displayed in Tables 2.9 and 2.10.

Variables	PRO_1	PRO_2
	(1)	(2)
TCP	1.931***	1.811***
	(0.000)	(0.000)
TCP * FC	-1.725***	-1.578***
	(0.000)	(0.000)
TCP^2	-5.779***	-5.190***
	(0.000)	(0.000)
TCP^2 * FC	2.780***	2.560***
	(0.000)	(0.000)
LEV	-0.027**	-0.032***
	(0.021)	(0.005)
CASH	0.222***	0.238***
	(0.000)	(0.000)
LIQ	-0.005***	-0.004***
	(0.000)	(0.000)
ATAN	0.054***	0.034***
	(0.000)	(0.000)
GROWTH	0.033***	0.038***
	(0.000)	(0.000)
SIZE	-0.025***	-0.021***
	(0.000)	(0.000)
INDUST	0.198***	0.104***
	(0.000)	(0.000)
GDP	-1.202***	-1.192***
	(0.000)	(0.000)
Constant	0.229***	0.193***
	(0.000)	(0.000)
F_1	0.09	0.09
F_2	0.00	0.00
R-squared	0.219	0.197
Observations	9,025	9,025

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All models are estimated with robust standard errors. Time dummies are included in the model. F_1 is the p-value of an F-test for the linearrestriction test under the following null hypothesis $H_0 : (\beta_1+\alpha_1) = 0$. F_2 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0 : (\beta_2+\alpha_2) = 0$. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.16: The impact of financial constraints on the relationship between trade credit payable and firm profitability in 2SLS estimation.

2.5.3. Alternative measure for financial constraints

In this section, this study will use the cost of external financing as another proxy for the existence of financial constraints. This ratio is calculated as the ratio of financial expenses to total debt (Baños-Caballero et al., 2014). Firms with the cost of external financing above the sample median are considered financially constrained because their external financing is too expensive (Fazzari et al., 1988). Otherwise, they are less likely to face financial constraints. Using different proxies for the existence of financing constraints verifies the robustness of the results.

In columns (1) and (2) of Table 2.17, this study finds that the coefficient of TCR is positive and significant at the 1 percent level while the coefficient of TCR^2 is negative and significant at the 1 percent level for less and more financially constrained firms. This finding indicates that there is a concave association between trade credit receivable (TCR) and firm profitability (PRO_1 and PRO_2) for less and more financially constrained firms.

Moreover, this study compares the optimal TCR level among these firms. When using gross operating income (PRO_1) as the dependent variable, the coefficient of TCR of less financially constrained firms (FC = 0) is 0.275 and their coefficient of TCR^2 is -0.391. Hence, the optimal TCR of these firms is (-0.275) / 2 x (-0.391) = 0.351. For more financially constrained firms (FC = 1), the coefficient of TCR is 0.275 + (-0.169) = 0.106 and the coefficient of TCR^2 is (-0.391) + 0.225 = (-0.166). Thus, the optimal TCR of more financially constrained firms (FC = 1) is (-0.106)/ 2 x (-0.166) = 0.319. Similarly, when using net operating income (PRO_2), for less financially constrained firms (FC = 0), the coefficient of TCR has a value of 0.268 and that of TCR^2 is -0.388. Based on formula (7), the optimal TCR of these firms is (-0.268)/ 2 x (-0.388) = 0.345. For the more financially constrained firms, the coefficient of TCR is 0.268 + (-0.200) = 0.068 and the coefficient of TCR^2 is (-0.388) + 0.277 = (-0.111). Thus, the optimal TCR is (-0.068) / 2x (-0.111) = 0.306. With these values, this study confirms that less financially

constrained firms have a higher level of optimal trade credit receivable than more financially constrained ones. Hence, the results are unchangeable when using the cost of external financing as the different proxy for the existence of financing constraints.

Variables	PRO_1	PRO_2
	(1)	(2)
TCR	0.275***	0.268***
	(0.000)	(0.000)
TCR * FC	-0.169***	-0.200***
	(0.000)	(0.000)
TCR^2	-0.391***	-0.388***
	(0.000)	(0.000)
TCR^2 * FC	0.225***	0.277***
	(0.000)	(0.000)
LEV	0.091***	0.084***
	(0.000)	(0.000)
CASH	0.094***	0.097***
	(0.000)	(0.000)
LIQ	-0.0002	-0.00018
	(0.842)	(0.818)
ATAN	0.102***	0.074***
	(0.000)	(0.000)
GROWTH	0.059***	0.059***
	(0.000)	(0.000)
SIZE	0.0024	-0.0001
	(0.462)	(0.974)
INDUST	0.354***	0.293***
	(0.000)	(0.000)
GDP	0.308***	0.281***
	(0.000)	(0.002)
Constant	0.060***	0.059***
	(0.000)	(0.000)
F_1	0.00	0.06
F_2	0.00	0.03
R-squared	0.230	0.203
Observations	10,537	10,537

Notes: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All models are estimated with robust standard errors. Time dummies are included in the model. F_1 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_1+\alpha_1) = 0$. F_2 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_2+\alpha_2) = 0$. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.17: The impact of financial constraints on the relationship between trade credit receivable and firm profitability in FEM.

Table 2.18 shows the regression results of the association between trade credit payable (TCP) and firm profitability (PRO_1 and PRO_2) for less and more financially constrained firms categorized according to external financing cost. From columns (1) and (2) of Table 2.18, the coefficient of TCP is positive and significant at the 1 percent level while the coefficient of TCP^2 is negative and significant at the 1 percent level of both more and less financially constrained firms. This finding indicates that less and more financially constrained firms have a concave relationship between trade credit payable (TCP) and firm profitability.

When comparing the optimal TCP level between less financially constrained firms and more financially constrained ones, this study find similar results to when using cash flow as a classification factor. In column (1), the coefficient of TCP is 1.163 and that of TCP^2 is -2.974 for less financially constrained firms (FC = 0). Hence the optimal of TCP of those firms is (-1.163) / 2 x (-2.974) = 0.196. For more financially constrained firms (FC = 1), the coefficient of TCP is 1.163 + (-0.359) = 0.804 and the coefficient of TCP^2 is (-2.974) + 0.846 = (-2.128). The optimal TCP of these firms is (-0.804)/ 2 x (-2.128) = 0.189. In column (2), when the net operating income (PRO_2) is used as a profit proxy, the coefficient of TCP of less financially constrained firms (FC = 0) is 1.276 and their coefficient of TCP^2 is -3.292. Therefore, the optimal TCP of those firms is (-1.276) / 2 x (-3.292) = 0.194. For more financially constrained firms (FC = 1), the value of the coefficient of TCP is 1.276 + (-0.530) = 0.746 and that of the coefficient of TCP^2 is (-3.292) + 1.304 = (-1.988). The optimal TCP of those firms is (-0.746) / 2 x (-1.988) = 0.187. Hence, this study indicates that less financially constrained firms have a higher level of optimal trade credit payable than the more financially constrained ones.

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Variables	PRO_1	PRO_2
	(1)	(2)
TCP	1.163***	1.276***
	(0.000)	(0.000)
TCP * FC	-0.359***	-0.530***
	(0.000)	(0.000)
TCP^2	-2.974***	-3.292***
	(0.000)	(0.000)
TCP^2 * FC	0.846**	1.304***
	(0.045)	(0.003)
LEV	0.066***	0.073***
	(0.000)	(0.000)
CASH	0.095***	0.109***
	(0.000)	(0.000)
LIQ	0.002**	0.0019**
	(0.027)	(0.034)
ATAN	0.101***	0.080***
	(0.000)	(0.000)
GROWTH	0.059***	0.068***
	(0.000)	(0.000)
SIZE	-0.001	-0.0082**
	(0.757)	(0.038)
INDUST	0.342***	0.278***
	(0.000)	(0.000)
GDP	0.244***	0.231**
	(0.005)	(0.033)
Constant	0.049***	0.052***
	(0.000)	(0.000)
F_1	0.00	0.00
F_2	0.00	0.00
R-squared	0.246	0.189
Observations	10,537	10,537

Note: In column (1), the dependent variable is gross operating income (PRO_1). In column (2), the dependent variable is net operating income (PRO_2). All independent and dependent variables are defined in Table 2.2. FC is a dummy variable representing financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All models are estimated with robust standard errors. Time dummies are included in the model. F_1 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_1+\alpha_1) = 0$. F_2 is the p-value of an F-test for the linear restriction test under the following null hypothesis $H_0: (\beta_2+\alpha_2) = 0$. P-value in parentheses. ***,** **, *** Indicates significance at the 10, 5, 1 percent level.

Table 2.18: The impact of financial constraints on the relationship between trade credit payable and firm profitability in FEM.

2.6. Conclusion

This paper provides empirical evidence of a non-linear association between trade credit and SMEs' profitability with both aspects of trade credit considered, including trade credit receivable (TCR) and trade credit payable (TCP). The study is based on a panel data set of 1,509 non –financial listed SMEs from nine countries or territories in East Asia and the Pacific, namely, China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong, over the seven-year period from 2010 to 2016. The findings indicate an inverted U-shaped relationship between TCR, TCP and firm profitability; that is, SMEs have an optimal trade credit level that balances between benefits and costs to maximize their profitability. Further investigations demonstrate that the profitability of firms will decrease when their trade credit level moves away from the optimal trade credit. Thus, this study suggests that trade credit is a crucial factor which influences SMEs' profitability, and managers of SMEs should try to keep the level of trade credit investment as close to the optimal point as possible.

Given that accessing formal finance is the greatest challenge facing SMEs, this paper analyses whether the optimal level of investment in TCR and TCP changes according to their financial constraints. By taking cash flow and external financing cost as proxies of financial constraints to classify firms, the paper shows that a concave relationship between trade credit and profitability exists in both more and less financially constrained firms. However, more financially constrained firms have a lower optimal trade credit level than less financially constrained ones.

Although this study shows an inverted U-shaped association between trade credit and firm profitability, it has some limitations that may warrant investigations in the future. First, this study focuses only on listed SMEs in East Asia and the Pacific, and so the findings cannot be blindly applied to all SMEs in this region, especially unlisted SMEs. In fact, for non-listed SMEs, access to the financial markets is even harder than for listed

ones; hence, managing their trade credit maybe even more important. Second, this research only uses a sample of listed SMEs for a seven-year period from 2010 to 2016 – a calmer period after the financial crisis. However, problems of liquidity and financial constraints will increase in times of general financial crisis, and hence, provision and receipt of trade credit by SMEs will be different from the periods before and after the crisis. It would be interesting in the future to conduct similar research to compare outcomes among different periods. Third, this studies only focus on trade credit receivable and trade credit payable, but it does not take account into the net trade credit which is measured by the difference between trade credit receivable and trade credit payable. According to Love et al. (2007), this ratio means that firms that obtain more credit from their suppliers are likely to extend more credit to their customers. In this sense, net credit reflects the relative willingness of firms to extend trade credit, net of the credit that firms receive themselves. Forth, further studies can use return on equity (ROE) as a cleaner proxy for profitability than gross profit (Novy-Marx, 2010), and investigate the influence of trade credit on ROE. Fifth, because of the limitation of the database, this study only uses cash flow and the cost of external financing as proxies for the existence of financial constraints. Further studies can use the alternative measures of financial constraints such as dividends, and White and Wu index (Baños-Caballero et al., 2014). Six, the studies can expand the control variables which can impact SMEs profitability, such as market-to-book ratios and credit conditions. Finally, one of the limiting factors of this research was that the ownership structure of SMEs is not considered. Hence, the further studies can investigate how the proportion of equity held SME mangers impact the association between trade credit and firm profitability.

CHAPTER 3 - THE INFLUENCE OF NATIONAL CULTURE ON TRADE CREDIT IN SMEs.

3.1. Introduction

It is well recognised that trade credit is a crucial source of short-term financing for small and medium enterprises (SMEs) as these firms experience restricted access to formal sources of external finance from the capital markets (Petersen & Rajan, 1997; Peel et al., 2000; Beck et al., 2008). A study by García-Teruel and Martínez-Solano (2010a) indicate that trade credit accounts for a large percentage of total assets in SMEs. In particular, the ratio of trade credit to total assets is 39.28 % for Spanish SMEs and 35.42 % for Belgians SMEs while this number ranges between 19.18% and 39.28% across five European countries, including Finland, France, Greece, Sweden and UK. Consequently, trade credit decisions have an important impact on the performance of SMEs (García-Teruel & Martínez-Solano, 2007; Ferrando & Mulier, 2013; Tauringana & Adjapong Afrifa, 2013; Martínez-Sola et al., 2014; Pais & Gama, 2015).

Given that Chapter Two demonstrates the importance of trade credit in SMEs by indicating the influence of trade credit on firm profitability, it is interesting to know what determines variation in trade credit across firms and countries. The majority of the prior studies have attempted to answer this question across SMEs on a single country through examining firm-level factors, such as cash flow, assets turnover, profitability, ability to access to bank credit, among others (Nilsen, 2002; Huyghebaert, 2006; Niskanen & Niskanen, 2006; Rodríguez-Rodríguez, 2006; García-Teruel & Martínez-Solano, 2010a; 2010b; 2010c; Casey & O'Toole, 2014; Carbó-Valverde et al., 2016; McGuinness & Hogan, 2016; Palacín-Sánchez et al., 2019). Nevertheless, other studies looked farther afield and found evidence that trade credit decision in SMEs is impacted by country-specific factors (Demirgüç-Kunt & Maksimovic, 2001; Andrieu et al., 2018). In particular, these papers emphasise the institutional differences among countries in terms of the

development level of the banking system and the legal infrastructure. However, these two factors do not fully explain the variation in trade credit across countries.

There is an important "missing piece" to variation in the trade credit decisions in SMEs across countries which has been largely ignored by the existing literature. This missing piece is national culture. According to institutional economics, institutions as defined as the humanly devised constraints that structure human interaction and are categorised into formal (rules, laws, constitutions) and informal (norms of behaviour, conventions, and self-imposed codes of conduct) (North, 1990; Kostova & Marano, 2019). Formal institutions concerns laws and rules that influence the business operations and strategies, while informal institution concerns rules embedded in values, norms and belief (Estrin et al., 2009). In the line with informal institutions, Lewellyn (2017:798) states that firm decision-makers are influenced by common understandings of what is appropriate and, fundamentally, meaning behaviour in the environment in which they are embedded. These common understandings are described as informal institutions (North, 1990). Culture is considered as an important informal institution which provides justification and motivation for types of behaviour that are consistent with the assumptions, beliefs, values and practices prevailing within a given country (North, 1990; Licht et al., 2005; Deephouse et al., 2016). Therefore, the culture of society could shape the behaviour and action of individuals within organisations, including entrepreneurs or managers who are key decisions makers (Kreiser et al., 2010). Thus, cultural differences across societies have important bearings on the variation in managerial decisions.

Although several prior studies use the cultural framework to explain various corporate activities and behaviours in SMEs across countries (Kreiser et al., 2010; Mac an Bhaird & Lucey, 2014; El Ghoul et al., 2016; Gaganis et al., 2019), the influence of national culture on trade credit in SMEs is scarcely explored. A recent study by El Ghoul and Zheng (2016) demonstrates the influence of national culture on variation in trade

credit provision across countries, but this study has some limitations. First, the study focuses on large firms rather than SMEs. It cannot be assumed that empirical examination on SMEs will provide the same findings as those conducted on large firms because of the differences between the two types of firms. According to Martínez-Sola et al. (2014), trade credit is more intensive in SMEs because these firms face a greater problem of asymmetric information and greater difficulty in accessing the formal capital markets compared to large firms. Second, national culture plays a role in determining organizational culture and hence, the cultural differences among countries impact on the decisions made not only within large firms but also within SMEs (Pagell et al., 2005). Third, most SMEs are controlled by families or individuals whose investment decisions are more likely to be influenced by cultural values than those of larger firms (El Ghoul et al., 2016). Also, SMEs tends to operate mainly on the domestic market rather than the international market because and hence their decisions are more affected by the influence of national culture (Ramirez & Tadesse, 2009; El Ghoul et al., 2016). Finally, El Ghoul and Zheng (2016) only pay particular attention to the provision of trade credit. However, the usage of trade credit should be analysed from two aspects, including the provision of trade credit (suppliers) and receipt of trade credit (customers) (Petersen & Rajan, 1997). In particular, receipt of trade credit indicates how much a firm borrows from its suppliers, as a firm can be viewed as a customer. In contrast, the provision of trade credit reflects how much a firm lends its customers as it is viewed as a supplier.

To bridge these gaps, the first aim of this study is to demonstrate whether cultural differences can influence the variations in trade credit usage of SMEs across different countries. In particular, the paper employs Hofstede's culture dimensions to investigate whether the degree of collectivism and uncertainty avoidance can explain the variation in trade credit receivable (TCR) and trade credit payable (TCP) of SMEs across countries.

Besides, previous studies have suggested that the use of trade credit of SMEs depends on the ability of access to short-term bank credit and cash holdings (Love et al., 2007; García-Teruel & Martínez-Solano, 2010a; 2010b; 2010c). In particular, firms with a high level of short-term bank credit and cash holdings will offer more trade credit to customers and reduce reliance on trade credit from suppliers compared to firms with a low level of short-term bank credit and cash holdings (García-Teruel & Martínez-Solano, 2010a; 2010b; 2010c). The decisions related to access to short-term bank credit and cash holding are influenced by the national culture (Chang & Noorbakhsh, 2009; Fairbairn, 2013; Chen et al., 2015). Hence, the second objective of this study is to investigate whether national culture has an indirect influence on the variations in TCR and TCP across countries through the use of short-term bank credit and cash holdings.

For these purposes, this paper uses a sample of 1,509 non-financial listed SMEs from nine countries or territories located in East Asia and the Pacific, namely China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong. This sample is selected for several reasons. First, the East Asia and Pacific region has experienced rapid economic growth and is an engine of growth for the global economy as discussed in Chapter one. Given the emergence of the East Asia-Pacific economy, it is interesting to learn about the national culture and its effects on the operation of SMEs in this region. Second, the East Asia and Pacific region consists of forty countries, but only these nine countries or territories have well developed public equity markets for SMEs (The World Bank, 2018). Although some other nations in this area also have SME boards, the number of listed firms is too small. For example, the Cambodia Securities Exchange (CSX) was established in 2011 but has only two companies listed in total (Asian Development Bank, 2015). The situation is similar in Philippine where only two companies have been listed in the Small, Medium and Emerging Board (SME Board) created by the Philippine Stock Exchange (PSE) (Asian Development Bank, 2015). Third,

the TCR ratio is well above the ratio of bank loan in this sample, and both TCR and TCP ratios showed a rising tendency between 2010 and 2016 as presented in Figure 3.1. TCR reached approximately 39% in 2011 from 25% in 2010. It decreased to 27% in 2012 before recovering steadily afterwards. The figure also shows that TCP remained stable and stayed slightly below bank loans between 2010 and 2014. Since then, it has increased significantly, exceeding bank loans after 2015. Such change indicates that trade credit decisions are becoming even more important to listed SMEs in these countries. This offers us an excellent opportunity to examine our objectives set out above.

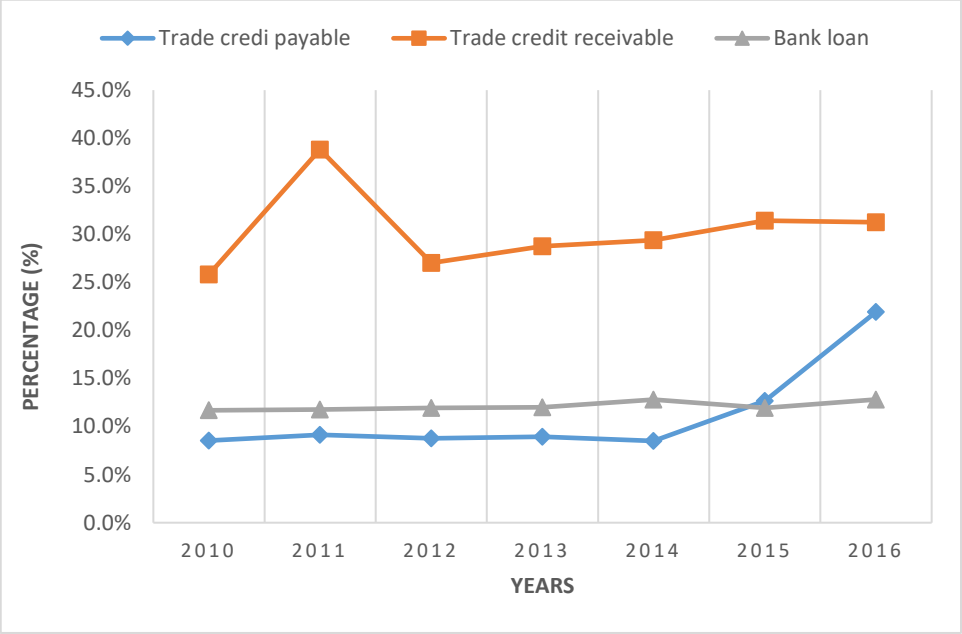

Figure 3.1: Evolution of trade credit in SMEs from 2010 to 2016.

The result of this study shows that collectivism has a positive influence on trade credit receivable. This means that managers of firms in a collectivistic culture offer more trade credit to customers because they can reduce the risks related to customers' asymmetric information from their strong social networks. Besides, the study indicates that uncertainty avoidance has a negative association with trade credit receivable. In a society with a high value on uncertainty avoidance, managers tend to reduce trade credit provision because they want to mitigate the effect of default risk or late payment of customers, which can damage the operation of firms.

With regard to trade credit payable, the study indicates that collectivism has a negative association with trade credit payable. This finding implies that managers of SMEs in countries with a high value on collectivism tend to reduce reliance on trade credit received from suppliers because they want to retain their reputations with suppliers. In such societies, where suppliers have strong connections, if firms have the habit of paying suppliers late, suppliers will consider them as high default-risk and low creditworthy customers and may share information about it to others. This can result in increased monitoring or stricter terms on future sales. Moreover, uncertainty avoidance has a negative relationship with trade credit payable. That is, managers from countries with a high uncertainty avoiding culture prefer to retain a high level of cash holdings to hedge against financial difficulties in the future. Thus, they receive less trade credit from creditors.

The study also analyses the indirect effect of the two cultural dimensions of collectivism and uncertainty avoidance on trade credit receivable and trade credit payable through the use of short-term bank credit and cash holdings. This found that firms in countries with a highly collectivistic culture will have high ability of access to short-term bank credit and a high level of cash holdings, which leads to their offering more trade credit to customers and reducing more demand for trade credit from suppliers compared to firms in countries with a low level of collectivism. Moreover, this study finds that firms in countries with a high level of uncertainty avoidance tend to use short-term bank credit less than firms in countries with a low level of uncertainty avoidance and thus, they offer less trade credit to customers and receive more trade credit from suppliers. Besides, such firms prefer to hold more cash and hence, they reduce provision and receipt of trade credit in comparison with firms in countries with a low level of uncertainty avoidance.

The findings from this study make a number of contributions to the existing literature on trade credit in several different ways. First, most of the previous studies on

the determinants of SMEs mainly focus on a single country such as the U.S. (Petersen & Rajan, 1997; Nilsen, 2002), the United Kingdom (Wilson & Summers, 2002; García-Teruel & Martínez-Solano, 2010c), Belgium (Huyghebaert, 2006), Finland (Niskanen & Niskanen, 2006), Ireland (McGuinness & Hogan, 2016), Italia (Agostino & Trivieri, 2014) and Spain (García-Teruel & Martínez-Solano, 2010b; Carbó-Valverde et al., 2016). However, cross-country studies are relatively scared. For a sample of SMEs from seven European countries, García-Teruel and Martínez-Solano (2010a) compare the influence of firm-level factors on trade credit granted and received across those countries. Moreover, studies by Casey and O'Toole (2014) and Palacín-Sánchez et al. (2019) demonstrate the substitutive relationship between trade credit and bank credit in SMEs operating across the European Union. In another study, Demirgüç-Kunt and Maksimovic (2001) used a sample of publicly traded firms from forty countries and demonstrate the impact of two formal institutions such as the development level of a country legal infrastructure and banking systems on the use of trade credit. Similarly, Beck et al. (2008) use sample of firms in forty-eight countries to demonstrate the relationship between firms' external financing and a country's financial and legal institutions Meanwhile, Andrieu et al. (2018) also documents that link between the development of financial system and SMEs' capacity to access trade credit by using data of SMEs in 11 countries in Europe. This study contributes to the current literature on the determinants of SMEs' trade credit by showing that an informal country-level institution, in particular, national culture, is an important determinant of variation in trade credit in SMEs across countries. Specifically, by studying a diverse group of countries in East Asia and the Pacific, the study provides empirical evidence that national culture significantly influences the cross-country variation in SMEs' investment in trade credit receivable and trade credit payable.

Second, to my best knowledge, there are few previous studies which demonstrate the impact of national culture on financial decision-making in SMEs. In particular,

Kreiser et al. (2010) investigate the influence of national culture on risk-taking and proactiveness, while Mac an Bhaird and Lucey (2014) examine the relationship between national culture and capital structure. Recently, El Ghoul et al. (2016) and Gaganis et al. (2019) demonstrate the influence of national culture on profit reinvestment and profitability of SMEs, respectively. This study contributes to this literature by providing a demonstration of the effect of national culture on trade credit - another firm financial decision.

Third, this study extends the study by El Ghoul and Zheng (2016) by demonstrating this association in SMEs and considering their trade credit under two aspects, namely, provision of trade credit (i.e. suppliers) and receipt of trade credit (i.e. customers). Finally, the previous studies indicate that decisions on trade credit depend on ability of access to short-term bank credit and a level of cash holdings (Petersen & Rajan, 1997; Love & Zaidi, 2010). However, the authors do not investigate how the cultural difference across countries impact those relationships. Hence, the investigation of the indirect effect of national culture on the variation in trade credit among countries through the use of short-term bank credit and cash holdings is new to the literature. In particular, the study examines the influence of short-term bank credit and cash holdings on SMEs' investment in trade credit according to the different scores on dimensions of national culture across countries.

The remainder of the study is structured as follows. Section 3.2 provides a brief review of the literature review. Section 3.3 carries out theoretical framework and hypothesis development. Section 3.4 describes the data, regression models and methodology. Section 3.5 conducts the analyses and explanation of the empirical results. Section 3.6 reports robustness tests. Finally, the conclusions are presented in the last section.

3.2. Literature Review

3.2.1. Theories that explain why firms manage their trade credit.

A number of theories have been offered to explain why SMEs offer trade credit to their customers and why they receive trade credit from suppliers instead of bank credit, even though trade credit is an expensive form of finance after the discount date. The first is transaction costs theory developed by Ferris (1981) who suggests that the use of trade credit allows a firm to separate its purchase cycle from the payment cycle and increase flexibility in payments, leading to reduce the transaction costs of paying bills. A second theory that describes the reason for firms to manage their trade credit is for financing advantage. By the use of trade credit, sellers will control the buyers better than financial intermediaries (Huyghebaert, 2006). This is because a seller and the buyer have a closer and more 'physical' relationship compared to the association between the buyer and financial intermediaries (Niskanen & Niskanen, 2006). Suppliers can obtain information on customers by observing the ability of firms to take advantage of the prompt payment discount, the timing and size of their orders (Huyghebaert, 2006). In the case, if the buyers do not pay in time, the supplier can threaten to cut off future suppliers. Meanwhile, a financial intermediary does not have as an powerful influence as sellers, because its threat to withdraw future finance may not impact immediately on the behaviour of the buyers (Petersen & Rajan, 1997). In this theory, trade credit is viewed as an important source of finance, such that firms that have a lower cost of funds and better access to institutionalised capital markets will be willing to grant more trade credit to customers who borrow from financial intermediaries with higher costs (Schwartz, 1974).

The third explanation is the **i**nformational asymmetry theory (Smith, 1987; Long et al., 1993). According to this theory, the seller firms are willing to extend credit to allow their customers sufficient time to check the product before making a payment because of the existence of various informational asymmetries about product quality between sellers

and buyer firms. Thus, trade credit is considered as a guarantee of product quality (Lee & Stowe, 1993). The fourth theory is price discrimination, which suggests that a supplier can use trade credit as a form of discriminatory pricing, whereby it can provide goods at entirely different prices to different buyers by offering unlike levels of trade credit terms and payment discounts (Mian & Smith, 1992). In general, the use of trade credit of SMEs stems from the four main theories, namely: transaction costs theory, the financing advantage theory, informational asymmetries theory, and the price discrimination theory.

3.2.2. Firm-level determinants of trade credit - empirical studies

A number of studies have been conducted, based on the above theories, to demonstrate the firm-level determinants of trade credit in SMEs**.** Rodríguez-Rodríguez (2006) indicate empirical evidence about factors that influence trade credit of a sample of 71 non-financial SMEs in the Canary Islands over the period from 1990 to 1996. Within this study, the authors find that firms experiencing a reduction in short-term bank credit mostly seek short-term finance from their suppliers, which is in line with the financing advantage theory. Furthermore, firms that generate greater sales per unit of assets receive less trade credit from suppliers. This is because these firms have a greater income-generating capacity, and hence they need not be late in making payment to suppliers. Nilsen (2002) also support the financing advantage theory of trade credit by indicating that small firms increase trade credit received from suppliers as a substitute when banks restrict loans over the severe 1979-1982 recession in the USA. Similarly, although Carbó-Valverde et al. (2016) use a sample of Spanish SMEs and McGuinness and Hogan (2016) use a sample of Irish SMEs and they provide the evidence that credit-constrained SMEs depend on more trade credit as an alternative source of external finance during the financial crisis. Recent, A study by Palacín-Sánchez et al. (2019) suggests the substitutive relationship between trade credit and bank credit in SMEs operating across

12 European Union over the period 2008-2014. This finding also shows that SMEs can solve a fall in bank credit since they obtain more financing from suppliers.

Agostino and Trivieri (2014) used micro-data on Italian SMEs in the years 1998-2006 and found that the availability of suppliers' credit might be crucial to boosting access to bank financing for SMEs. This is because trade credit can provide information content for banks, especially when the later do not have adequate information on SMEs at the beginning stages of bank-firm relationships. Niskanen and Niskanen (2006) investigate the trade credit policy of SMEs in Finland. Their finding also supports the financing advantage theory by showing that small firms with better access to the financial markets and high growth rates offer more trade credit to their customers. Additionally, firms that have the strength of internal financing require less trade credit from suppliers in their financing.

In another study, Huyghebaert (2006) investigates the determinants of trade credit by using data for 328 business start-ups in Belgium for the period from 1992 to 2002. The author also provides evidence in support of the financing advantage theory and transaction costs theory of trade credit. In particular, the author indicates that firms with high financial constraints have a high demand for trade credit offered by suppliers. Consistent with transaction cost theory, the result of this study indicates that firms that have a high turnover of raw materials require more trade credit from suppliers. This suggests that these firms are centralising payments at the end of each month instead of making them every time, and they use trade credit to decrease the transaction cost of paying bills. Recently, García-Teruel and Martínez-Solano (2010a) provide a comprehensive analysis of the determinants of trade credit in SMEs, using a sample of 47,197 SMEs in Europe in the period from 1996 to 2002. Their results provide evidence to support the informational asymmetry theory. In particular, they find that SMEs with a greater capacity to obtain resources from the capital markets (with less information

asymmetry problems) will use less trade credit from their suppliers and offer more trade credit to their customers. Additionally, this study also supports the price discrimination theory by indicating that firms with higher margins offer more trade credit. This is due to the fact that firms with higher profit margins will have more incentive to raise their sales. When firms obtain high marginal earnings, they are likely to incur additional costs to generate new sales. Their profits come from their financial and commercial activities, and therefore they are willing to accept lower returns on the finance they grant to customers.

Moreover, a study by García-Teruel and Martínez-Solano (2010b) uses a sample of 2,922 Spanish SMEs for the period 1997 – 2001 in order to examine whether account receivable decisions follow a model of partial adjustment. They find that firms' sales growth, capacity to generate internal funds and access to short-term financing are vital in shaping the trade credit provided by firms. In particular, firms with low sales growth are willing to offer more trade credit to customers in order to stimulate their sales. Also, firms with easier access to short-term financing and greater capacity to generate internal funds can offer more trade credit to customers. In another study, García-Teruel and Martínez-Solano (2010c) identify the factors that impact on accounts payable by using a sample of 3,589 SMEs in the UK. The findings reveal that firms with higher growth opportunities use more trade credit in order to finance their sales growth. Moreover, firms use less credit from suppliers when they have better access to alternative internal and external financing.

3.2.3. Country-level determinants of trade credit – empirical studies.

In addition to firm-level factors, there is little research about investigating the determinants of trade credit policies in SMEs at the country level. García-Teruel and Martínez-Solano (2010c) find that SMEs in countries with deteriorating macroeconomic conditions suffer from decreased the ability to generate cash flow from their operations. Besides, banks are less willing to grant credit to firms. Hence, these firms could offer less

credit to their customers and increase trade credit receipt from suppliers. A recent study by Demirgüç-Kunt and Maksimovic (2001) also investigates whether country-level factors impact trade credit across different countries. They argue that the use of trade credit of SMEs is related to the cross-country differences in terms of the development level of the banking system and country legal infrastructure. Based on a sample of firms in 39 countries over the period from 1989 to 1996, they argue that firms in countries with inefficient legal systems prefer to require cash payment rather than to provide trade credit to customers. Additionally, such firms increase reliance on trade credit from suppliers to finance their transactions. Moreover, firms in countries with more developed banking systems offer more trade credit to their customers. Besides, such firms also receive much financial support from banks through credit programme and hence, they are less dependent on trade credit from suppliers. Additionally, Beck et al. (2008) use a database of 48 countries and found that small firms in countries, where the property rights are not well protected, have reduced access to external (e.g. bank) finance but that trade credit does not help fill this gap. Andrieu et al. (2018) use data of SMEs in 11 countries in Europe in the period from 2009 to 2014, and they document that SMEs in countries with the high development of the financial system have a high capacity of access to external capital, namely bank credit and trade credit.

3.3. Theoretical Framework and Hypothesis Development

3.3.1. Hofstede's culture framework

Hofstede (1991:5) describes culture as "collective programming of the mind which distinguishes the members of one group or category of people from another". It includes "a set of norms, beliefs, shared values, and expected behaviours that serves as guiding principles in people's lives" (Bae et al., 2012:290). Hence, national culture acts as "the frame of reference, which societal members utilise to comprehend and understand organisations, the environment, and their relationships with one another" (Kreiser et al.,

2010:961). It reflects the cultural values of a society, and the organisations in such a society are a part of that culture (Hofstede, 2001). According to institutional theory, " organisations become similar to the national culture in which they embedded – and to one another as a result - as they seek legitimacy in a given cultural environment" (Lee & Kramer, 2016b:199). In line with this theory, Hofstede (2001) emphasises that national culture imposes on organisational culture through transmission, resistance to change and maintenance. In other words, national cultures play an important role in shaping organisational culture (Tayeb, 1994). Meanwhile, organisational culture shapes the attitudes, beliefs, actions and preferences of individuals who are operating within the organisation (De Jonge, 2015). Hence, national culture affects the decision-making process of individuals within organisations (Vitell et al., 1993; Busenitz & Lau, 1996; Mitchell et al., 2000).

By using managerial surveys to IBM employees in different countries, Hofstede (1980) initially categorises four cultural dimensions, including individualism versus collectivism, masculinity versus femininity, power distance, and uncertainty avoidance. In a later study, he adds one more dimension, namely long-term versus short-term orientation (Hofstede, 1991). A brief description of the five cultural dimensions is presented as follows: *individualism versus collectivism* is related to the relationship between the collective and the individual in a culture (Kreiser et al., 2010). In particular, collectivism focuses on the harmony and interests of the group, while individualism only concerns independence and equality among individuals. *Masculinity versus femininity* describes the division of emotional roles between women and men. A society with a highly masculine culture emphasises competition, assertiveness and material success whereas a culture with a high value on the feminine index emphasises interpersonal relationships, quality of life and caring for the weak (Hofstede, 2001). *Power distance* refers to the degree of inequality and dependence in society. This dimension is defined as

“ the extent to which less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally” (Hofstede, 2001:98). A society with high power distance displays control mechanisms, strong hierarchies and unequal distribution of power (Kreiser et al., 2010). Moreover, it also emphasises that subordinates are obedient and deferential to those in positions of power and has less communication among organisation levels. *Uncertainty avoidance* is associated with the ability of a society to cope with unknown or uncertain situations (Hofstede, 2001). People from highly uncertainty-avoiding cultures have little tolerance for change or ambiguity. They often avoid uncertainty by relying on regulations and written rules, embracing formal structures and predicting results (Kreiser et al., 2010). *Long-term versus short-term orientation* is defined as “long-term orientation stands for the fostering of virtues oriented forwards future rewards, in particular perseverance and thrift. It is an opposite pole, short-term orientation, stands for the fostering of virtues related to the past and present, in particular, respect for tradition, preservation of ‘face’ and fulfilling social obligations” (Hofstede, 2001:359).

Although there are some well-reputed studies about national cultures, such as Smith et al. (2002), Schwartz et al. (2001) and Leung and Bond (2004), this study only employs the Hofstede’s concepts of culture for the following reasons. First, the five cultural dimensions of his study are supposed extensive and concentrate on fundamental issues that all societies face with (Ramirez & Tadesse, 2009). The second crucial aspect is that Hofstede quantifies his cultural dimensions of each country in his study and hence these dimensions can be used to conduct empirical analysis (Chang & Noorbakhsh, 2009). Finally, Hofstede’s dimensions are suitable for a study about the influence of culture on business organisations because of the nature of the data used to derive his culture dimensions. In particular, he relies on results of a survey among IBM employees at all levels, while the culture dimensions of Schwartz (1994) are based on the responses of

teachers and students, and the Globe study is based on 160 researchers to develop culture dimensions (House et al., 2004; Ramirez & Tadesse, 2009; Arosa et al., 2014)

Although Hofstede's five-dimension framework is clear, parsimonious, and resonant, it has some criticisms, such as limiting the sample to a single multinational corporation, an overly simplistic dimensions conceptualisation, ignoring within-country cultural heterogeneity, and failing to capture the malleability of culture over time (Kirkman et al., 2006). In the line with the weaknesses of the Hofstede framework, McSweeney (2002) undermined Hofstede's dimensions by arguing that Hofstede selected only one company's (IBM) staffs as a sample to evaluate the country's cultural measurement. This raises the survey of how far each IBM part can be measured culturally representative of the country in which it based. Moreover, McSweeney (2002) argue that Hofstede used one survey method to measure dozens of different national cultures which is unrealistic. This is because collecting data from questionnaires is too limited and not reliable to determine and measure cultural discrepancy. Furthermore, five dimensions are not enough to sufficiently reflect cultural aspects and the data used to design these dimensions are outdated. However, Hofstede (2002) reacts to McSweeney's (2002) criticism by arguing that his survey measured the differences between nations. Moreover, Hofstede (2002) also welcome every researcher to come up with proposals to define further dimensions, instead of using surveys as a research instrument. He claims that data used in his study have centuries-old roots and that recent replications show no loss of validity. Hence, he rejects the accusation of relying on outdated data.

A number of previous studies have widely used the cultural dimensions of Hofstede to investigate the association between national culture and corporate decisions in large firms across countries (Ramirez & Tadesse, 2009; Shao et al., 2010; Bae et al., 2012; Chen et al., 2015). However, limited studies use these cultural dimensions in SMEs. Kreiser et al. (2010) represent the influence of national culture on managerial decision

making by demonstrating its role in determining the level of risk-taking and proactive of SMEs' behaviours. In particular, their finding indicates that the level of uncertainty avoidance in a country has a negative association with risk-taking of an organisation. That is, managers of firms from societies with a low uncertainty avoidance index will be more ready to take risks compared to managers in highly uncertainty-avoiding cultures. Moreover, they also find that the level of individualism is positively associated with organisational risk-taking. Managers from individualistic cultures make decisions based on their judgment rather than members of groups and hence, they will make risky decisions. In other studies, Mac an Bhaird and Lucey (2014) demonstrate the linkage between national culture and capital structure in SMEs. They indicate a negative relationship between the degree of individualism and long-term debts. Moreover, they find that firms from countries with a high level of uncertainty avoidance avoid incurring high debts because these firms avoid the high possibility of bankruptcy. Recently, Gaganis et al. (2019) demonstrate that the dimensions of national culture play an important role in shaping the profitability of SMEs across 25 EU countries. In particular, power distance and uncertain avoidance have the opposite impact on profitability, whereas individualism, masculinity, and long-term orientation have a positive effect.

3.3.2. Hypothesis development

3.3.2.1. The effect of national culture and trade credit

Hofstede's study includes five dimensions that are available to the manager of SMEs but this study only selects individualism versus collectivism and uncertainty avoidance as two main dimensions to investigate the relationship between Hofstede's culture variables and trade credit decisions. This is because these two cultural dimensions have a substantial effect on economic outcomes (Chui et al., 2010; Kanagaretnam et al., 2011; Ahern et al., 2015; Chen et al., 2015). Moreover, Ramirez and Tadesse (2009) also

claim that culture is situational, and hence, people do not need to employ all these dimensions in all situations that they face every day.

a. Collectivism and trade credit

Individualism and collectivism concern how people describe themselves and their association with others in society (Hofstede, 2001). In an individualist culture, individuals act to satisfy their self-interest ahead of the group's interests (Hofstede, 2001). They only value their individual freedom and have loose ties with others. Conversely, in a collectivist culture, individuals tend to consider the interest of the group rather than their own interest (De Mooij & Hofstede, 2010). In such a culture, the group is considered "… as the primary unit of reality and requires that individuals sacrifice themselves for the alleged interest of the collective…" (Realo et al., 2008:448). The collectivism-individualism orientation characterises differences between Western and Eastern cultures (Hofstede, 1991). Collectivism tends to be pronounced in Eastern culture, while individualism is more frequently characterising in Western societies (Nurmi, 1992). According to (Hofstede, 2001), Eastern culture refers to the nations in the Asia region, and hence, the collectivist orientation strongly shapes the activities of people in this region.

The collectivistic culture emphasises to a greater degree the relationship among people in society (Hofstede, 2001), such that their activities have strong interdependence (Bae et al., 2012). According to Oyserman et al. (2002), managers of firms in collectivistic countries tend to make less risky decisions than individualistic ones because they use a group decision-making process rather than using their own judgment solely. Also, Li (2011) states that collectivist managers turn to close others for help with decisions. Consequently, the agency problem for firms in collectivist countries is lower than for those in individualist ones (Chui et al., 2002; Ferris et al., 2013).

Given the emphasis on group connections in collectivistic countries, SMEs belong to business and social networks to extend trade credit to their customers. Goto (2013) suggests that social networks are one of the important key determinants in order to decide the provision of trade credit because they help firms reduce great risks associated with customers' asymmetric information problem. A close network allows SMEs to obtain customers' information easily (McMillan and Woodruff, 1999). In particular, firms can ask other manufacturers or family members about the reliability of customers before offering trade credit (McMillan & Woodruff, 1999). They can know customers who fail to pay their debt on time through information shared among others in the line of business. Hence, SMEs in a collectivistic culture can have better information on customers as a result of having strong social networks; thereby they provide more trade credit to customers. Base on this discussion, the study would expect as follows:

Hypothesis 1: Trade credit provision has a positive relationship with collectivism

Moreover, the level of collectivism impacts the SMEs' decision on trade credit received from suppliers. According to Chen et al. (2015), firms in highly collectivistic cultures have a close-knit network with others and thus, their managers are always concerned with preserving their public image. When they pursue a certain action, they have to ensure that the public image of the firm is not lost in any way (Chui et al., 2002). For example, Chen et al. (2015) state that firms in a highly collectivist culture hold more cash than those in a less collectivist culture. By doing so, firms provide a good sign to the public that they are well-managed. In another study, Chui et al. (2002) point out that firms in a highly collectivist culture also use less debt financing because high financial leverage may deteriorate the financial position of the company and send a bad signal that firms are facing a high possibility of bankruptcy. Therefore, firms always emphasise preserving public image in financing decisions in highly collectivist societies.

Based on the above discussion, the study expects that firms in a collectivist culture will use less trade credit to retain their reputation with their suppliers. Smith (1987) argues that a trade credit contract between buyers and sellers has a function as a screen contract that sellers can rely on evaluating the creditworthiness of buyers. If firms habitually fail to make the payment on time, suppliers will consider them as high default-risk customers. In this case, they rank these firms as low in creditworthiness and increase monitoring or impose stricter terms on future sales (Cunat, 2006). Besides, they can share information about firms' late payment with others, which can result in blacklisting by other suppliers (McMillan & Woodruff, 1999). Hence, in countries with a high level of collectivism, firms tend to reduce reliance on trade credit from their creditors. Our hypothesis is presented as follows:

Hypothesis 2: Trade credit receipt has a negative association with collectivism.

b. Uncertainty avoidance and trade credit

The uncertainty avoidance dimension measures the extent to which members of a society feel either comfortable or uncomfortable with situations that are uncertain, unknown, or different from usual (Hofstede, 2001). In a society with high uncertainty avoidance, people always feel more anxious in an unknown situation, and as a result, they tend to take immediate actions to reduce the level of uncertainty (Hofstede, 2001). Hence, members from a highly uncertainty-avoiding culture consider "…short-run reaction to short-run feedback rather than anticipation of long-run uncertain events. They solve pressing problems rather than develop long-run strategies…" (Hofstede, 2001:147).

According to Kreiser et al. (2010), a low uncertainty avoidance society shows that people exhibit a low sense of urgency in unstructured, ambiguous, or surprising situations. They enjoy taking risks and cope with ambiguity in strategic situations in such a society. On the other hand, culture in high uncertainty avoidance is linked with clear rules, stability, and uniformity and it avoids ambiguous situations (Chen et al., 2015). In this

line, the psychological characteristics of members in such a culture are risk aversion and conservatism (Hofstede, 2001). However, this does not mean that uncertainty avoidance is equal to risk avoidance (Hofstede, 2001). In fact, people in high uncertainty avoidance do not sit back and wait for potential risk. They tend to interpret and predict all events clearly and engage in and fight with them in order to reduce ambiguities (Hofstede, 2001).

How is uncertainty avoidance linked with trade credit receivable decisions? Based on information asymmetry theory, Moorthy and Srinivasan (1995) state that before buying the products, customers may be uncertain about the intrinsic quality of products, such as product performance, durability, and fit. Thus, firms grant trade credit to their customers by allowing buyers to delay payment as a product quality guarantees (Long et al., 1993). However, this would bring the risk for firms because their managers do not know whether the buyers will pay on time (Smith, 1987). Accordingly, the selling firms experience an uncertainty about the creditworthiness and performance of customers (Ng et al., 1999). In order to mitigate the risks of customers, firms must allocate their time and energy to monitor customers' credit risk and organise the delayed payment contract (Biais & Gollier, 1997). This allows selling firms to distinguish between buyers who are likely to default and those that require temporary assistance (Smith, 1987). If customers have a high risk of default, the firms incur the high cost of the screening process and collecting the payment from them (Smith, 1987).

Moreover, selling firms often do not have enough cash to cover their provision of trade credit to their customers, and hence they must borrow this amount from the bank (Biais & Gollier, 1997). If buyers default and fail to pay the sellers, the firms will face difficulties in repaying their bank borrowings (Biais & Gollier, 1997). Although they pledged their cash flow from other activities as collateral to this loan, it is not sufficiently large to repay their bank debt (Biais & Gollier, 1997). In this case, the default of customers leads to the default of sellers. According to Wilson and Summers (2002),

selling firms are more likely to use credit insurance against the risk of buyer insolvency. Nevertheless, Biais and Gollier (1997) argue that if the buyers default, the sellers also maintain a portion of the default risk even when their trade credit receivables are securitised.

From the above discussion, this study expects that countries with a high uncertainty avoidance index do not encourage managers of firms to develop a greater willingness to take risks. Hence, firms operating in such countries will offer less trade credit to their customers because they avoid the risks of default or late payment of buyers. The hypothesis is presented as follows:

Hypothesis 3: Trade credit provision has a negative relationship with the level of uncertainty-avoiding culture

Moreover, receipt of trade credit from suppliers is an ambiguous decision where managers must identify how much trade credit they need from their suppliers to meet their needs.

"The main underlying dimension of uncertainty avoidance is the tolerance for uncertainty (ambiguity), which can be found in individuals and which in identical situations leads some individuals to feel more pressed for action than others" (Hofstede, 2001:148). This means that in a similar level of uncertainty, individuals in society with a high level of uncertainty-avoidance tend to act more cautiously compared to those in low uncertainty-avoiding culture because they always feel more nervous about future uncertainty (Chen et al., 2015). For example, Li and Zahra (2012) demonstrate that managers in a society with a high level of uncertainty avoidance are anxious about ambiguity so they will select low-risk projects or require a high premium to compensate for their risk-taking. In contrast, low uncertainty avoidance managers prefer innovative projects, as a result of being comfortable with unpredictability and ambiguity. Similarly,

Kreiser et al. (2010) find that corporate risk-taking is negatively associated with the level of uncertainty avoidance.

The association between financial decision and uncertainty avoidance has been demonstrated in recent empirical studies. For instance, Chen et al. (2015) state that firms from cultures with a high level of uncertainty avoidance would hold more cash in anticipation of uncertainty, whereas firms from cultures with a low level of uncertainty avoidance need less cash to cover possible cash shortfalls in the future. Similarly, Chang and Noorbakhsh (2009) also find that firms desire to hold more cash in cultures with a high uncertainty-avoiding score. In the same vein, Bae et al. (2012) find that managers of firms in a highly uncertainty-avoiding culture prefer to hold more cash rather than to pay lower dividends because high cash holding will help firms to prevent financial difficulties in the future. In short, when making financial decisions, managers from a highly uncertainty-avoiding culture demand more cash and they consider cash as a tool to take precautions against uncertainty in the future.

From the discussion above, it is reasonable to expect that SMEs in societies with high uncertainty avoidance score will retain a high level of cash holding. Although cash is the least profitable asset, it is the most liquid and helps firms to be ready for potential risks in the future (Mun & Jang, 2015). According to Opler et al. (1999) and Kim et al. (1998), SMEs hold more cash than larger firms, as a result of being exposed to more operating and financial risk. When SMEs hold high cash, they would tend to receive less trade credit from creditors (Love & Zaidi, 2010). Therefore, the hypothesis is represented as follows:

Hypothesis 4: Receipt of trade credit from suppliers has a negative association with the level of uncertainty avoidance.

3.3.2.2. The interaction effect of national culture on bank credit

Previous studies demonstrate that the level of trade credit granted to customers and received from suppliers depends on SMEs' ability of access to short-term bank credit (Petersen & Rajan, 1997; Niskanen & Niskanen, 2006; Love et al., 2007; García-Teruel & Martínez-Solano, 2010b; Psillaki & Eleftheriou, 2015; McGuinness & Hogan, 2016). Firms can more easily increase credit in the form of trade credit when they have easier access to bank credit, compared to those that are constrained in the bank loan market (Meltzer, 1960). A study by García-Teruel and Martínez-Solano (2010b) provides empirical evidence that SMEs with a higher ability to obtain short-term bank credit are able to grant more trade credit to their customers. Thus, short-term bank credit has a positive association with trade credit receivable. With regard to trade credit payable, previous studies show that trade credit can be considered a substitute for bank credit (Love et al., 2007; García-Teruel & Martínez-Solano, 2010c; Ogawa et al., 2013). Firms have a greater need for trade credit from suppliers when they have little access to short-term bank credit in order to overcome their financial constraints (Schwartz, 1974; Petersen & Rajan, 1997). Otherwise, firms have less need for trade credit. Therefore, short-term bank credit has a negative association with trade credit payable.

The ability of access to bank credit is impacted by cultural difference across countries (Chui et al., 2002; Antonczyk & Salzmann, 2014; Mac an Bhaird & Lucey, 2014; Wang & Esqueda, 2014). According to institution theory, the national culture shapes the corrupt behaviour of institutions or individuals (Pillay & Dorasamy, 2010). Countries with a high level of collectivism will have high levels of corruption (Davis & Ruhe, 2003; González-Trejo, 2007). In collectivist societies, individuals have a strong belief in group decisions and prefer tight social frameworks (Davis & Ruhe, 2003). They believe that the group can protect their interests, and hence, they pay attention to group loyalty rather than efficiency (Li & Zahra, 2012). According to Pillay and Dorasamy (2010), individuals in

a collectivist culture build strong "family" connections because the network of family and friends will create strong loyal relationships. This facilitates illegal transactions (Davis & Ruhe, 2003). Public officials may be tempted to accept bribes in exchange for favours to members of their group (Getz & Volkema, 2001). In the same vein, Hofstede (2001) states that different group will have different laws and rights. There is no single standard in collectivist culture when evaluating the behaviour of different groups. This would increase the level of corruption.

The high level of corruption in countries with a high level of collectivism can arise the ability of access to the bank credit of firms (Zheng et al., 2013). According to Gestland (1999), firms located in collectivist societies emphasise relationships ahead of the business. They tend to connect with banks where they know the bank employees, even though the banks are relatively far away. This leads to an increase in the ability of engagement in corruption with related customers of bank officers (Zheng et al., 2013). Hofstede (2001) states that a collectivist society features relationships over impersonal legal entities such as banks because of its particularistic norms. Accordingly, bank officers in a collectivist society have greater motivation to provide or offer preferential loan terms to related customers who apply for bank credit (Zheng et al., 2013). In so doing, they will receive rewards from related customers such as immediate monetary bribes or a strengthened relationship (Zheng et al., 2013). Hence, the level of collectivism of a country leads to high-level corruption in bank lending to firms.

SMEs experience scarcity of financial resources, lower bargaining power, and lack of political connections compared to large firms, and thereby they consider bribes as a vehicle for access to bank credit (Galli et al., 2017; Wellalage et al., 2019). It allows firms to overcome complex regulations and bureaucratic processes from which they can increase the ability to obtain bank loans (Agrawal & Knoeber, 2001; Beck et al., 2005; Khwaja & Mian, 2005). According to Harstad and Svensson (2011), the bribe intensity

is higher for SMEs than for large firms. In countries with a high level of corruption (i.e. a high level of collectivism), SMEs are willing to accept the payment of bribes to bank officers in exchange for decreasing barrier of access to bank credit (Galli et al., 2017). Instead of selecting credible SMEs, bank officers support firms who are willing to pay bribes (Wellalage et al., 2019). Based on the discussion above, in collectivist societies, SMEs can access more bank credit by paying a high bribe. In the same vein, Petersen and Rajan (1997) indicate that SMEs will increase the availability of finance from financial institutions when they have well-established relationships with those institutions. Thus, firms in collectivist countries can obtain more short-term bank credit. This encourages them to grant more trade credit to their customers and to decrease the demand for trade credit from suppliers (García-Teruel & Martínez-Solano, 2010a) . The hypotheses are expected as follows:

Hypothesis 5: The influence of short-term bank credit on trade credit provision in countries with a high level of collectivism is higher than that in countries with a low level of collectivism.

Hypothesis 6: The influence of short-term bank credit on trade credit receipt in countries with a high level of collectivism is lower than that in countries with a low level of collectivism.

People tend to avoid unpredictable situations and feel more anxious about ambiguity when they live in societies with high uncertainty avoidance (Hofstede, 1991). They find ambiguity stressful and prefer predictability and certainty (Offermann & Hellmann, 1997). Therefore, people from countries with high uncertainty avoidance are more risk-averse (Riddle, 1992). In this sense, firms in countries with high uncertainty avoidance tend to use less debt finance because it can increase the likelihood of bankruptcy and puts a firm in greater financial instability (Chui et al., 2002). Similarly, Gleason et al. (2000) state that firms use a lower level of bank loans in order to avoid

exposure to the risk of bankruptcy in cultures with strong uncertainty avoidance. In the same vein, Chang et al. (2012) show that firms in countries with a high uncertainty avoidance decrease use of short-term bank credit because they are more likely to avoid a greater refinancing risk that may increase from that debt. Based on these discussions, there is a negative association between uncertainty avoidance and short-term bank credit. That is, firms in countries with high uncertainty avoidance will use less short-term financial debt. Hence, such firms will decrease the provision of trade credit to customers and increase the need for trade credit from suppliers (García-Teruel & Martínez-Solano, 2010b; 2010c). In other words, the association between short-term bank credit and trade credit provision in firms in countries with a high level of uncertainty avoidance is lower than those in countries with low uncertainty avoidance. Besides, the relationship between short-term financial debt and trade credit receipt in firms in countries with a high level of uncertainty avoidance is lower than that in countries with low uncertainty avoidance. The hypotheses are expected as follows:

Hypothesis 7: The influence of short-term bank credit on trade credit provision in countries with a high level of uncertainty avoidance is lower than that in countries with a low level of uncertainty avoidance.

Hypothesis 8: The influence of short-term bank credit on trade credit receipt in countries with a high level of uncertainty avoidance is lower than that in countries with a low level of uncertainty avoidance.

3.3.2.3. The interaction effect of national culture and cash holdings

Trade credit is influenced by cash holdings beyond short-term bank credit (Love et al., 2007; García-Teruel & Martínez-Solano, 2010c). According to Love et al. (2007), firms with a large stock of cash holdings are likely to be in a better financial position and hence, they have an incentive to provide more trade credit to their customers in order to support profitable commercial operations. Conversely, firms with a shortage of cash

reduce investment in accounts receivable (Deloof & Jegers, 1999). Therefore, cash holdings have a positive association with trade credit provision. Moreover, firms also reduce reliance on trade credit received from suppliers when they have large stocks of cash (Love et al., 2007). Similarly, García-Teruel and Martínez-Solano (2010c) demonstrate that firms with low cash holdings need more financing from suppliers. Hence, cash holdings have a negative relationship with trade credit payable.

Many previous studies find that national culture is an important determinant of cash holdings across countries (Chang & Noorbakhsh, 2009; Chen et al., 2015). Countries with high collectivism emphasise strong group cohesion, in contrast to countries with low collectivism, where individual freedom is emphasised (Li et al., 2013). People from the latter countries overestimate their ability compared to their peers (Markus & Kitayama, 1991; Heine et al., 1999; Chen et al., 2015). They act as if they have more ability than they actually possess, and so they feel optimistic about the accuracy of their predictions (Yates, 1990; Campbell et al., 2004; Van den Steen, 2004; Trivers, 2010). In countries with a low level of collectivism, firms tend to hold less cash because they are more confident about the financial situation of firms (Chen et al., 2015). In contrast, firms from countries with high collectivism feature higher self-monitoring (Biais et al., 2005). They want to send a positive signal to the public by holding a high level of cash (Chen et al., 2015). This reflects to the outside that firms are well-managed. Therefore, the higher level of collectivism is, the higher cash holdings are. When firms hold a high level of cash, they will have an incentive to offer more trade credit to customers (Love et al., 2007). With regard to trade credit payable, according to the Pecking Order theory, firms prefer to use cash for financing investment projects rather than raise external finance, such as equity or debt financing, because the latter is very expensive (Opler et al., 1999; Ramirez & Tadesse, 2009). When firms hold a high level of cash, they will reduce reliance on credit from suppliers (Love et al., 2007). Based on the discussion above, firms in

countries with a high level of collectivism will hold more cash, leading them to offer more trade credit to customers and to receive less trade credit from suppliers. The hypotheses are presented as follows:

Hypothesis 9: The influence of cash holdings on trade credit provision in countries with a high level of collectivism is higher than that in countries with a low level of collectivism.

Hypothesis 10: The influence of cash holdings on trade credit receipt in countries with a high level of collectivism is lower than that in countries with a low level of collectivism.

Uncertainty avoidance refers to the extent to which people in a society confront an unknown future (Ramirez & Tadesse, 2009). A high level of uncertainty avoidance indicates that a country has a high level of tolerance for ambiguity and uncertainty (Hofstede, 2001). Managers of firms in such societies tend toward risk aversion, and so they retain a high level of liquid assets in order to quickly deploy them when needed in any situation (Kreiser et al., 2010). Another study by Ramirez and Tadesse (2009) finds that a firm's cash holdings has a positive association with the level of uncertainty avoidance of a country. That is, managers of firms located in societies with high levels of uncertainty avoidance will retain high cash as an instrument to hedge against future because they will be less willing to take risks. Similarly, Chang and Noorbakhsh (2009) also find that firms in countries with a high level of uncertainty avoidance hold larger balances of cash. This helps them to reduce the fear of potential financial distress raised from unexpected losses and decreases the possibility of raising external funds at high interest rate because of cash shortage. In the same line, Chen et al. (2015) also find evidence that firms from high uncertainty avoiding cultures hold more cash in anticipation of uncertainty associated with future cash-flows generated by firms. Hence, firms hold more cash when they operate in countries with a high level of uncertainty avoidance.

According to Love et al. (2007), holding a high level of cash allows firms to offer more trade credit to their customers. However, in countries with high uncertainty avoidance, firms provide less trade credit to customers, although they hold high cash. This is because they fear the risk of late payment or renegotiation in case of default of customers and, at worst, an increase in delinquent accounts (Martínez-Sola et al., 2013b). Late payment of customers also exposes companies to liquidity problems and limits firm growth, and in some circumstance, firms can go bankrupt (Martínez-Sola et al., 2013b). Hence, in countries with a high level of uncertainty avoidance, firms with high cash holdings will offer less trade credit to their customers compared to others in countries with a low level of uncertainty avoidance. In addition to offering less trade credit to customers, firms will receive less trade credit from suppliers when they hold high cash (Love et al., 2007). Therefore, firms in countries with a high level of uncertainty avoidance will receive less trade credit from suppliers than others in countries with a low level of uncertainty avoidance. The hypotheses are presented as follows:

Hypothesis 11: The influence of cash holdings on trade credit provision in countries with a high level of uncertainty avoidance is lower than that in countries with a low level of uncertainty avoidance.

Hypothesis 12: The influence of cash holdings on trade credit receipt in countries with a high level of uncertainty avoidance is lower than that in countries with a low level of uncertainty avoidance.

3.4. Data, Regression Models and Methodology

3.4.1. Data

In order to test the above hypotheses, this study utilises panel data of SMEs for the seven-year period from 2010 to 2016. During this time, liquidity and financial constraints were raised amongst the SMEs in the aftermath of the 2008 financial crisis (Martínez-Sola et al., 2014). Such constraints should make the efficiency of trade credit management

even more critical. The selection of SMEs is based on the following criteria. Firstly, these firms must be listed on the SME board of a public equity market in the East Asia - Pacific region. This sample covers nine countries or territories, including China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong. The selection of listed SMEs as a focus is because their financial statements are more accurate and more reliable than those of their non-listed counterparts. Secondly, these firms must meet the definition of small- and medium-sized enterprises (SMEs) set by each country (see Appendix A).

In addition to those selection criteria, this study applies a series of filters based on earlier studies (García-Teruel & Martínez-Solano, 2007; Pais & Gama, 2015; Lyngstadaas & Berg, 2016). Specifically, firms with anomalies in their accounting data are excluded. For instance, firms are excluded if their total assets, sales, trade credit receivable and trade credit payable have negative values and if their total assets differ from total liabilities and equity. Financial firms are excluded from the sample because these firms have very different accounting requirements and asset structures from non-financial ones. The final sample consists of 1,509 non-financial listed SMEs, which amounts to an unbalanced panel of 10,537 firm-year observations.

Country	SMEs market	Listed of companies
China	ChiNext	276
Vietnam	HNX	130
Malaysia	ACE market	71
Thailand	MAI	68
Japan	JASDAQ	220
	MOTHER	26
South Korea	KOSDAQ	353
Taiwan	GreTai	164
Singapore	SGX Catalist	125
Hong Kong	GEM	76
Total		**1,509**

Table 3.1: The number of SMEs selected for Chapter Three.

The required financial and accounting firm-level data are retrieved from Bloomberg and DataStream Thomson One. The country-level data, such as Gross Domestic Product per capita (GDPCAP), private credit to GDP (PRIV) and market capitalization to GDP (MARKETGDP) are gathered from the World Bank and (Beck et al., 2019) for all years available within 2010-2016, but those of Taiwan are collected from National Statistics (2018), the International Monetary Fund (IMF) and Central Bank of the Republic of China (Taiwan). The Hofstede Collectivism index (CLT) and Uncertainty-Avoidance index (UAI) are obtained from Hofstede (2001) who constructs cultural indices based on the psychological survey of IBM employee values in more than 70 countries between 1967 and 1973. The base currency used for the data analyzed is in terms of the US dollar. Further, both dependent and independent variables are winsorized at 5% and 95% to mitigate the influence of outliers.

3.4.2. Variables and regression models

3.4.2.1. The effect of national culture on trade credit

In order to check the relationship between national culture and trade credit, this study builds models as follows:

For trade credit receivable (TCR):

$$TCR_{it} = \beta_0 + \beta_1 CLT_{it} + \beta_2 SIZE_{it} + \beta_3 STDEBT_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YEAR_t + \varepsilon_{it} \quad (1)$$

$$TCR_{it} = \beta_0 + \beta_1 UAI_{it} + \beta_2 SIZE_{it} + \beta_3 STDEBT_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YEAR_t + \varepsilon_{it} \quad (2)$$

For trade credit payable (TCP):

$$TCP_{it} = \beta_0 + \beta_1 CLT_{it} + \beta_2 SIZE_{it} + \beta_3 STDEBT_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YEAR_t + \varepsilon_{it} \quad (3)$$

$$TCP_{it} = \beta_0 + \beta_1 UAI_{it} + \beta_2 SIZE_{it} + \beta_3 STDEBT_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YEAR_t + \varepsilon_{it} \quad (4)$$

Where i and t indicate firm and year respectively, while j denotes industry. IND and YEAR are industry and year dummies, respectively, and ε is the error term. The definitions and sources of both dependent and independent variables can be found in Table 3.2.

The dependent variables include trade credit receivable (TCR) and trade credit payable (TCP). TCR is measured by the ratio of accounts receivable to total sales**.** This ratio reflects the percentage of sales made by providing trade credit to customers (Ferrando & Mulier, 2013). Firms retain a high amount of trade credit on total sales, which indicates that they offer a higher proportion of trade credit to their customers. Moreover, TCP is calculated by the ratio of accounts payable to total assets. This ratio

reflects the important role of accounts payable in the financing of the firm (Deloof & Jegers, 1999). A higher ratio of accounts payable to total assets indicates the ability of firms to rely on higher trade credit than institutional financing to finance their current assets and investment.

The main independent variables include two cultural factors: collectivism (CLT) and uncertainty avoidance (UAI). Following previous studies on the relationship between national culture and financial decisions (Chang & Noorbakhsh, 2009; Chen et al., 2015; El Ghoul & Zheng, 2016), this study uses culture dimensions developed by Hofstede (2001) to measure these two proxies of culture. In particular, collectivism (CLT) is constructed by 100 minus Hofstede's individualism (IDV), and uncertainty avoidance (UAI) is the measure of uncertainty avoidance from Hofstede (2001). After that, each cultural variable is divided by 100 (Zhang et al., 2016). As discussed above, the scores of the CLT and UAI are from a worldwide survey of employees' values at IBM conducted between 1967 and 1973 (Hofstede, 2001). A question arising from using the cultural dimensions developed by Hofstede (2001) is whether or not the data of cultural dimensions could be outdated. However, Hofstede (2001) argues that these cultural dimensions maintain validity over a long period because of the following reasons. First, national culture is extremely stable over time (Williamson, 2000). Second, "the dimensions scores for each country do not indicate an absolute position, instead it is a relative position with respect to other countries, which rarely shifts even if culture does change" (Haq et al., 2018:5).

In addition to main dependent variables, all regression models also include control variables which have been found by previous studies (Petersen & Rajan, 1997; García-Teruel & Martínez-Solano, 2010a; 2010b; 2010c; El Ghoul & Zheng, 2016). These variables include firm size (SIZE), short-term debt (STDEBT), cost of external financing (FCOST), cash holdings (CASH), sales growth (SGROWTH), cash flow (CFLOW),

Gross Domestic Product per capita (GDPCAP), private credit to GDP (PRIV) and market capitalisation to GDP (MARKETGDP).

Firm size (SIZE) is measured as the natural logarithm of total assets. Firms with large size can easier access to funding in the capital markets compared to small firms because they have better creditworthiness. Thus, large-sized firms are able to act as financial intermediaries to grant more trade credit to customers or financially constrained firms (Schwartz, 1974). Moreover, these firms also tend to receive less trade credit from their suppliers because they can use other sources of finance as a result of their reputation (Petersen & Rajan, 1997). Hence, this study expects that the relationship between SIZE and TCR is positive, while the association between SIZE and TCP is negative.

Short-term debt (STDEBT) is measured as the ratio of short-term debt to total assets. This is a common ratio used in empirical studies in order to reflect the ability of access to short-term bank credit (Love et al., 2007; García-Teruel & Martínez-Solano, 2010a; Huang et al., 2011; Palacín-Sánchez et al., 2019). Firms' receipt and provision of trade credit depend on the availability of access to financial resources from banks. According to García-Teruel and Martínez-Solano (2010b), firms are willing to grant more trade credit to their customers when they can obtain more short-term resources. With regard to trade credit payable, firms have more need for trade credit from suppliers when credit from financial institutions is not available and does not satisfy the firms' demand for the fund (Schwartz, 1974; Petersen & Rajan, 1997). Otherwise, they decrease their need for trade credit from suppliers. Therefore, this study would expect that STDEBT has a positive relationship with TCR and a negative association with TCP.

The cost of external finance (FCOST) is calculated as the ratio of financial costs over total debt minus accounts payable. When firms incur the higher cost of external finance, they will have less encouragement to provide trade credit to customers and more motivation to demand trade credit from suppliers (García-Teruel & Martínez-Solano,

2010a; 2010b; 2010c). Thus, this study would expect that FCOST is associated negatively with TCR and related positively to TCP.

Cash holding (CASH) is calculated as the ratio of cash and cash equivalents to total assets. Firms with high cash holdings have less incentive to receive trade credit from their suppliers (Petersen & Rajan, 1997; Deloof & Jegers, 1999; Love et al., 2007). Hence, this study could expect that the association between CASH and TCP is negative. Moreover, according to Wu et al. (2012), trade credit receivable (TCR) is considered as a cash substitute. When firms have low cash holdings, they will have less motivation to provide trade credit customers. Hence, this study could expect that CASH and TCR have a positive relationship.

Sales growth (SGROWTH) is calculated by $(Sales_t - Sales_{t-1}) \div Sales_{t-1.}$ (García-Teruel & Martínez-Solano, 2010b) suggest that firms with low sales growth could use trade credit as a mechanism to stimulate sales by providing more credit to their customers. Hence, this study would expect a negative relationship between SGROWTH and TCR. Moreover, firms with high sales growth have a high demand for finance in general, and for trade credit from their suppliers in particular (Cunat, 2006). In the same vein, García-Teruel and Martínez-Solano (2010c) indicate that firms with high sales growth have an increased demand for trade credit from suppliers because they have greater growth opportunities and need more funds to finance their new investments. Therefore, the study would anticipate that SGROWTH has a positive relationship with TCP.

Cash flow (CFLOW) is measured by the ratio of net profits plus depreciation to sales, which reflects the firms' ability to generate internal resources. According to Petersen and Rajan (1997), firms offer more trade credit to customers when they have more resources available as a result of a greater capacity to generate internal funds. Similarly, Niskanen and Niskanen (2006) point out that firms with strong internal finance extend more trade credit to customers. Hence, the study would expect a positive

relationship between CFLOW and TCR. Furthermore, firms will decrease their demand for financing through their suppliers, since they have a greater capacity to generate internal funds (Petersen & Rajan, 1997; Deloof & Jegers, 1999; Niskanen & Niskanen, 2006). Hence, this study would expect that CFLOW has a negative association with TCP.

Similar to in the previous studies (Ramirez & Tadesse, 2009; Chen et al., 2015; El Ghoul & Zheng, 2016), this study includes Gross Domestic Product per capita (GDPCAP), which is measured by log (GDPCAP) as a country-level control variable. This ratio reflects economic development. Firms in less developed countries tend to offer more trade credit to customers (El Ghoul & Zheng, 2016). Moreover, those firms tend to rely more on trade credit from suppliers to finance their purchases than ones in more developed countries (Demirgüç-Kunt & Maksimovic, 2001). Firms operating in countries with low economic development will have less ability to generate cash from their operations and reduce credit supplied from banks (García-Teruel & Martínez-Solano, 2010c). Those firms need more trade credit from suppliers. Thus this study would expect that GDPCAP has a negative association with TCR and TCP.

Besides, this study uses private credit to GDP (PRIV) as a measure of size of the credit market and market capitalisation to GDP (MARKETGDP) as a measure of size of stock market based on the previous studies by Ramirez and Tadesse (2009), Fisman and Love (2003), Demirgüç-Kunt and Maksimovic (2001), El Ghoul and Zheng (2016) and Beck et al. (2000). Firms in countries with more developed banking systems and more developed stock markets have higher ability to access to capital and hence, they tend to offer more trade credit to customers and reduce reliance on trade credit from suppliers compared to their counterparts in countries with less developed systems (Demirgüç-Kunt & Maksimovic, 2001; Fisman & Love, 2003; El Ghoul & Zheng, 2016). Hence, this study would expect that TCR has a positive association with PRIV and MARKETGDP, while TCP has a negative relationship with PRIV and MARKETGDP.

Variables	Acronym	Definition	Source
Dependent variables			
Trade credit receivable	TCR	The ratio of accounts receivable to sales.	Bloomberg and DataStream Thomson One
Trade credit payable	TCP	The ratio of accounts payable to total assets.	Bloomberg and DataStream Thomson One
Independent variables			
Collectivism	CLT	A higher score indicates a higher degree of collectivism.	Hofstede (2001)
Uncertainty avoidance	UAI	A higher score indicates a higher degree of uncertainty avoidance.	Hofstede (2001)
Firm level controls			
Firm Size	SIZE	Natural logarithm of total assets in $US millions	Bloomberg and DataStream Thomson One
Short-term debt	STDEBT	The ratio of short-term financial debt to total assets	Bloomberg and DataStream Thomson One
Cost external financing	FCOST	The ratio of finance expenses over total debt minus accounts payable	Bloomberg and DataStream Thomson One
Cash holdings	CASH	The ratio of cash and cash equivalents to total assets	Bloomberg and DataStream Thomson One

Variables	Acronym	Definition	Source
Sales growths	SGROWTH	The annual growth rate of sales	Bloomberg and DataStream Thomson One
Cash flow	CFLOW	The ratio of net profits plus depreciation to sales	Bloomberg and DataStream Thomson One
Country level controls			
GDP per capita	GDPCAP	The logarithm of GDP per capita	World Bank Databank
Private credit	PRIV	The ratio of private credit to GDP	Beck et al. (2019)
Market capitalisation	MARKETGDP	The ratio of Market capitalization to GDP	Beck et al. (2019)

Table 3.2: Definition of dependent and independent variables in Chapter Three.

3.4.2.2. Interaction effect of national culture on short-term bank credit

This section will check the influence of collectivism (CLT) and uncertainty avoidance (UAI) on the association between short-term bank credit and trade credit. The models are presented as follows:

For trade credit receivable (TCR):

$$TCR_{it} = \beta_0 + (\beta_1 + \alpha_1 DCLT_{it}) STDEBT_{it} + \beta_2 DCLT_{it} + \beta_3 SIZE_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (5)$$

$$TCR_{it} = \beta_0 + (\beta_1 + \alpha_1 DUAI_{it}) STDEBT_{it} + \beta_2 DUAI_{it} + \beta_3 SIZE_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (6)$$

For trade credit payable (TCP):

$$TCP_{it} = \beta_0 + (\beta_1 + \alpha_1 DCLT_{it}) STDEBT_{it} + \beta_2 DCLT_{it} + \beta_3 SIZE_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (7)$$

$$TCP_{it} = \beta_0 + (\beta_1 + \alpha_1 DUAI_{it}) STDEBT_{it} + \beta_2 DUAI_{it} + \beta_3 SIZE_{it} + \beta_4 FCOST_{it} + \beta_5 CASH_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (8)$$

where all independent and dependent variable are defined in Table 3.2. DCLT and DUAI are dummy variables that distinguish between firms from countries with high levels of CLT and UAI and those from countries with low levels of CLT and UAI. Specifically, DCLT and DUAI will take a value of 1 for firms in countries with high levels of collectivism (CLT) and uncertainty avoidance (UAI). In this case, $\beta_1 + \alpha_1$ will accounts for the effect of short-term bank credit on trade credit. Otherwise, these dummy variables take 0 for firms in countries with a low level of collectivism (CLT) and

uncertainty avoidance (UAI). Hence, β_1 accounts for the impact of short-term bank credit on trade credit.

3.4.2.3. Interaction effect of national culture on cash holdings

This section will check the influence of collectivism (CLT) and uncertainty avoidance (UAI) on the association between cash holdings and trade credit. The models are presented as follows:

For trade credit receivable (TCR):

$$TCR_{it} = \beta_0 + (\beta_1 + \alpha_1 DCLT_{it}) CASH_{it} + \beta_2 DCLT_{it} + \beta_3 SIZE_{it} + \beta_4 STDEBT_{it} + \beta_5 FCOST_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (9)$$

$$TCR_{it} = \beta_0 + (\beta_1 + \alpha_1 DUAI_{it}) CASH_{it} + \beta_2 DUAI_{it} + \beta_3 SIZE_{it} + \beta_4 STDEBT_{it} + \beta_5 FCOST_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (10)$$

For trade credit payable (TCP):

$$TCP_{it} = \beta_0 + (\beta_1 + \alpha_1 DCLT_{it}) CASH_{it} + \beta_2 DCLT_{it} + \beta_3 SIZE_{it} + \beta_4 STDEBT_{it} + \beta_5 FCOST_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (11)$$

$$TCP_{it} = \beta_0 + (\beta_1 + \alpha_1 DUAI_{it}) CASH_{it} + \beta_2 DUAI_{it} + \beta_3 SIZE_{it} + \beta_4 STDEBT_{it} + \beta_5 FCOST_{it} + \beta_6 SGROWTH_{it} + \beta_7 CFLOW_{it} + \beta_8 GDPCAP_{it} + \beta_9 PRIV_{it} + \beta_{10} MARKETGDP_{it} + IND_j + YR_t + \varepsilon_{it} \quad (12)$$

where all independent and dependent variable are defined in Table 3.2. DCLT and DUAI are dummy variables that distinguishes between firms from countries with high levels of CLT and UAI and those from countries with low levels of CLT and UAI. Specifically, DCLT and DUAI will take a value of 1 for the firms in countries with high levels of collectivism (CLT) and uncertainty avoidance (UAI). In this case, $\beta_1 + \alpha_1$ will account for the effect of cash holdings on trade credit. Otherwise, these dummy variables

take a value of 0 for firms in countries with a low level of collectivism (CLT) and uncertainty avoidance (UAI). Hence, β_1 accounts for the impact of cash holdings on trade credit.

3.4.3. Methodology

As discussed in Chapter One, there are three-panel data models: The Pooled ordinary least squares model (Pooled OLS), Fixed Effect Model (FEM) and Random Effect Model (REM). In this Chapter, all regressions are estimated by Pooled Ordinary Least Squares (Pooled OLS) with robust standard errors based on the previous studies (Bae et al., 2012; Chen et al., 2015; El Ghoul & Zheng, 2016; Haq et al., 2018). This study uses robust standard errors because it controls for heteroscedasticity which could arise from time-series and the cross-sectional nature of the data (Petersen, 2009). According to Brooks (2008), a Pooled Ordinary Least Squares model (Pooled OLS) pools all of the data and runs regression models but it does not take into account the unit-specific effects. Meanwhile, the Fixed Effect Model (FEM) takes into consideration the changes within each entity and eliminates bias in Pooled OLS (Brooks, 2008). However, the Fixed Effect Model (FEM) is not suitable for this study because the culture variables are time-invariant variables. According to Baltagi (2008), the effect of any time-invariant variables cannot be estimated in the Fixed Effect Model (FEM) because these variables do not change in individuals over time. Hence, any time-invariant variables are wiped out in 'within transformation' or 'time-demeaning' process of the variables in FEM (Baltagi, 2008). The Random Effect Model (REM) used in robustness check in order to control for the unobserved omitted variable problem (Haq et al., 2018).

3.5. Analysis and Results

3.5.1. Descriptive analysis

Tables 3.3 and 3.4 present the descriptive statistics of all dependent and independent variables across countries and for the full sample, respectively. Table 3.3 shows that China, Japan, South Korea, and Taiwan account for the largest proportion in the sample. In particular, South Korea makes up 23.36% of the sample, indicating that it has the largest number of firms in the sample, while the second-largest country in the sample is China with 18.34%. Moreover, Japan and Taiwan account for 16.34% and 10.85% respectively. As shown in Table 3.3, the mean values of trade credit receivable (TCR) are higher than those of trade credit payable (TCP) across countries, except for Vietnam where the mean value of TCP is higher than that of TCR. This shows that SMEs in China, Thailand, Malaysia, Japan, South Korea, Taiwan, Singapore, and Hong Kong offer more trade credit to customers rather than receiving trade credit from suppliers. For trade credit receivable (TCR), China has the highest number with 0.412, while Taiwan has the smallest value with 0.183. Regarding trade credit payable (TCP) variables, Vietnam has the highest value with 0.990 and Hong Kong has the lowest value with 0.046. The overall means of TCR and TCP across the nine countries are 0.249 and 0.08 respectively. The national cultural variables are different across countries. In particular, the mean values of collectivism (CLT) of China, Vietnam, Thailand, Malaysia, South Korea, Taiwan, Singapore and Hong Kong are higher than 0.7, which is higher than that of Japan, with 0.54. The mean value of UAI is highest in Japan with 0.92, while the lowest value is 0.08 in Singapore. Considering the mean value of SIZE across countries, SMEs in China is the biggest value of 4.475. Meanwhile, the size of SMEs in Malaysia is the smallest at 1.944. Thailand is the country where SMEs have the highest short-term debt (STDEBT) with 0.346 compared to the rest of the countries in East Asia and the Pacific. Moreover, Table 3.3 also shows that SMEs in China, Japan, Taiwan, and Hong Kong

hold cash higher than 0.2. However, some countries have a mean value of cash holdings (CASH) less than 0.2, such as Vietnam, Thailand, Malaysia, South Korea, and Singapore. Moreover, the sales growth (SGROWTH) of SMEs in China is the highest at 0.261 while that of SMEs in Japan is lowest at 0.033. The cash flow generated by firms (CFLOW) in China is the highest at 0.173. Moreover, the mean value of GDP per capita (GDPCAP) of Singapore is the highest with 10.888 compared to the lowest value of Vietnam with 7.487. The private credit (PRIV) of Taiwan has the highest mean value with 2.183 while that of Vietnam has the lowest mean value with 0.990. Finally, the mean value of market capitalisation (MARKETGDP) is highest in Hong Kong with 9.086, while the lowest value is 0.270 in Vietnam.

Table 3.4 reports overall descriptive statistics for the full sample. The mean value of trade credit receivable (TCR) is 0.249, while that of trade credit payable (TCP) is 0.08. This means that SMEs in the East Asia and Pacific region tend to offer more trade credit to customers rather than receive trade credit from suppliers. With regard to national culture variables, the collectivism (CLT) variable has a mean value of 0.760, and this index ranges from 0.54 (Japan) to 0.83 (Taiwan). This suggests that most of the selected countries in East Asia and Pacific region are collectivist countries, except for Japan. The uncertainty avoidance (UAI) variable has a mean value of 0.572, and this index ranges from 0.08 (Singapore) to 0.92 (Japan). The mean value of firm size (SIZE) is 3.128, with a minimum and maximum of 0.147 and 5.172 respectively. On average, the short-term debt (STDEBT) of companies in the sample has a value of 0.276, and the cost of external financing (FCOST) has a value of 0.020. Moreover, these firms have average cash holdings (CASH) of 0.203. These numbers show that firms are likely to access short-term bank debt and to hold high cash. This explains why these firms offer more trade credit to customers but receive less trade credit from suppliers. The sales growth (SGROWTH) of the firms in this sample ranges from a minimum of -0.432 to a maximum of 0.918, with

an average value of 0.108. The cash flow (CFLOW) of companies in the sample has an average value of 0.028, and its median value is 0.069. The mean value of GDP per capita (GDPCAP) is 9.717 while those of private credit (PRIV) and market capitalisation (MARKETGDP) are 1.281 and 1.400 respectively.

Country	N	TCR	TCP	CLT	UAI	SIZE	STDEBT	FCOST	CASH	SGROWTH	CFLOW	GDPCAP	PRIV	MARKETGDP
China	1,932	0.412	0.075	0.80	0.30	4.475	0.231	0.020	0.300	0.261	0.173	8.804	1.282	0.560
Vietnam	906	0.208	0.990	0.80	0.30	0.674	0.343	0.032	0.123	0.073	0.071	7.487	0.990	0.270
Thailand	476	0.203	0.126	0.80	0.64	2.561	0.346	0.220	0.111	0.133	0.047	8.658	1.045	0.908
Malaysia	491	0.325	0.070	0.74	0.36	1.944	0.203	0.026	0.170	0.079	-0.003	9.229	1.118	1.403
Japan	1,722	0.200	0.094	0.54	0.92	3.289	0.282	0.007	0.307	0.033	0.006	10.636	1.013	0.810
South Korea	2,461	0.198	0.062	0.82	0.85	3.354	0.268	0.028	0.091	0.066	0.066	10.146	1.137	0.911
Taiwan	1,144	0.183	0.080	0.83	0.69	3.034	0.282	0.010	0.231	0.080	0.003	9.979	2.183	1.536
Singapore	875	0.228	0.102	0.80	0.08	3.163	0.328	0.020	0.193	0.081	-0.024	10.888	1.140	2.396
Hong Kong	530	0.259	0.046	0.75	0.29	2.594	0.251	0.025	0.233	0.154	-0.278	10.553	1.972	9.086
All countries	10,537	0.249	0.080	0.76	0.57	3.128	0.280	0.020	0.203	0.108	0.028	9.717	1.281	1.400

Notes: All variables are defined in Table 3.2

Table 3.3: Summary statistics across countries.

Variable	N	Mean	Median	Std. Dev	Min	Max
TCR	10,537	0.249	0.201	0.196	0.008	0.767
TCP	10,537	0.080	0.057	0.077	0.000	0.269
CLT	10,537	0.760	0.80	0.100	0.54	0.83
UAI	10,537	0.572	0.69	0.293	0.08	0.92
SIZE	10,537	3.128	3.337	1.342	0.147	5.172
STDEBT	10,537	0.276	0.248	0.174	0.033	0.635
FCOST	10,537	0.020	0.012	0.023	0.000	0.081
CASH	10,537	0.203	0.147	0.178	0.006	0.623
SGROWTH	10,537	0.108	0.051	0.321	-0.432	0.918
CFLOW	10,537	0.028	0.069	0.237	-0.736	0.333
GDPCAP	10,537	9.717	10.029	0.970	7.607	10.910
PRIV	10,537	1.281	1.157	0.398	0.909	2.195
MARKETGDP	10,537	1.400	0.890	1.854	0.260	9.086

Notes: All variables are defined in Table 3.2

Table 3.4: Summary statistics for the full sample.

3.5.2. Pearson correlation analysis

The purpose of the Pearson correlation analysis is to identify the presence of multi-collinearity in regression analysis. While a high correlation between one of the independent variable and the dependent variable does not show the presence of multi-collinearity, a high correlation coefficient among independent variables indicates that the model is suffering from multicollinearity (Brooks, 2008). When an independent variable is very highly correlated with one or more other independent variables, it will increase the standard error and make the estimates unstable (Allen, 1997). Also, the presence of multicollinearity raises the sensitivity to change of the regression. Thus, adding or removing any independent variables to or from the model also leads to modify significant or the coefficient value of the other variables. Besides, this problem will widen confidence intervals for the parameters, leading to an inappropriate conclusion (Brooks, 2008). According to Field (2009), multicollinearity is a problem in regression analysis when the correlation coefficient between independent variables is higher than 0.80 or

0.90. From the result presented in Table 3.5, the correlation coefficients among independent variables do not exceed these numbers, so multicollinearity does not influence the multiple regression analysis.

Table 3.5 reports the correlation matrix for all variables. It can be seen that the correlation between trade credit receivable (TCR) and collectivism (CLT) is positive and significant at the 1 percent level, while the correlation between trade credit receivable (TCR) and uncertainty avoidance (UAI) is negative and significant at the 1 percent level. Firm size (SIZE) is positively correlated with trade credit receivable (TCR). Moreover, trade credit receivable (TCR) has a significantly positive correlation with short-term debt (STDEBT), cost of external financing (FCOST), sales growth (SGROWTH), and cash flow (CFLOW). However, the correlation between TCR and cash holdings (CASH) is positive but insignificant. There is a significant positive correlation between TCR and private credit (PRIV). TCR is negatively correlated with GDP per capita (GDPCAP) and market capitalisation (MARKETGDP). For trade credit payable (TCP), there are a significant negative correlation between this variable and collectivism (CLT) and uncertainty avoidance (UAI). Moreover, TCP is significantly correlated negatively with firm size (SIZE), cash holdings (CASH), GDP per capita (GDPCAP), private credit (PRIV) and market capitalisation (MARKETGDP). On the other hand, this variable has significantly positive correlations with short-term debt (STDEBT), cost of external financing (FCOST), sales growth (SGROWTH), and cash flow (CFLOW).

	TCR	TCP	CLT	UAI	SIZE	STDEBT	FCOST	CASH	SGROWTH	CFLOW	GDPCAP	PRIV	MARKETGDP
TCR	1.00												
TCP	0.11***	1.00											
CLT	0.07***	-0.07***	1.00										
UAI	-0.25***	-0.03***	-0.41***	1.00									
SIZE	0.27***	-0.02*	-0.01	0.07***	1.00								
STDEBT	0.03***	0.55***	0.0004	-0.01	-0.02*	1.00							
FCOST	0.05***	0.04***	0.23***	-0.11***	-0.04***	0.20***	1.00						
CASH	0.01	-0.11***	-0.27***	-0.08***	0.08***	-0.27***	-0.26***	1.00					
SGROWTH	0.07***	0.05***	0.09***	-0.14***	0.16***	0.05***	-0.01	0.02**	1.00				
CFLOW	0.04***	0.02*	0.07***	-0.06***	0.18***	-0.12***	-0.14***	0.06***	0.19***	1.00			
GDPCAP	-0.17***	-0.04***	-0.38***	0.43***	0.25***	-0.01	-0.16***	0.04***	-0.12***	-0.25***	1.00		
PRIV	0.02*	-0.08***	-0.44***	0.42***	0.27***	-0.07***	-0.20***	0.16***	-0.02*	-0.19***	0.50***	1.00	
MARKETGDP	-0.02*	-0.09***	0.02**	-0.27***	-0.08***	-0.02*	0.02**	0.02**	0.01	-0.33***	0.36***	0.46***	1.00

Notes: All variables are defined in Table 3.2. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.5: Pearson Correlation Matrix.

3.5.3. The influence of national culture on trade credit

Table 3.6 presents the regression results of trade credit on national culture. In particular, columns (1) and (2) show the influence of national culture on trade credit receivable (TCR), while columns (3) and (4) show the impact of national culture on trade credit payable (TCP). All models from (1) to (4) are estimated by using pooled Ordinary Least Squares (OLS) regressions with robust standard errors. In general, the coefficient on dimensions of culture is statistically significant at the 1 percent level, indicating that cultural factors are important determinants of trade credit.

According to the results reported in column (1), the coefficient of collectivism (CLT) is positive and statistically significant at the 1 percent level. In other words, collectivism (CLT) has a significantly positive association with trade credit receivable (TCR). The coefficient of collectivism (CLT) is 0.077, which indicates that a one-unit change in collectivism (CLT) results in a 0.077 increase in trade credit provision. When other things are equal, movement in the collectivism index from the lowest country (0.54) to the highest country (0.83) leads to an increase in trade credit provision of 0.022. This result is consistent with the prediction in hypothesis one. In particular, firms located in more collectivist countries provide more trade credit to customers because they can obtain more information on customers as a result of building a strong network with other firms and suppliers (McMillan & Woodruff, 1999). This allows them to evaluate the reliability of customers and decrease the information asymmetry concerns before offering trade credit (McMillan & Woodruff, 1999). This finding is consistent with the finding of El Ghoul and Zheng (2016).

In column (2), the study finds that uncertainty avoidance (UAI) is negatively related to trade credit receivable (TCR) at the 1 percent significance level. The magnitude of the coefficient of UAI is (-0.145), indicating that a one-unit change in the UAI results in a 0.145 decrease in trade credit provision. When the UAI index moves from the lowest

country (0.08) to the highest country (0.92), the trade credit offered to customers will decrease by 0.1218 with the condition that other things are equal. The negative sign of the coefficient of UAI means that firms in countries with a high level of uncertainty avoidance tend to provide less trade credit. This supports hypothesis three. Providing trade credit to customers means that firms are allowing buyers to delay payment as a product quality guarantee (Long et al., 1993). However, this can bring risks for firms because they experience uncertainty about when they will receive payment from customers (Smith, 1987). If the buyers default and fail to pay their suppliers on time, firms will face difficulties to pay their loans from banks (Biais & Gollier, 1997). Hence, firms from a high uncertainty-avoidance culture offer less trade credit provision because they would tend to be less comfortable with ambiguous and uncertain situations.

The significant negative coefficient on collectivism (CLT) in column (3) suggests that firms in countries with a more collectivist culture will receive less trade credit received from suppliers. The magnitude of the coefficient is (-0.181), which indicates that a one-unit increase in CLT will decrease TCP by 0.181. When the collectivism index increases from the lowest country (0.54) to the highest country (0.83), the trade credit will decrease by 0.052. This finding agrees with the hypothesis two, which predicts a negative relationship between collectivism (CLT) and trade credit payable (TCP). In more collectivist countries, firms have close-knit networks with others, and hence, their managers always try to preserve public image (Chen et al., 2015). If firms habitually fail to make payment on time, suppliers will rank them as having low creditworthiness and increase their monitoring or impose stricter terms on future sales (Cunat, 2006). Besides, the suppliers can share this information with others, affecting firms' operation in the future. Hence, this finding suggests that firms from countries with a high level of collectivism tend to receive less trade credit from their creditors or pay trade credit on time because they want to preserve a good image to their suppliers.

Column (4) shows that the coefficient of uncertainty avoidance (UAI) in association with trade credit payable (TCP) is negative and significant at the 1 percent level. The magnitude of the coefficient is (-0.0203), which indicates that a one-unit increase in UAI leads to 0.0203 reduction in TCP. When other things are equal, the movement in the collectivism index (CLT) from the lowest (0.54) to the highest (0.83) results in a decrease in TCP by 0.01. This finding is consistent with hypothesis four, that the higher level of UAI will decrease the TCP. According to Bae et al. (2012) and Chen et al. (2015), firms located in cultures with a high level of uncertainty avoidance would have a tendency to protect themselves against the uncertainty and hence they prefer to hold more cash as a precaution against unexpected difficulties in the future. Hence, the firm will reduce trade credit received from suppliers.

With regard to control variables, in columns (1) – (4), this study finds that firm size (SIZE) has a positive association with trade credit receivable (TCR) and trade credit payable (TCP). All coefficients are significant at the 1 percent level. The positive association between SIZE and TCR suggests that larger firms grant more trade credit to customers because they have better access to capital markets and face fewer constraints when they raise capital to finance their investment (Faulkender & Wang, 2006). Moreover, larger firms have financial stability and therefore increasingly provide more trade credit to customers (Schwartz, 1974). This finding is consistent with the findings of past studies by Petersen and Rajan (1997) and García-Teruel and Martínez-Solano (2010a) which find a positive association between firm size and extending trade credit. In addition to trade credit receivable, this study shows a significantly positive association between firm size (SIZE) and trade credit payable (TCP). Although this finding is opposed to what the study expected, it is similar with a study by García-Teruel and Martínez-Solano (2010a) which found that larger firms normally receive a higher proportion of their financing from their suppliers.

Furthermore, short-term debt (STDEBT) is found to be positive and significantly associated with trade credit receivable (TCR) at the 1 percent level. This finding is in line with Petersen and Rajan (1997) and García-Teruel and Martínez-Solano (2010b) who provide evidence that a higher level of short-term financing leads to a higher level of trade credit granted. That is, firms that get more short-term funds offer longer terms of payment to customers. In contrast, the availability of financial resources from banks is negatively related to trade credit payable (TCP). In line with García-Teruel and Martínez-Solano (2010c) , this finding shows that firms' need for trade credit from suppliers will decrease when they have better access to short-term bank credit.

With regards to the cost of external finance (FCOST), this variable is found to be negative and significantly associated with trade credit receivable (TCR) at the 1 percent level. This finding also supports a study by García-Teruel and Martínez-Solano (2010a) which concludes that firms with higher costs of obtaining external financing will have less incentive to provide trade credit to their customers. In contrast, FCOST is found to be positive and insignificant related to trade credit payable (TCP).

The study finds that the relationship between cash holdings (CASH) and trade credit receivable (TCR) is positive and significant at the 1 percent level. Meanwhile, the association between cash holdings (CASH) and trade credit payable (TCP) is negative and significant at the 1 percent level. Consistent with findings by Love et al. (2007), the study shows that firms with larger cash holdings tend to extend more trade credit to their customers in order to support profitable commercial operations and to reduce receipt of trade credit from suppliers.

Sales growth (SGROWTH) is negative and significantly related to trade credit receivable (TCR) at either the 5 percent level or 1 percent level. This means that the lower sales growth leads to higher trade credit receivable. Consistent with the finding of García-Teruel and Martínez-Solano (2010b), the study suggests that firms use trade credit to

stimulate sales when their sales growth is low. Moreover, this study finds a significantly positive association between sales growth (SGROWTH) and trade credit payable (TCP). This result is consistent with the finding of a study by García-Teruel and Martínez-Solano (2010c), which suggests that firms with high sales growth will have an increased demand for trade credit from their suppliers in order to finance their new investments in current assets and to attain greater growth opportunities.

The cash flow (CFLOW) has a significantly positive association with trade credit receivable (TCR). Like Petersen and Rajan (1997) and Niskanen and Niskanen (2006), the study points out that firms can offer more trade credit to customers when firms have a greater capacity to generate internal funds. In contrast, this variable has a significantly negative relationship with trade credit payable (TCP). Consistent with García-Teruel and Martínez-Solano (2010c), this study concludes that firms will decrease their demand for financing through their suppliers when they have a greater capacity to generate internal funds.

Moreover, the study finds a significant negative association between GDP per capita (GDPCAP) and trade credit receivable (TCR). This finding is consistent with the finding of the study by El Ghoul and Zheng (2016), who indicate that firms in less developed countries will increase trade credit provision. Moreover, the relationship between GDP per capita (GDPCAP) and trade credit payable (TCP) is negative and significant at the 1 percent level. This finding is consistent with (Demirgüç-Kunt & Maksimovic, 2001), who indicate a significantly negative association between GDPCAP and TCP. This means that firms in less developed countries rely more on trade credit from suppliers to finance their investment rather than firms from more developed countries.

Finally, private credit (PRIV) and market capitalisation (MARKETGDP) have a significantly positive association with trade credit receivable (TCR). Meanwhile, these variables have a significantly negative association with trade credit payable (TCP). These

findings suggest that firms in countries with more financial market development extend more trade credit to customers and reduce the use of trade credit from suppliers when access to credit institution is not difficult (Demirgüç-Kunt & Maksimovic, 2001; Fisman & Love, 2003).

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
CLT	0.077***		-0.181***	
	(0.006)		(0.000)	
UAI		-0.145***		-0.0203***
		(0.000)		(0.000)
SIZE	0.0188***	0.0192***	0.0202***	0.0178***
	(0.000)	(0.000)	(0.000)	(0.000)
STDEBT	0.212***	0.202***	-0.0042**	-0.0102***
	(0.000)	(0.000)	(0.024)	(0.000)
FCOST	-0.397***	-0.385***	0.050	0.0376
	(0.001)	(0.001)	(0.158)	(0.286)
CASH	0.0717***	0.0363***	-0.0601***	-0.0437***
	(0.000)	(0.007)	(0.000)	(0.000)
SGROWTH	-0.0125**	-0.0142***	0.0042*	0.0024
	(0.013)	(0.004)	(0.089)	(0.318)
CFLOW	0.0536***	0.0397**	-0.0429***	-0.0473***
	(0.002)	(0.024)	(0.000)	(0.000)
GDPCAP	-0.0529***	-0.0298***	-0.0170***	-0.0062***
	(0.000)	(0.000)	(0.000)	(0.000)
PRIV	0.0685***	0.0614***	-0.0216***	-0.0031**
	(0.000)	(0.000)	(0.000)	(0.043)
MARKETGDP	0.0043**	0.0042	-0.0025***	-0.0085*
	(0.027)	(0.145)	(0.000)	(0.069)
Constant	0.427***	0.373***	0.370***	0.129***
	(0.000)	(0.000)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.195	0.209	0.157	0.130

Notes: Columns (1) and (2) present the regression results of the models (1) and (2). Columns (3) and (4) present the regression results of the models (3) and (4). All models are estimated by Pooled OLS with robust standard errors. All variables are defined in Table 3.2. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.6: The association between national culture and trade credit.

3.5.4. Interaction effect of national culture on short-term bank credit

Table 3.7 shows the impact of national culture on the association between short-term bank credit and trade credit. Specifically, columns (1) and (2) present the impact of collectivism (CLT) and uncertainty-avoidance (UAI) on the relationship between short-

term debt (STDEBT) and trade credit receivable (TCR). Meanwhile, columns (3) and (4) present the impact of collectivism (CLT) and uncertainty-avoidance (UAI) on the association between short-term debt (STDEBT) and trade credit payable (TCP).

As shown in column (1), the coefficient of short-term debt (STDEBT) is positive and significant at the 1 percent level for firms in countries with a low level of collectivism (DCLT = 0). Furthermore, the coefficient of STDEBT in association with TCR of firms in countries with a high level of collectivism (DCLT = 1) is 0.142 + 0.119 = 0.261. In line with Martínez-Sola et al. (2013a), the study conducts an F-test to investigate whether the sum of the coefficients of STDEBT and STDEBT * DCLT is significant for firms in countries with a high level of collectivism. As a result of the F-test presented in column (1), the sum of these two coefficients is significant at the 1 percent level. This means that STDEBT has a significant and positive association with TCR for firms located in countries with a high level of collectivism. In general, the association between STDEBT and TCR keeps the same tendency in firms from countries with a different level of collectivism. This result suggests that firms in these countries increase trade credit provision when they have greater access to bank debt. This finding is consistent with the findings of previous studies by Petersen and Rajan (1997), García-Teruel and Martínez-Solano (2010a), and Niskanen and Niskanen (2006). However, the magnitude of the coefficient of the STDEBT variable is 0.142 for firms in countries with a low level of collectivism while that of STDEBT is 0.261 for firms in countries with a high level of collectivism. This means that the latter will provide more trade credit to customers than the former when the STDEBT increases by one unit. This is because firms from countries with a high level of collectivism have greater ability of access to the bank credit based on their connections with bank officers (Gestland, 1999; Zheng et al., 2013). According to Hofstede (2001), more collectivist culture emphasises relationship over business. Firms in more collectivist cultures tend to build close connections with banks where they know

the bank employees, and therefore, they can receive preferential loan terms (Zheng et al., 2013). In the same vein, Petersen and Rajan (1997) indicate that firms will increase the availability of finance from financial institutions when they have well-established relationships with those institutions. Hence, this finding confirms hypothesis five, which indicates that the collectivism increases the positive association between short-term debt and trade credit receivable.

In column (2), the coefficient of short-term debt (STDEBT) in association with trade credit receivable (TCR) is 0.163 for firms in countries with a low level of uncertainty avoidance (DUAI = 0). Moreover, this association is significant at the 1 percent level, which shows that STDEBT has a positive relationship with TCR. When considering firms in countries with a high level of uncertainty avoidance (DUAI = 1), short-term debt (STDEBT) has a positive coefficient of (0.163 + (-0.0718) = 0.0912). Besides, the result of the F-test reveals that the sum of coefficients of STDEBT and STDEBT * DUAI is significant at the 1 percent level, indicating the existence of a relationship between STDEBT and TCR. From the results above, this study concludes that STDEBT has a positive association with TCR for firms in countries with high levels and low levels of uncertainty avoidance. This suggests that firms from countries with different levels of uncertainty avoidance tend to offer more trade credit to customers when they have the ability to access bank credit. The finding is consistent with the study by Petersen and Rajan (1997). However, the coefficient of the STDEBT variable of firms in countries with a low level of uncertainty avoidance (DUAI = 0) is 0.163, while that of firms in countries with a high level of uncertainty avoidance (DUAI = 1) is 0.0912. This means that the association between STDEBT and TCR of firms in countries with a high level of uncertainty avoidance is lower than that of firms in countries with a low level of uncertainty avoidance. This finding supports the hypothesis developed above. According to Hofstede (1991) , firms in societies with high uncertainty avoidance avoid

unpredictable situations and feel more anxious about ambiguity. They tend to use less debt finance because it can increase the likelihood of bankruptcy and put a firm in greater financial instability (Chui et al., 2002). In other words, lower use of short-term debt allows firms in countries with a high uncertainty avoidance to avoid a greater refinancing risk that may increase from that debt (Chang et al., 2012). From this perspective, firms in countries with a high level of uncertainty avoidance will have lower access to bank credit, and hence, they offer less trade credit to customers compared to those in countries with a low level of uncertainty avoidance.

In column (3) of Table 3.7, short-term debt (STDEBT) is negatively associated with trade credit payable (TCP) for firms in countries with a low level of collectivism (DCLT = 0). Moreover, this coefficient is significant at the 10 percent level, indicating that STDEBT affects TCP. When evaluating firms in countries with a high level of collectivism (DCLT = 1), the coefficient of short-term debt (STDEBT) is (-0.0138) + (-0.0391) = (-0.0529), which indicates that STDEBT has a negative relationship with TCR. Besides, the result of the F-test shows that this coefficient is significant at the 1 percent level; thereby there exists a relationship between STDEBT and TCP. From these results, it is concluded that STDEBT has a significantly negative association with TCP for firms in countries with high levels and low levels of collectivism. Consistent with García-Teruel and Martínez-Solano (2010a), firms will reduce the level of trade credit received from suppliers when they have the chance to access bank credit. However, the magnitude of the STDEBT coefficient of firms in countries with a low level of collectivism is (-0.0138), which is higher than that of firms in countries with a high level of collectivism, which is (-0.0529). This finding suggests that firms in the latter countries have less need for trade credit from suppliers rather than firms in former countries because they have a higher ability to access short-term bank debt. According to Zheng et al. (2013), countries with a high level of collectivism tend to have a high level of corruption in bank lending

because firms in such countries emphasise relationships ahead of business. In such countries, SMEs are willing to accept the payment of bribes to bank officers in exchange to decrease barrier of access to bank credit (Galli et al., 2017). Hence, they have high ability to access more bank credit. This allows them to reduce reliance on trade credit from suppliers.

As column (4) shows, short-term debt (STDEBT) is negative and significantly associated with the trade credit payable (TCP) at the 1 percent level for firms in countries with a low level of uncertainty avoidance (DUAI = 0). Moreover, the coefficient of STDEBT of firms in countries with a high level of uncertainty avoidance (DUAI = 1) is (-0.0623) + (-0.0116) = (-0.0739). Besides, the result of F-tests shows that this coefficient is significant at the 1 percent level. Hence, STDEBT has a significantly negative relationship with TCP for firms in countries with a high level of uncertainty avoidance (DUAI = 1). From these results, it is concluded that firms in both types of countries exist a negative association between STDEBT and TCP. This means that they tend to receive more trade credit from suppliers when they have low access to short-term bank debt. It is in line with previous studies by García-Teruel and Martínez-Solano (2010c) who find that firms with the low ability of access to short-term debt will raise their levels of trade credit from suppliers. However, the magnitude of the coefficient of STDEBT of firms in countries with a low level of uncertainty avoidance is (-0.0623) while that of firms in countries with a high level of uncertainty avoidance is (-0.0739). This means that firms in the latter countries have a higher need for trade credit from suppliers than firms in the former countries when the short-term debt decreases by one unit. According to Chui et al. (2002), firms in countries with high uncertainty avoidance have a tendency to use less debt finance because it can increase the likelihood of bankruptcy and put a firm in greater financial instability. As a result, these firms will need more trade credit from suppliers.

Hence, this finding reveals that uncertainty avoidance decreases the negative association between STDEBT and TCP.

Regarding control variables, in columns (1) to (4), firm size (SIZE) is positive and significantly related to trade credit receivable (TCR) and trade credit payable (TCP) at the 1 percent level. Consistent with Petersen and Rajan (1997) and García-Teruel and Martínez-Solano (2010a), this finding suggests that larger firms provide more trade credit to customers because they have better access to capital markets. Moreover, these firms also receive a higher proportion of their financing from their suppliers. In line with García-Teruel and Martínez-Solano (2010a) and García-Teruel and Martínez-Solano (2010c), this study finds that the cost of external finance (FCOST) is negative and significantly associated with TCR at the 1 percent level while it is positive and significantly related to TCP at the 1 percent level. This means that firms with higher costs of obtaining external financing will have less incentive to provide trade credit to their customers. Also, these firms demand more financing from suppliers. Furthermore, the relationship between cash holdings (CASH) and trade credit receivable (TCR) is positive and significant at the 1 percent level while the association between CASH and trade credit payable (TCP) is negative and significant at the 1 percent level. Consistent with findings by Love et al. (2007), the study suggests that firms with larger cash holdings tend to extend more trade credit to their customers in order to enhance profitable commercial operations. Besides, they reduce receipt of trade credit from suppliers. This study finds that the cash flow (CFLOW) is positively and significantly related to TCR at the 1 percent level while it is negatively and significantly associated with TCP at the 1 percent level. Like Petersen and Rajan (1997), García-Teruel and Martínez-Solano (2010c) and Niskanen and Niskanen (2006), this finding indicates that firms with a greater capacity to generate internal funds can offer more trade credit to customers and decrease their demand for trade credit from suppliers. GDP per capita (GDPCAP) has a significant and

negative association with TCR and TCP. In line with El Ghoul and Zheng (2016) and Demirgüç-Kunt and Maksimovic (2001), this finding suggests that firms in less developed countries will make less trade credit provision and they will rely on more trade credit from suppliers. Finally, this study finds that both private credit (PRIV) and market capitalisation (MARKETGDP) have a significantly positive association with TCR and have a significantly negative association with TCP. Consistent with previous studies (Demirgüç-Kunt & Maksimovic, 2001; Fisman & Love, 2003), these findings suggest that firms in countries with more developed financial markets extend more trade credit to customers and make less use of trade credit from suppliers.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
STDEBT	0.142***	0.163***	-0.0138*	-0.0623***
	(0.000)	(0.000)	(0.068)	(0.008)
STDEBT * DCLT	0.119***		-0.0391***	
	(0.000)		(0.000)	
DCLT	-0.0596***		-0.0767***	
	(0.000)		(0.000)	
STDEBT * DUAI		-0.0718***		-0.0116**
		(0.000)		(0.015)
DUAI		-0.0529***		-0.0170***
		(0.000)		(0.000)
SIZE	0.0183***	0.0234***	0.0232***	0.0185***
	(0.000)	(0.000)	(0.000)	(0.000)
FCOST	-0.353***	-0.0686	0.143***	-0.0383
	(0.004)	(0.460)	(0.000)	(0.288)
CASH	0.0625***	0.0404***	-0.0749***	-0.0468***
	(0.000)	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0149	-0.0039	0.0026	0.0013
	(0.109)	(0.561)	(0.275)	(0.584)
CFLOW	0.0528***	0.0400***	-0.0467***	-0.0497***
	(0.003)	(0.001)	(0.000)	(0.000)
GDPCAP	-0.0562***	-0.0160***	-0.0308***	-0.0018
	(0.000)	(0.000)	(0.000)	(0.182)
PRIV	0.0521***	0.0273***	-0.0340***	-0.0062***
	(0.000)	(0.000)	(0.000)	(0.000)
MARKETGDP	0.0074***	0.0056***	-0.0023***	-0.0020***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.570***	0.231***	0.430***	0.094***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test	497.29***	74.31***	29.44***	22.82***
	(0.000)	(0.000)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.198	0.218	0.197	0.139

Notes: Columns (1) and (2) present the regression results of the models (5) and (6). Columns (3) and (4) present the regression results of the models (7) and (8). All models are estimated by pooled OLS with robust standard errors; All variables are defined in Table 3.2. DUAI is a dummy variable that presents the degree of Uncertainty avoidance. DCLT is a dummy variable that presents the degree of collectivism. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and α_1 is zero. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.7: The influence of national culture on the relationship between short-term bank credit and trade credit.

3.5.5. Interaction effect of national culture on cash holdings

Table 3.8 shows the impact of national culture on the association between cash holdings and trade credit. Specifically, the influence of collectivism (CLT) and uncertainty-avoidance (UAI) on the relationship between cash holdings (CASH) and trade credit receivable (TCR) is presented in columns (1) and (2). Meanwhile, the impact of collectivism (CLT) and uncertainty avoidance (UAI) on the association between cash holdings (CASH) and trade credit payable (TCP) is presented in columns (3) and (4).

According to the results are shown in column (1), the coefficient of cash holdings (CASH) in relationship with TCR is positive and significant at the 1 percent level for firms in countries with a low level of collectivism (DCLT = 0). Similarly, the coefficient of CASH of firms in countries with a high level of collectivism (DCLT = 1) is 0.0337 + 0.0148 = 0.0485, indicating that the association between these two variables is positive. The study conducts an F-test to investigate whether the sum of the coefficients of CASH and CASH * DCLT is significant for firms in countries with a high level of collectivism. The result of the F-test shows that the sum of these two coefficients is significant at the 1 percent level. This indicates that there is a significantly positive relationship between CASH and TCR. In general, CASH has a positive relationship with TCR for firms from both highly collectivist and less collectivist countries. This finding points out that firms with higher cash holdings will offer more trade credit to customers, which is consistent with the finding of Love et al. (2007). However, the level of this association is different among countries. In particular, the magnitude of CASH of firms in countries with a low level of collectivism is 0.0337, which is lower than that of firms in countries with a high level of collectivism (0.0485). This finding means that when CASH increases by one unit, the TCR of firms in the former countries will increase by 0.0337 and that of firms in the latter countries will increase by 0.0485. Hence, firms in countries with a high level of collectivism will offer more trade credit to customers than firms in countries with a low

level of collectivism. This is due to the fact that firms in the former countries hold a high level of cash because they want to preserve a positive signal to the public (Chen et al., 2015). This reflects outside that firms are well-managed. Given a high level of cash, firms tend to offer more trade credit to customers (Love et al., 2007). The finding is consistent with hypothesis nine, that the association between CASH and TCR in countries with a higher level of collectivism is higher than that in countries with a low level of collectivism.

In column (2) of Table 3.8, the coefficient on the relationship between CASH and TCR is positive and significant at the 1 percent level for firms in countries with a low level of uncertainty avoidance (DUAI = 0). Moreover, when considering firms in countries with a high level of uncertainty avoidance (DUAI = 1), CASH has a positive coefficient of (0.0579 + (-0.0245) = 0.0334. Besides, the result of the F-test in column (2) is significant at the 5 percent level. With these results, it is concluded that there is an existence of a positive relationship between CASH and TCR for firms from countries with a high level and a low level of uncertainty avoidance. Consistent with Love et al. (2007), this association reveals that firms with a high level of cash holding will offer more trade credit to customers. Nevertheless, the magnitude of the coefficient of CASH is 0.0579 for firms in countries with a low level of uncertainty avoidance (DUAI = 0) while the value of CASH of firms in countries with a high level of uncertainty avoidance (DUAI = 1) is 0.0334. This indicates that the relationship between CASH and TCR of firms in countries with a low level of uncertainty avoidance is higher than that of firms in countries with a high level of uncertainty avoidance. Consistent with the hypothesis presented above, this study suggests that firms in the former countries will offer more trade credit to customers than firms in the latter countries. In other words, uncertainty avoidance decreases the positive association between CASH and TCR. According to Hofstede (2001), countries with a high level of uncertainty avoidance have a low level of tolerance for ambiguity and uncertainty. In such societies, managers of firms tend toward risk

aversion, and therefore they will retain high cash as an instrument to hedge against future undesired states of nature (Ramirez & Tadesse, 2009). Hence, they tend to offer less trade credit to customers than firms in countries with a low level of uncertainty avoidance.

From column (3) in Table 3.8, CASH has a significantly negative association with trade credit payable (TCP) for firms in countries with a low level of collectivism (DCLT = 0). Moreover, the coefficient of CASH of firm in countries with a high level of collectivism (DCLT = 1) is (-0.0412) + (-0.015) = (-0.0562). Besides, the result of the F-test is significant at the 1 percent level. This indicates that CASH also has a significantly negative association with TCP. In line with García-Teruel and Martínez-Solano (2010c) and Love et al. (2007), this finding indicates that firms in countries with a high level and a low level of collectivism tend to reduce receipt of trade credit from suppliers when they hold a high level of cash. However, the receipt of trade credit is at different levels between the two types of countries. Particularly, the magnitude of the CASH coefficient of firms in countries with a low level of collectivism is (-0.0412) while that of firms in countries with a high level of collectivism is (-0.0562). This finding suggests that firms in the latter countries will make less demand for trade credit from suppliers than firms in the former countries as they keep high cash. Hence, consistent with hypothesis ten, this finding confirms that the level of collectivism of countries decreases the negative association between CASH and TCP.

As column (4) shows, in countries with a low level of uncertainty avoidance (DUAI = 0), CASH is negative and significantly related to TCP at the 1 percent level. Similarly, the coefficient of CASH of firm in countries with a high level of uncertainty avoidance (DUAI = 1) is (-0.0548) + (-0.0012) = (-0.056*)*. Based on the result of F-tests, this coefficient is significant at the 1 percent level, indicating that CASH has a significantly negative association with TCP. Hence, firms in both countries have a negative relationship between CASH and TCP. This result is in line with the study by Love et al.

(2007) who indicate that firms with a high level of cash reducing trade credit received from suppliers. However, the magnitude of the coefficient of CASH of firms in countries with a low level of uncertainty avoidance is (-0.0548) while that of firms in countries with a high level of uncertainty avoidance is (-0.056). Therefore, firms in the latter countries have a lower need for trade credit from suppliers than firms in the former countries when CASH increase by one unit. According to Chen et al. (2015), firms in countries with a high level of uncertainty avoidance hold more cash and hence they decrease reliance on trade credit from suppliers. This finding supports hypothesis twelve.

Regarding control variables, in columns (1) to (4), firm size (SIZE) has a significantly positive relationship with both trade credit receivable (TCR) and trade credit payable (TCP) at the 1 percent level. In line with Petersen and Rajan (1997) and García-Teruel and Martínez-Solano (2010a), these results indicate that larger firms with better access to capital markets will provide more trade credit to customers and receive a higher proportion of trade credit from their suppliers. Moreover, short-term debt (STDEBT) is positive and significantly associated with TCR at the 1 percent level while it is negative and insignificantly related to TCP. The cost of external finance (FCOST) has a significant and negative association with TCR at either the 10 percent or 1 percent level. Meanwhile, there is no existence of the relationship between FCOST and TCP. Cash flow (CFLOW) is not associated with TCR while it has a negative association with TCP at the 1 percent level. Like Petersen and Rajan (1997), García-Teruel and Martínez-Solano (2010c) and Niskanen and Niskanen (2006), this finding indicates that firms with a greater capacity to generate internal funds can offer more trade credit to customers. GDP per capita (GDP) is negative and significantly associated with both TCR and TCP. The finding is in lines with previous studies by El Ghoul and Zheng (2016) and Demirgüç-Kunt and Maksimovic (2001) who found that firms in less developed countries will decrease trade credit provision and they will rely on more trade credit from suppliers. Private credit

(PRIV) has a significantly positive association with TCR, while it has a significantly negative relationship with TCP. This result is consistent with Demirgüç-Kunt and Maksimovic (2001) and Fisman and Love (2003), who indicate that firms in countries with more developed banking systems will extend more trade credit to customers and reduce the use of trade credit from suppliers. Besides, market capitalisation (MARKETGDP) has a significantly negative association with TCR, which is in contrast to Fisman and Love (2003) who suggest that firms will offer more trade credit to customers when they operate in countries with more developed financial markets.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
CASH	0.0337**	0.0579***	-0.0412***	-0.0548***
	(0.010)	(0.008)	(0.000)	(0.000)
CASH *DCLT	0.0148		-0.0150**	
	(0.410)		(0.054)	
DCLT	-0.0810***		-0.0254***	
	(0.000)		(0.000)	
CASH * DUAI		-0.0245		-0.0012
		(0.382)		(0.532)
DUAI		-0.111***		-0.0321***
		(0.000)		(0.000)
SIZE	0.0237***	0.0211***	0.0188***	0.0217***
	(0.000)	(0.000)	(0.000)	(0.000)
STDEBT	0.139***	0.199***	-0.0077	-0.0034
	(0.000)	(0.000)	(0.423)	(0.135)
FCOST	-0.0851*	-0.477***	0.0400	0.0161
	(0.063)	(0.000)	(0.254)	(0.620)
SGROWTH	-0.0017	-0.0126**	0.0708	0.0047
	(0.607)	(0.011)	(0.625)	(0.110)
CFLOW	0.0029	-0.0059	-0.0052***	-0.0484***
	(0.491)	(0.414)	(0.000)	(0.000)
GDPCAP	-0.0174***	-0.0134***	-0.0118***	-0.0144***
	(0.000)	(0.004)	(0.000)	(0.000)
PRIV	0.0300***	0.0242***	-0.0140***	-0.0146***
	(0.000)	(0.000)	(0.000)	(0.000)
MARKETGDP	-0.0068***	-0.0094***	0.0085	0.0011
	(0.001)	(0.000)	(0.258)	(0.602)
Constant	0.257***	0.269***	0.197***	0.229***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test	11.51***	5.15**	154.57***	57.18***
	(0.000)	(0.023)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.215	0.193	0.134	0.126

Notes: Columns (1) and (2) present the regression results of the models (9) and (10). Columns (3) and (4) present the regression results of the models (11) and (12). All models are estimated by pooled OLS with robust standard errors. DCLT is a dummy variable that presents the degree of collectivism; DUAI is a dummy variable that presents the degree of Uncertainty avoidance. All variables are defined in Table 3.2. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and α_1 is zero. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.8: The influence of national culture on the relationship between cash holdings and trade credit.

3.6. Robustness Checks

3.6.1. Omitted variables

This study uses Pooled Ordinary Least Squares (Pooled OLS) with robust standard errors to estimate all equations (1) - (12). However, one major concern arising from the use of this methodology is an omitted variable problem. It could cause an endogeneity issue when variables, either observed or unobserved, that are not included in the models, are related to variables incorporated in the regression models (Brooks, 2008). Hence, OLS regression can produce biased and inconsistent estimates. Based on previous studies by Chen et al. (2015) and Haq et al. (2018), this study reduces the omitted variable bias by using a Random Effects Model (REM) with generalised least squares (GLS) in order to re-estimate the main regression models from (1) to (12).

Regarding the results of the regression presented in Table 3.9, the study confirms the impact of national culture on trade credit and its findings are largely similar to those in Table 3.6. In columns (1) and (2), the coefficient on collectivism (CLT) is significantly positive, while the coefficient on uncertainty avoidance (UAI) is significantly negative. These findings are consistent with expectations as discussed in Section 3.2. Firms in countries with a more collectivist culture offer more trade credit to the customer because they can easily get information on the creditworthiness of customers through their connection with other companies or suppliers. Besides, in a society with a high level of uncertainty avoidance, managers of firms tend to avoid risk, and hence, they offer less trade credit to their customers because they are afraid of customers' default. In column (3), this study finds a significantly negative relation between collectivism (CLT) and trade credit payable (TCP). Similarly, the association between uncertainty avoidance (UAI) and trade credit payable (TCP) is negative and significant at the 1 percent level, as shown in column (4). Consistent with the expectations, these findings indicate that firms in a more collectivistic culture try to preserve the public image in financing decisions. Hence,

they limit the amount of trade credit received from suppliers in order to retain their reputation with their suppliers. This is because the late payment of firms can destroy the belief of suppliers. It can impact on firms' operation in the future. Moreover, firms from countries with a high level of uncertainty-avoidance culture receive less trade credit from suppliers. This is because those firms prefer to hold more cash to prevent financial difficulties in the future (Chen et al., 2015).

For control variables, firm size (SIZE) is found to be positive and significantly associated with trade credit receivable (TCR) and trade credit payable (TCP). Short-term debt (STDEBT) has a significantly positive association with TCR while the association between STDEBT and TCP is insignificant. Moreover, cash holding (CASH) has a significantly positive association with TCR and it has a significantly negative association with TCP. Sales growth (SGROWTH) is found to be negative and significantly related to TCR. Besides, it is positive and significantly associated with TCP. CFLOW has a significantly positive association with TCR and has a significantly negative association with TCP. GDP per capita (GDPCAP) is found to be negative and significantly associated with TCR and TCP. Private credit (PRIV) and market capitalization (MARKETGDP) have a significantly positive association with TCR. However, PRIV has a significantly negative relation with TCP. MARKETGDP has a significantly positive association with TCP. In general, the results reported in Table 3.9 confirm the previous findings in Table 3.6.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
CLT	0.0843**		-0.167***	
	(0.029)		(0.000)	
UAI		-0.129***		-0.0121**
		(0.000)		(0.021)
SIZE	0.0202***	0.0208***	0.0207***	0.0204***
	(0.000)	(0.000)	(0.000)	(0.000)
STDEBT	0.133***	0.132***	-0.0071	-0.0074
	(0.000)	(0.000)	(0.343)	(0.395)
FCOST	-0.0019	0.0075	0.112***	0.100**
	(0.103)	(0.341)	(0.006)	(0.014)
CASH	0.0014***	0.0012***	-0.0391***	-0.0344***
	(0.000)	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0242***	-0.0254***	0.0066***	0.0067***
	(0.000)	(0.000)	(0.000)	(0.000)
CFLOW	0.0249**	0.0239*	-0.0210***	-0.0206***
	(0.046)	(0.056)	(0.000)	(0.000)
GDPCAP	-0.0278***	-0.0122**	-0.0185***	-0.0086***
	(0.000)	(0.015)	(0.000)	(0.001)
PRIV	0.0477***	0.0382***	-0.0147***	-0.0167***
	(0.000)	(0.000)	(0.000)	(0.000)
MARKETGDP	0.0034	0.0034	0.0036***	0.0020*
	(0.167)	(0.215)	(0.000)	(0.078)
Constant	0.232***	0.239***	0.356***	0.241***
	(0.000)	(0.000)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.139	0.142	0.117	0.113

Notes: Columns (1) and (2) present the regression results of the models (1) and (2). Columns (3) and (4) present the regression results of the models (3) and (4). All models are estimated by Random Effect Model (REM) with robust standard errors. All variables are defined in Table 3.2. p-value is in parentheses. The symbols *, **, and *** indicate significance at 10%, 5%, and 1% levels respectively.

Table 3.9: The relationship between trade credit and national culture in REM

In Table 3.10, this study analyses the impact of collectivism (CLT) and uncertainty avoidance (UAI) on the relationship between short-term debt (STDEBT) and trade credit, including trade credit receivable (TCR) and trade credit payable (TCP).

In columns (1) and (2), STDEBT has a significantly positive association with TCR for firms in countries with a high level and a low level of CLT and UAI. However, this association is different between firms in these two countries. As presented in column (1), the magnitude of the coefficient of STDEBT of firms in countries with a low level of CLT is 0.08, while that of firms in countries with a high level of CLT is 0.171. Consistent with expectation, these findings suggest that firms in countries with a high level of CLT have high ability to access bank credit and hence, they will offer more trade credit than firms in countries with a low level of CLT. In column (2), the magnitude of the coefficient of STDEBT of firms in countries with a low level of UAI is 0.218, while that of firms in countries with a high level of UAI is 0.1254. In line with expectation, this finding indicates that firms in countries with a high level of UAI use less bank credit than those in countries with a low level of UAI, and hence, they offer less trade credit to customers.

In columns (3) and (4), STDEBT has a significantly negative association with TCP. Nevertheless, the influence of STDEBT on TCP is different between firms in countries with a high level and a low level of CLT and UAI. As shown in column (3) of Table 3.10, the magnitude of coefficient of STDEBT of firms in countries with a low level of CLT is (-0.0303) while that of firms in countries with a high level of CLT is (-0.0368). Consistent with the expectation, this finding indicates that firms in countries with a high level of collectivism have better access to bank credit and hence, they use less trade credit from suppliers compared to firms in countries with a high level of CLT. In column (4), this study does not find an association between STDEBT and TCP for firms in countries with a low level of UAI. Meanwhile, this association exists in firm in countries with a high level of UAI. Hence, this study cannot confirm the impact of UAI on the association

between STDEBT and TCP. In general, all the results are similar to those of Table 3.7, except those for the coefficient of STDEBT for firms in countries with a low level of UAI, which now loses significance.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
STDEBT	0.0800***	0.218***	-0.0303**	-0.0116
	(0.000)	(0.000)	(0.016)	(0.193)
STDEBT * DCLT	0.0910***		-0.0065***	
	(0.000)		(0.007)	
DCLT	-0.0401***		-0.0311***	
	(0.001)		(0.000)	
STDEBT * DUAI		-0.0926***		-0.0355***
		(0.001)		(0.008)
DUAI		-0.0872***		-0.0128**
		(0.000)		(0.016)
SIZE	0.0170***	0.0167***	0.0228***	0.0256***
	(0.001)	(0.000)	(0.000)	(0.000)
FCOST	0.0065	0.0101	0.160***	0.126***
	(0.495)	(0.343)	(0.002)	(0.000)
CASH	0.0142***	0.0141***	-0.0421***	-0.0143***
	(0.000)	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0239***	-0.0439***	0.0085***	0.0077***
	(0.000)	(0.000)	(0.000)	(0.000)
CFLOW	0.0247**	0.0217	-0.0211***	-0.0248***
	(0.044)	(0.263)	(0.000)	(0.000)
GDPCAP	-0.0309***	0.0026	-0.0177***	-0.0093***
	(0.000)	(0.319)	(0.000)	(0.000)
PRIV	0.0382***	0.0198**	-0.0135***	-0.0028
	(0.000)	(0.033)	(0.001)	(0.433)
MARKETGDP	0.0056**	-0.0077**	0.0019*	0.0008
	(0.020)	(0.049)	(0.084)	(0.436)
Constant	0.368***	0.262***	0.243***	0.134***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test	281.09***	47.68***	3.54*	22.66***
	(0.000)	(0.000)	(0.060)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.144	0.133	0.122	0.112

Notes: Columns (1) and (2) present the regression results of the models (5) and (6). Columns (3) and (4) present the regression results of the models (7) and (8). All models are estimated by Random Effect Model (REM) with robust standard errors. DCLT is a dummy variable that presents the degree of Collectivism. DUAI is a dummy variable that presents the degree of Uncertainty avoidance. All variables are defined in Table 3.2. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and α_1 is zero. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.10: The influence of national culture on the relationship between short-term bank credit and trade credit in REM

From Table 3.11, the study presents results of influence of national culture on the association between cash holdings (CASH) and trade credit. In general, all results are consistent with those displayed in Table 3.8.

In columns (1) and (2) of Table 3.11, there is a significantly positive association between CASH and trade credit receivable (TCR) for firms in countries with a high level and a low level of collectivism (CLT) and uncertainty avoidance (UAI). However, there is a difference of this association between two countries. In column (1), the coefficient of CASH of firms in countries with a low level of CLT has a value of 0.0154 while the coefficient of this variable is 0.0177 for firms in countries with a high level of CLT. This result is consistent with the expected relationship, as firms in countries with a high level of CLT hold high cash and can offer more trade credit to customers compared to firms in countries with a low level of CLT. In column (2), the coefficient of CASH of firms in countries with a low level of UAI is 0.0259, while that of firms in countries with a high level of UAI is 0.0247. This finding shows that firms in countries with a high level of UAI tend to hold more cash in anticipation of uncertainty associated with future cash-flows generated by firms. Hence, firms in such countries offer less trade credit than those in countries with a low level of UAI. This finding supports the expectation proposed in section 3.2.

As shown in columns (3) and (4), CASH has a statistically significant negative relationship with TCP for firms in countries with a low level and a high level of CLT and UAI. Nevertheless, there is a difference of this association among countries. In column (3), the coefficient of CASH is (-0.0218) for firms in countries with a low level of CLT while that of firms in countries with a high level of CLT is (-0.0485). In column (4), the coefficient of CASH of firms in countries with a low level of UAI is (-0.0238) while the coefficient of this variable is (-0.0807) for firms in countries with a high level of UAI. In line with the expectation presented in section 3.2, these results suggest that firms in

countries with a high level of CLT and UAI tend to hold more cash and hence, they can reduce their level of trade credit from suppliers.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
CASH	0.0154**	0.0259***	-0.0218*	-0.0238***
	(0.019)	(0.000)	(0.066)	(0.000)
CASH * DCLT	0.0023		-0.0267*	
	(0.462)		(0.078)	
DCLT	-0.0884		-0.0278***	
	(0.517)		(0.000)	
CASH * DUAI		-0.0012		-0.0569*
		(0.162)		(0.053)
DUAI		-0.127***		-0.0373
		(0.000)		(0.493)
SIZE	0.0174***	0.0037	0.0223***	0.0191***
	(0.000)	(0.485)	(0.000)	(0.000)
STDEBT	0.187***	0.134***	-0.0054***	-0.0142***
	(0.000)	(0.000)	(0.001)	(0.000)
FCOST	-0.0214	-0.0066	0.1331***	0.0802**
	(0.575)	(0.633)	(0.005)	(0.042)
SGROWTH	-0.0386***	-0.0236***	0.0076***	0.0067***
	(0.000)	(0.000)	(0.001)	(0.000)
CFLOW	-0.0134*	-0.0570***	-0.0020	-0.0151***
	(0.086)	(0.033)	(0.104)	(0.000)
GDPCAP	-0.0428***	0.0167**	-0.0176***	-0.0140***
	(0.000)	(0.000)	(0.000)	(0.000)
PRIV	0.0477***	0.0427***	-0.0104**	-0.0342
	(0.000)	(0.000)	(0.010)	(0.347)
MARKETGDP	0.0041	0.0063	0.0011	0.0028**
	(0.219)	(0.107)	(0.334)	(0.016)
Constant	0.418***	0.285***	0.236***	0.170***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test	29.22***	3.16*	38.85***	19.53***
	(0.000)	(0.076)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.140	0.137	0.115	0.126

Notes: Columns (1) and (2) present the regression results of the models (9) and (10). Columns (3) and (4) present the regression results of the models (11) and (12). All models are estimated by Random Effect Model with robust standard errors. DCLT is a dummy variable that presents the degree of collectivism; DUAI is a dummy variable that presents the degree of Uncertainty avoidance. All variables are defined in Table 3.2. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and α_1 is zero. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.11: The influence of national culture on the relationship between cash holdings and trade credit in REM.

3.6.2. Alternative measures of national culture

Although this study applied Hofstede's national culture dimensions in the main test, it is possible that cultural data are outdated, as the survey data used to derive Hofstede's culture indices were collected between 1967 and 1973. In order to address this concern, this study will uses a cultural framework derived from Tang and Koveos (2008) as alternative proxies of culture. They argue that culture has a correlation with economic development based on classic Marxism. In particular, economic factors dictate all human activities and hence form the foundation of human societies. Therefore, they updated Hofstede's indices based on the changing economic climate within countries. Tables 3.12, 3.13, and 3.14 report the results of the pooled-OLS estimations of all equations (1) – (12) by using the culture scores provided by Tang and Koveos (2008). In general, the results reported are consistent with our main findings

Regarding the regressions results presented in Table 3.12, the study finds an association between national culture and trade credit. In columns (1) and (2), collectivism (CLT) has a positive association with trade credit receivable (TCR) while uncertainty avoidance (UAI) has a negative relationship with TCR. These findings are consistent with expectations discussed in Section 3.2. In particular, firms from countries with a highly collectivist culture can easily get information on the creditworthiness of customers through their connection with other companies or suppliers and thus offer more trade credit to customers than firms from countries with a culture low in collectivism. Moreover, managers of firms in countries with a high level of uncertainty avoidance tend to offer less trade credit to customers because they avoid the risk of customers' default.

In columns (3) and (4) of Table 3.12, this study shows that both collectivism (CLT) and uncertainty avoidance (UAI) have a significantly negative relation with trade credit payable (TCP). Consistent with the expectations, these findings indicate that firms in a highly collectivistic culture limit the amount of trade credit received from suppliers

because they want to preserve their reputation with their suppliers. Late payment of firms can destroy the belief of suppliers. This could impact the firms' operation in the future. Furthermore, firms in countries with a high level of uncertainty avoidance also receive less trade credit from suppliers because they tend to hold more cash to prevent financial difficulties in the future.

For control variables, firm size (SIZE) is found to be positive and significantly associated with trade credit receivable (TCR) and trade credit payable (TCP). Short-term debt (STDEBT) has a significantly positive association with TCR, while it has a significantly negative relationship with TCP. Moreover, cash holdings (CASH) has a significantly positive association with TCR and it has a significantly negative association with TCP. Sales growth (SGROWTH) is found to be negative and insignificantly related to TCR. Besides, this variable is positive and significantly associated with TCP. Cash flow (CFLOW) has a significantly positive association with TCR and has a significantly negative association with TCP. GDP per capita (GDPCAP) is found to be positive and significantly associated with TCR, while this variable is found to be negative and significantly related to TCP. Private credit (PRIV) has a significantly positive association with TCR, while it has a significantly negative relationship with TCP. Moreover, market capitalization (MARKETGDP) has a significantly negative association with TCR and it has a significantly positive relationship with TCP.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
CLT	0.349***		-0.176***	
	(0.000)		(0.000)	
UAI		-0.312***		-0.103***
		(0.000)		(0.000)
SIZE	0.0123***	0.0184***	0.0222***	0.0209***
	(0.000)	(0.000)	(0.000)	(0.000)
STDEBT	0.139***	0.140***	-0.0409***	-0.0026
	(0.000)	(0.000)	(0.000)	(0.174)
FCOST	-0.191**	-0.326***	0.0198	0.0076
	(0.034)	(0.000)	(0.685)	(0.330)
CASH	0.0584***	0.0587***	-0.0598***	-0.0403***
	(0.000)	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0044	-0.0051	0.0062**	0.0048*
	(0.506)	(0.447)	(0.032)	(0.051)
CFLOW	0.0463***	0.0344***	-0.0703***	-0.0418***
	(0.000)	(0.004)	(0.000)	(0.000)
GDPCAP	0.0183***	0.0189	-0.0418***	-0.0268***
	(0.000)	(0.610)	(0.000)	(0.000)
PRIV	0.143***	0.0363***	-0.0478***	-0.0038*
	(0.000)	(0.000)	(0.000)	(0.078)
MARKETGDP	-0.0024	-0.0047***	0.0053***	0.0051***
	(0.141)	(0.006)	(0.000)	(0.000)
Constant	0.426***	0.205***	0.601***	0.243***
	(0.623)	(0.000)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.224	0.221	0.119	0.151

Notes: Columns (1) and (2) present the regression results of models (1) and (2). Columns (3) and (4) present the regression results of models (3) and (4). All models are estimated by pooled OLS with robust standard errors. CLT is Collectivism index of Tang and Koveos (2008). UAI is Uncertainty Avoidance index of Tang and Koveos (2008) . All variables are defined in Table 3.2. p-value is in parentheses. The symbols *, **, and *** indicate significance at 10%, 5%, and 1% levels respectively.

Table 3.12: The relationship between trade credit and national culture.

In Table 3.13, this study analyses the impact of collectivism (CLT) and uncertainty avoidance (UAI) on the relationship between short-term debt (STDEBT) and trade credit, including trade credit receivable (TCR) and trade credit payable (TCP).

Based on the results presented in column (1) and (2), this study finds that the association between STDEBT and TCR is positive and significant at the 1 percent level for firms in countries with a high level and a low level of CLT and UAI. Nevertheless, the level of this association has a difference between firms in these two countries. In particular, in column (1), the coefficient of STDEBT of firms in countries with a low level of CLT is 0.0947, while that of firms in countries with a high level of CLT is 0.2047. These findings are in line with the expectation of the study presented in section 3.2. They suggest that firms in countries with a high level of CLT have high ability to access bank credit and hence they will offer more trade credit than firms in countries with a low level of CLT. In other words, the level of CLT of countries increases the positive association between STDEBT and TCR. In column (2), the magnitude of coefficient of STDEBT of firms in countries with a low level of UAI has a value of 0.247 while that of firms in countries with a high level of UAI is 0.069. The finding is consistent with the expectation, which indicates that firms in countries with a high level of UAI use less bank credit than those in countries with a low level of UAI, and thus they offer less trade credit to customers. In other words, the level of UAI decreases the positive association between STDEBT and TCR.

In columns (3) and (4), STDEBT has a significantly negative association with TCP in firms in countries with a low level and a high level of CLT and UAI. Nevertheless, the influence of STDEBT on TCP has a difference among firms in these two countries. In column (3), the value of coefficient of STDEBT is (-0.0185) for firms in countries with a low level of CLT. Meanwhile, coefficient of STDEBT of firms in countries with a high level of CLT has a value of (-0.0427). Like the expectation presented in previous sections,

the result indicates that firms in countries with a high level of CLT have better access to bank credit and hence, they reduce more trade credit from suppliers than firms in countries with a low level of CLT. In other words, the level of CLT of countries decreases the negative association between STDEBT and TCP. In the column (4), the coefficient of STDEBT has a value of (-0.0629) for firms in countries with a low level of UAI, while this value for firms in countries with a high level of UAI is (-0.0745). In other words, this finding suggests that the level of UAI of a country decreases the negative association between STDEBT and TCP. Firms in countries with a high level of UAI use less short-term debt and hence they will use more trade credit from suppliers than firms in countries with a low level of UAI.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
STDEBT	0.0947***	0.247***	-0.0185*	-0.0629***
	(0.000)	(0.000)	(0.063)	(0.008)
STDEBT * DCLT	0.110***		-0.0242	
	(0.000)		(0.407)	
DCLT	-0.0109		-0.0766***	
	(0.142)		(0.000)	
STDEBT * DUAI		-0.178***		-0.0116**
		(0.000)		(0.015)
DUAI		-0.0346***		-0.0167***
		(0.000)		(0.000)
SIZE	0.0185***	0.0204***	0.0225***	0.0186***
	(0.000)	(0.000)	(0.000)	(0.000)
FCOST	-0.268***	-0.148	0.0743**	-0.0393
	(0.004)	(0.222)	(0.029)	(0.276)
CASH	0.0683***	0.0429***	-0.0705***	-0.0468***
	(0.000)	(0.001)	(0.000)	(0.000)
SGROWTH	-0.0882	-0.0223**	0.0024	0.0125
	(0.496)	(0.015)	(0.307)	(0.611)
CFLOW	0.0476***	0.0401**	-0.0461***	-0.0496***
	(0.000)	(0.023)	(0.000)	(0.000)
GDPCAP	-0.0393***	-0.0174***	-0.0313***	-0.0020
	(0.000)	(0.000)	(0.000)	(0.163)
PRIV	0.0622***	0.0305***	-0.0320***	-0.0629***
	(0.000)	(0.000)	(0.000)	(0.000)
MARKETGDP	0.0093***	0.0077***	-0.0012**	-0.0021***
	(0.000)	(0.006)	(0.015)	(0.000)
Constant	0.383***	0.225***	0.430***	0.0937***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test	600.57***	25.62***	2.83*	22.83***
	(0.000)	(0.000)	(0.093)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.211	0.220	0.195	0.139

Notes: Columns (1) and (2) present the regression results of models (5) and (6). Columns (3) and (4) present the regression results of models (7) and (8). All models are estimated by pooled OLS with robust standard errors. All variables are defined in Table 3.2. DCLT is a dummy variable that presents the degree of Collectivism index of Tang and Koveos (2008). DUAI is a dummy variable that presents the degree of Uncertainty Avoidance of Tang and Koveos (2008). All variables are defined in Table 3.2. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and α_1 is zero. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.13: The influence of national culture on the relationship between short-term bank credit and trade credit.

In Table 3.14, the study investigates the association between cash holdings (CASH) and trade credit according to different levels of collectivism (CLT) and uncertainty avoidance (UAI) among countries. In general, all results are similar as those displayed in Table 3.8.

In columns (1) and (2) of Table 3.14, there is a significantly positive association between CASH and trade credit receivable (TCR) for firms in countries with a high level and a low level of collectivism (CLT) and uncertainty avoidance (UAI). However, the level of these associations differs between two countries. In column (1), the coefficient of CASH of firms in countries with a low level of CLT has a value of 0.0262, while the value of coefficient of this variable is 0.1008 for firms in countries with a high level of CLT. Consistent with the expected relationship, firms in countries with a high level of CLT offer more trade credit to customers because they hold a high level of cash. In column (2), the value of coefficient of CASH of firms in countries with a low level of UAI is 0.0454, while that of firms in countries with a high level of UAI is 0.029. These results indicate that firms in countries with a high level of UAI offer less trade credit to customers because they need more cash in anticipation of uncertain difficulty in the future. This finding supports the expectation expressed in section 3.2, that the level of UAI decreases the positive association between CASH and TCR.

As shown in columns (3) and (4), there is a negative association between CASH and TCP in firms in countries with a low level and a high level of CLT and UAI. However, the association between these variables in firms in countries with a high level of CLT and UAI is lower than that in firms in countries with a low level of CLT and UAI. In column (3), the value of coefficient of CASH is (-0.0555) for firms in countries with a low level of CLT, while that of firms in countries with a high level of CLT is (-0.0853). In column (4), the coefficient of CASH of firms in countries with a low level of UAI is (-0.0691) while the coefficient of this variable is (-0.0745) for firms in countries with a high level

of UAI. In line with the expectation presented in section 3.2, these results suggest that firms in countries with a high level of CLT and UAI tend to hold more cash and hence, they can reduce reliance on trade credit from suppliers.

Variables	TCR		TCP	
	(1)	(2)	(3)	(4)
CASH	0.0262*	0.0454***	-0.0555***	-0.0691***
	(0.085)	(0.006)	(0.000)	(0.000)
CASH * DCLT	0.0746***		-0.0298***	
	(0.000)		(0.001)	
DCLT	-0.0254***		-0.0707***	
	(0.000)		(0.000)	
CASH * DUAI		-0.0164		-0.0054
		(0.451)		(0.475)
DUAI		-0.0804***		-0.0632***
		(0.000)		(0.000)
SIZE	0.0200***	0.0245***	0.0216***	0.0228***
	(0.000)	(0.000)	(0.000)	(0.000)
STDEBT	0.150***	0.141***	-0.0021	-0.0045**
	(0.000)	(0.000)	(0.254)	(0.015)
FCOST	-0.226**	-0.194**	0.113***	0.0885**
	(0.015)	(0.031)	(0.001)	(0.010)
SGROWTH	-0.0061	-0.0045	0.0027	0.0038
	(0.677)	(0.228)	(0.239)	(0.109)
CFLOW	0.0476***	0.0028	-0.0062***	-0.0464***
	(0.000)	(0.506)	(0.000)	(0.000)
GDPCAP	-0.0380***	-0.0172***	-0.0294***	-0.0299***
	(0.000)	(0.000)	(0.000)	(0.000)
PRIV	0.0695***	0.0280***	-0.0320***	-0.0329***
	(0.000)	(0.000)	(0.000)	(0.000)
MARKETGDP	0.0062***	0.0063***	-0.0068	-0.0016***
	(0.000)	(0.001)	(0.164)	(0.000)
Constant	0.340***	0.257***	0.410***	0.119***
	(0.000)	(0.000)	(0.000)	(0.000)
F-test	54.25***	5.48**	245.91***	141.76***
	(0.000)	(0.019)	(0.000)	(0.000)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	10,537	10,537	10,537	10,537
R-squared	0.200	0.215	0.186	0.149

Notes: Columns (1) and (2) present the regression results of the models (9) and (10). Columns (3) and (4) present the regression results of the models (11) and (12). All models are estimated by pooled OLS with robust standard errors. DCLT is a dummy variable that presents the degree of Collectivism index of Tang and Koveos (2008). DUAI is a dummy variable that presents the degree of Uncertainty Avoidance index of Tang and Koveos (2008). All variables are defined in Table 3.2. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and α_1 is zero. p-value is in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 3.14: The influence of national culture on the relationship between cash holdings and trade credit.

3.7. Conclusions

This paper investigates the influence of national culture on the variations in trade credit with both aspects of trade credit considered, including trade credit receivable (TCR) and trade credit payable (TCP) among countries. This study uses proxies for national culture from Hofstede (2001). By using data for 1,509 non –financial listed SMEs across nine countries or territories in East Asia and the Pacific, namely, China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong, over the seven-year period from 2010 to 2016, the study finds that firms in more collectivistic countries offer more trade credit to customers while those in more uncertainty-avoiding countries reduce trade credit provisions. With regards to trade credit payable, firms from suppliers in countries with higher collectivism and uncertainty avoidance reduce reliance on trade credit.

The study then investigates whether the national culture has an indirect effect on the variations in trade credit across countries in the East Asia and Pacific region through the use of short-term bank credit and cash holdings. The findings of the study show that firms have high ability of access to short-term bank credit and keep high level of cash in countries with higher collectivism, which results in providing more trade credit to customers and reducing more trade credit received from suppliers. In countries with a high level of uncertainty avoidance, firms use less short-term bank credit and hence they decrease trade credit provision and increase trade credit received from suppliers. Moreover, in such countries, firms tend to keep high cash in anticipation of uncertainty associated with the future. Thus, they reduce provision and receipt of trade credit. These results of this study are robust to the choice of alternative estimation method, and an alternative measure of national culture.

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The study provides strong support for the importance of cultural effect in determining variations in trade credit of SMEs across countries. However, it has limitations that may warrant investigation in the future. First, it only focuses on analysing two cultural dimensions, particularly collectivism and uncertainty avoidance. According to Hofstede (1991), there are five cultural dimensions, including individualism versus collectivism, masculinity versus femininity, power distance, uncertainty avoidance and long-term orientation. Hence, it is possible to consider the influence of masculinity vesus feminity, power distance, and long-term orientation on the variation in trade credit decision across countries in East Asia and the Pacific. Moreover, this study analysed the indirect effect of national culture on the trade credit through the use of short-term bank credit and cash holdings. Williamson (2000) indicates a four-level framework of economic and social analysis where informal institutions such as culture at level 1 force constraints on formal institutions at level 2 and in turn governance structures at level 3 and firm level decisions at level 4. This means that culture (level 1) not only indirectly affect trade credit through its effect on short-term bank credit and cash holdings but also through its effect on formal institutions (level 2), for example, economic development

and development of financial markets. Hence, it is possible to analyse the impact of culture on formal institutions. Furthermore, based on the framework of Williamson (2000), further studies can explore the influence of formal institutions, such as creditor rights, on trade credit decisions. Finally, this study only focuses on East Asia and the Pacific, and hence the result cannot be applied to other regions, such as Europe, Central Asia, etc., where they have cultural difference with East Asia and the Pacific

CHAPTER 4 - TRADE CREDIT IMPACTS INVENTORY MANAGEMENT IN SMEs: THE ROLE OF CHANGES IN SALES, MARKET POWER AND FINANCIAL CONSTRAINT

4.1. Introduction

Trade credit is provided when there is a delay between the delivery of goods or the provision of services by a supplier and the payment for them by a client (García-Teruel & Martínez-Solano, 2010b). It is considered to be a type of credit that sellers extend to buyers in order for them to sell goods without an immediate payment requirement. From the view of a selling firm, it represents accounts receivable. Firms tend to provide trade credit to customer because of its advantages such as reducing information asymmetry between buyer and seller (Smith, 1987; Long et al., 1993), decreasing transaction costs (Ferris, 1981; Emery, 1987), providing monitoring benefits (Jain, 2001; Mateut et al., 2006), maintaining or enhancing firms' competitiveness and image (Cheng & Pike, 2003). Trade credit is also considered as a mechanism of price discrimination (Brennan et al., 1988; Petersen & Rajan, 1997).

Previous studies examined trade credit provision in SMEs mainly from two perspectives. The first tries to explain the influence of trade credit provision on the profitability firms (Martínez-Sola et al., 2014; Hoang et al., 2019). The second attempts to provide empirical evidence on the determinants of trade credit extension (Petersen & Rajan, 1997; Niskanen & Niskanen, 2006; García-Teruel & Martínez-Solano, 2010b). In general, the empirical literature has demonstrated the importance of trade credit extended to customers in firms' operation, but studies analysing the influence of trade credit extension in inventory management in SMEs remain scant.

Managing inventories is at the core of production management (Schiff & Lieber, 1974). High inventories ensure that firms can achieve high capacity utilization and reduce the influence of demand or supply fluctuation over time (Benito, 2005). Several empirical

studies provide compelling evidence to demonstrate the effect of inventories on trade credit provision. Bougheas et al. (2009) build a theoretical model to identify the response of trade credit to changes in production. Through this, they find that high production causes high inventories, and consequently, the firm will need to offer more trade credit to its clients in order to promote more sales. In the same vein, Mateut et al. (2015) find evidence that the extent to which trade credit provision depends on the different types of inventories, namely raw materials, work in progress, and finished goods. Firms with large shares of raw material in total inventories have a strong incentive to promote sales by offering trade credit. In general, both of those studies support the sales motive identified by Wilson and Summers (2002), whereby firms with a high inventory level have a strong incentive to stimulate sales by selling their goods on trade credit.

Unlike the studies by Bougheas et al. (2009) and Mateut et al. (2015), other studies investigate the effect of trade credit on inventory investment. They consider trade credit (i.e. accounts payable) to be a short-term loan provided by suppliers. It is automatically created when suppliers offer delayed payment of the bills to firms (Guariglia & Mateut, 2006). Those firms can use all or a part of the trade credit received from suppliers to finance their inventories. Haley and Higgins (1973) introduce a model to identify order quantity under the condition of permissible delay in payments. They find that shorter payment time leads to lower optimal order quantity. Ward and Chapman (1987), Chapman et al. (1984) and Chapman and Ward (1988) provide useful insights into the importance of the credit period allowed by suppliers in inventory-control decisions. In particular, firms will have a larger optimal order quantity with a fixed credit period. Recently, Guariglia and Mateut (2006) also provide evidence on the relationship between inventory investment and trade credit financing. In particular, they find offsetting effects between the trade credit channel and bank credit channel on inventories investment in the period of tight monetary policy. They suggest that both transmission channels of

monetary policy exist, but the latter is stronger than the former. Along the same line, Yang and Birge (2017) suggest that firms finance inventory by using a portfolio of trade credit, bank credit and cash. When firms have a sufficiently high cash level, they only use trade credit as an external financing source. By contrast, firms will finance inventory with a portfolio of bank credit and trade credit, if they have low cash level.

As discussed above, previous studies demonstrate that firms extend trade credit to customers in order to stimulate sales. Simultaneously, those studies also indicate that firms receive trade credit from suppliers as an indispensable source of external financing for financing inventory. However, none recognise the advantage of passing trade credit to customers to accumulate costly inventories. Furthermore, the previous studies only focus on larger firms while trade credit is more important for SMEs (García-Teruel & Martínez-Solano, 2010b). This is because SMEs are most likely to experience greater difficulty in accessing capital markets (Petersen & Rajan, 1997; Berger & Udell, 1998). They rely more on trade credit (Peel et al., 2000), and use less bank credit (Beck et al., 2008). Besides, SMEs also have a tendency to provide more trade credit to customers to guarantee the quality of the product in spite of high costs associated and to increase sales because of their weak bargaining power and low market share compared to larger firms (Martínez-Sola et al., 2014).

To fill this gap in the literature, the aim of this chapter is to identify whether the provision of trade credit impact on the inventory investment of SMEs. Moreover, According to Petersen and Rajan (1997) and Martínez-Sola et al. (2014), SMEs provide trade credit to customers when they experience the changes in sales, low market power and greater ability of access the capital market. In the second aim, this study investigates whether those characteristics of SMEs impacts on the association between trade credit provision and inventory investment.

For these purposes, this paper uses a sample of 1,509 non-financial listed SMEs from nine countries or territories located in East Asia and the Pacific, namely China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong. This region is selected for several reasons. Firstly, the East Asia and Pacific region has experienced rapid economic growth, which is an engine of growth for the global economy (Asian Development Bank, 2014). SMEs operating in this region have more growth opportunities. Secondly, SMEs face high hurdles in accessing formal finance in economies around the world, but the challenge is the greatest in this area. According to Stein et al. (2013), seventeen million formal SMEs worldwide report that their demand for financial access is underserved or unserved by the formal financial sector, with eight million of these located in East Asia and the Pacific. The share of the SMEs justifies our selection of the region. Thirdly, the East Asia and Pacific region consist of forty countries (The World Bank, 2018b) but only these nine countries or territories have well developed public equity markets for SMEs. Although some other nations in this area also have SME boards, the number of listed firms is too small. For example, the Cambodia Securities Exchange (CSX) was established in 2011 but had only two companies listed in total (Asian Development Bank, 2015). Finally, these countries or territories have shown an increasing tendency of SMEs in the use of trade credit receivable (TCR) between 2010 and 2016. Figure 4.1 shows the evolution of trade credit receivable (TCR) and inventory investment (INV) in SMEs from 2010 to 2016. TCR is measure by the ratio of accounts receivable to total sales while INV is measure by the ratio of inventory to total assets. As can be seen in Figure 4.1, TCR reached approximately 39% in 2011 from 25% in 2010. During this time, the inventory also experienced as a decreasing trend, from 12% in 2010 to 10% in 2011. When TCR decreased to 27% in 2012 before recovering steadily afterwards, the inventory also slightly increased to 12% in 2012 and declined gradually from 2013 to 2016. Such change visually suggests the association between trade credit

and inventory. This gives us an excellent opportunity to examine our objectives set out above.

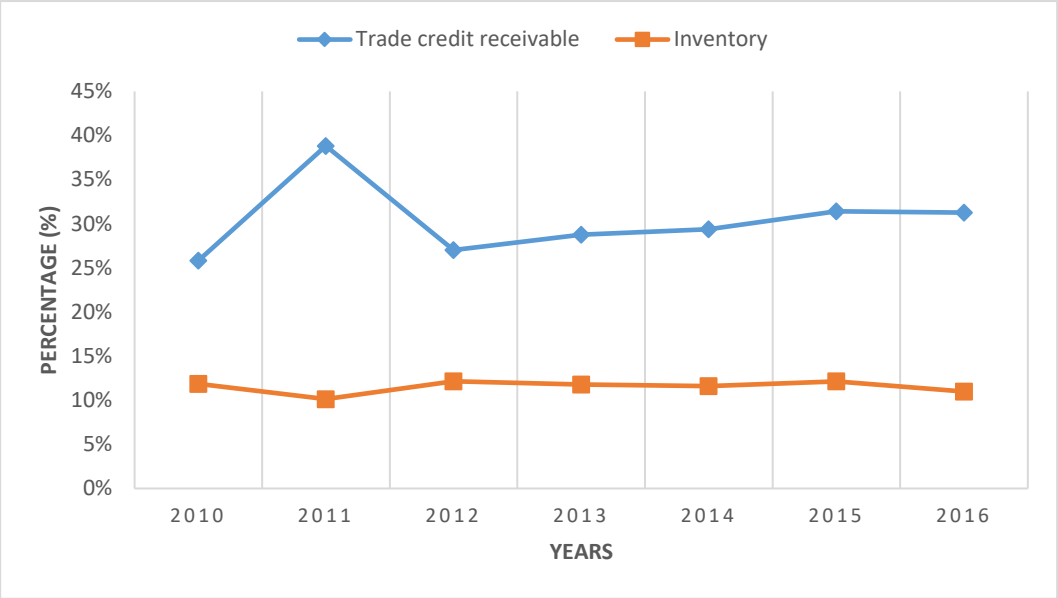

Figure 4.1 : Evolution of trade credit receivable and inventory investment in SMEs from 2010 - 2016.

The result of this study provides empirical evidence that firms decrease inventories when they provide trade credit to their customers. When considering the difference between firms in an industry, this study provides evidence that firms decrease inventories more when they offer more trade credit than their competitors in the same industry. These findings suggest that the benefit of trade credit provision is to decrease the costs associated with inventory investment. In addition, this study also shows the impact of firms' characteristics on the association between trade credit provision and inventories. Particularly, firms with a high change in sales decrease inventories more because they will extend more trade credit to customers than firms with a low change in sales. In this sense, firms with a high change in sales obtain more benefits from trade credit provision than firms with a low change in sales. Moreover, firms with high market power will decrease inventories more than firms with low market power because those firms extend more trade credit. This study also finds evidence consistent with the view that trade credit provision brings more advantages in managing inventory for less

financially constrained firms than for more financially constrained ones. In particular, the less financially constrained firms decrease inventories more than more financially constrained firms because those firms with easier access to financial markets will offer more trade credit to their customers.

This chapter provides a number of contributions to the existing literature on trade credit. First, it provides evidence that trade credit extended to customers is an important factor that impacts inventory investment. This finding extends current studies on determinants of inventory investment, which focus mostly on factors such as financial leverage, liquidity assets, firm size, sales growth, gross profit margin, and capital intensity (Benito, 2005; Gaur et al., 2005; Guariglia & Mateut, 2006; 2010; Elsayed & Wahba, 2013; Gaur & Kesavan, 2015). Second, the empirical findings of this study support the study by Emery (1988) who follows a transaction costs approach to develop a positive theory of passing trade credit to customers in inventory investment but does not provide empirical to demonstrate this association in SMEs**.** Third, to the best of the author's knowledge, although previous studies which indicate the important role of trade credit provision in SMEs (Martínez-Sola et al., 2014; Hoang et al., 2019), this is the first empirical study that provides evidence on the benefits of trade credit provisions to inventory management in SMEs. Finally**,** this study considers the association between trade credit provision and inventory investment varies according to SMEs' characteristics, namely changes in sales, market power and ability to access the capital market.

The remainder of this paper is organised into five main sections. Section 4.2 contains theoretical foundations and hypothesis development. Section 4.3 describes the data and regression models. Section 4.4 carries out the analyses and provides an explanation of the empirical results, and section 4.5 reports robustness checks. Finally, the conclusions are presented in the last section.

4.2. Theoretical Foundations and Hypothesis Development

4.2.1. Trade credit and inventory management

In a perfectly competitive market, trade between firms and suppliers would not involve holding inventories because of perfect certainty and zero transaction costs (Ferris, 1981). However, trading certainty cannot exist in reality where the time of delivery from a supplier to a firm is variable (Ferris, 1981). In general, a firm is certain of a specified time period when a supply will arrive, but uncertain of the actual day of product arrival. Hence, firms need to hold inventories to protect themselves against this trading uncertainty.

Under the trading uncertainty hypothesis, two related explanations are put forward. First, firms hold inventories to facilitate sales (Bils & Kahn, 2000). Inventories play the role of a buffer stock that is used to respond to demand uncertainty (Benito, 2005). When there is uncertainty about future demand, firms need to hold inventories of their products to ensure that they do not have to postpone or miss sales (Mills, 1957; Kahn, 1992; Caglayan et al., 2012). A firm will keep large inventories when it experiences higher demand uncertainty. Furthermore, when a firm holds a large stock of inventories of similar goods with different specifications, it can match the specific tastes of different customers (Hançerlioğulları et al., 2016). Additionally, holding stocks helps firms to reduce the costs of sales as a result of economies of bulk procurement (Modigliani, 1957). Through this method of procurement, firms purchase items in lots in order to reduce cost per unit.

Second, holding inventories helps firms to maintain smooth production. When a firm operating in an industry cannot predict customers' demand for its products or service, it needs to vary production rapidly in order to match a change of demand (Mills, 1957). This process is very costly, and hence, an increase in holding inventories reduces fluctuations in production. According to Bils and Kahn (2000), inventory investment is

associated with variations in marginal costs of production. When the marginal cost of production experiences a transitory reduction, firms raise production to accumulate inventories. This allows firms against an increase in marginal costs in the future. In the same line, Abel (1985) states that inventories economise costs of production when marginal costs of production are increasing. In production-inventory control, firms use economic order quantity (EOQ) to monitor the level of inventory at all time. It allows them to determine the appropriate reorder point and the optimal reorder quantity to ensure the instantaneous replenishment of inventory with no shortage (Alfares & Ghaithan, 2019).

Holding more extensive inventories ensures that firms maintain smooth production cycles and avoid stock out. Also, it helps firms to respond to the fluctuation of demand. However, when firms store high inventories, they may incur the costs of warehousing the inventories and the costs of financing it (Petersen & Rajan, 1997). Besides, firms also have to cope with the price fluctuation in the future. A drop in mark-up of price under the marginal costs of production decreases directly the value of inventories, which leads to reducing the sales generated by those inventories (Bils & Kahn, 2000). Emery (1988) developed a positive theory of trade credit by demonstrating that firms are able to manage their inventories better by extending trade credit to their customers, but he does not find empirical support for this association. In particular, extension of trade credit partitions the cost of holding inventories of firms into its operating and financial components; while the selling firms accept late payment and incur the financial costs (e.g. the opportunity costs of delayed payment of buyers), their buyers accept early delivery and incur the storage costs (Emery, 1988). In so doing, firms shift inventories to their buyers (Mateut et al., 2015). This allows them to minimise the stock of inventories, and hence, the storage costs of holding inventories will decrease (Emery, 1988). In other words, selling more on trade credit will help firms to avoid holding costly stock of inventories (Caglayan et

al., 2012). Similarly, Ferris (1981) states that the provision of trade credit economises further on the costs of holding inventories. Hence, higher the trade credit provided, lower the cost of holding inventories is. This study expects the following hypothesis:

Hypothesis 1: Trade credit extension has a negative relationship with inventory investment of SMEs

4.2.2. Variability in sales drives the inventory- trade credit relation

Changes in sales of firms create shocks to the operation of firms (Petersen & Rajan, 1997). According to operational theory, firms can use trade credit as a flexible way to respond to this variation (Emery, 1984; Emery, 1987; Long et al., 1993). This improves firms' operation effectively. When demand varies, firms need to change selling price frequently or to change their production to meet demand (Alchian, 1969). However, customers will face exceedingly high costs of information search if firms change the price of the product. Meanwhile, firms will face enormously high costs of production, if they vary production (Alchian, 1969). Instead of following high-cost options, firms can conduct two possible lower-cost alternatives (Alchian, 1969). That is, either to increase inventories holding or to provide trade credit to customers. Emery (1987) states that the use of trade credit is more effective than the accumulation of inventories. This is because extending trade credit can reduce the effective price while holding inventories raises the costs. Moreover, it allows firms to react flexibly to fluctuation in demand. In particular, firms can offer more to customers so that they can encourage customers to purchase products in a period of low demand that leads to low sale growths (Emery, 1987). Otherwise, they will tighten up the extension of trade credit during times of high demand. In this way, firms can reduce the costs of changing their production levels because of demand fluctuation. In the same vein, Long et al. (1993) also find that firms with stable demand extend trade credit less than those with more variable demand. Hence, the use of trade credit is associated with the changes in a firm's sales.

The literature on determinants of trade credit has demonstrated the relationship between trade credit receivables and change in sales in SMEs (Petersen & Rajan, 1997; Niskanen & Niskanen, 2006; García-Teruel & Martínez-Solano, 2010b). By using sales growth to determine the changes in a firm's sales, Petersen and Rajan (1997) sheds light on this association by splitting sales growth up into positive and negative sales growth. It indicates that firms with positive sales growth have a positive relationship between trade credit and sales growths, while firms with negative sales growth have a negative association. Through this finding, the authors suggest that firms with positive sales growth offer slightly more trade credit to customers and the benefits of trade credit in those firms is economically small (Petersen & Rajan, 1997). On the other hand, firms that have had negative sales growth increase significantly the extension of trade credit with the purpose of maintaining sales. Similarly, García-Teruel and Martínez-Solano (2010b) find a negative relationship between trade credit and sales growth. This means that firms whose sales growth is low and who wish to grow could use trade credit credit as a mechanism to improve their sales by extending more credit to their customers. Through the use of trade credit, they encourage customers to regularly purchase products, develop a relationship with customers, or accommodate the demand of customers for credits (Summers & Wilson, 2003). The above evidences suggest indirectly that the superficial link between inventory holding and trade credit provision is driven by the fundamental force of the sales cycle and by how much a firm's sales swing in such a cycle. More specifically, in comparison with firms experiencing high sales growth, firms with low sales growth hold less inventories because they seem to extend more trade credit to customers in order to stimulate sales at times of low demand. Thus the following hypothesis captures this new insight provided by the current study:

Hypothesis 2: Trade credit provision decrease more inventories within firms that experience variabilities in sales.

4.2.3. Market power drives the inventory- trade credit relation

According to the price discrimination theory, seller firms can use trade credit as a form of price discrimination (Mian & Smith, 1992). They can vary the level of trade credit terms or discount for prompt payment among customers in order to sell their goods at entirely different prices to different buyers (Brennan et al., 1988; Cheng & Pike, 2003; Pike et al., 2005). For example, a firm can raise the discount for early payment to reduce the price for customers who want to pay as soon as possible (Huyghebaert, 2006). Likewise, firms can lengthen the credit period to reduce the price by allowing their customers to pay outside the due date without penalty or by taking unearned discounts (Cheng & Pike, 2003; Pike et al., 2005). Hence, the use of trade credit gives firms a more flexible approach to pricing.

Price discrimination is attractive to firms with a strong market position (Petersen & Rajan, 1997; Summers & Wilson, 2003). Such firms often maintain different profit margins by selling their products in several markets (Cowan, 2018). They always try to enhance their competitive position in the market and to increase the return from exploiting market power, thereby choosing to make greater recourse to selling customers on credit (Cheng & Pike, 2003; Ferrando & Mulier, 2013). A study by Petersen and Rajan (1997) supports the price discrimination theory and indicates that firms with higher profit margins will extend more trade credit to the customer for price discrimination purpose because they have a stronger motivation to finance the sales of an additional unit to their customers with aims of generating additional cash flows. Moreover, higher marginal earning allows firms to incur additional costs to create new sales (García-Teruel & Martínez-Solano, 2010b).

SMEs have stronger incentive to offer more trade credit to customers in order to increase the size of their potential market, and to overcome restriction that market size imposes on their own growth (Ferris, 1981; Molina & Preve, 2009; Hill et al., 2012;

Martínez-Sola et al., 2014). Such firms use trade credit as a part of firm's pricing policy tool to attract new customers by offering preferential credit period although they have lower market power than larger firms (Cheng & Pike, 2003; Martínez-Sola et al., 2014). A study by García-Teruel and Martínez-Solano (2010a) find evidence on the existence of price discrimination as a determinant of SMEs' trade credit policies. This study uses the gross profit margin to reflect the market power of firms, which is consistent with studies by Petersen and Rajan (1997) and Niskanen and Niskanen (2006). In particular, they indicate that SMEs will use trade credit to finance the sales when they have larger profit margins. They decide to offer preferential credit terms not only to obtain higher profitability from trade credit receivables, and but also, more importantly, to maintain the commercial relationship with customers in the future (García-Teruel & Martínez-Solano, 2010a; Martínez-Sola et al., 2014). The above discussions suggest indirectly that the superficial link between inventory holding and trade credit provision is also driven by the fundamental force of market power which manifests itself in price mark-up. Therefore, SMEs with higher profit margins tend to hold less inventories because they pass more trade credit to their customers. This study would expect as follows:

Hypothesis 3: Trade credit provision decrease more inventories within firms with stronger market power.

4.2.4. Firms' access to financing and investment in trade credit

According to a financial theory for the use of trade credit, the sellers of products can acquire and monitor the information of buyers more advantageously than financial institutions (García-Teruel & Martínez-Solano, 2010a). This allows firms with easier access to capital markets to help firms that face difficulties to obtain funds from capital markets because of their low creditworthiness (Emery, 1984; Smith, 1987; Petersen & Rajan, 1997). These benefits come from the fact that the relationship between firms and customers is closer than the relationships between customers and financial intermediaries

(Niskanen & Niskanen, 2006). Firms can use the volume and frequency of orders to evaluate information about their customers' current financial situation (García-Teruel & Martínez-Solano, 2010a). The continuous contact with customers enables firms to have a great ability to acquire information on customers (Petersen & Rajan, 1997). Furthermore, the firms have a greater advantage in controlling customers because they also have more powerful influence on customers as opposed to financial intermediaries (Petersen & Rajan, 1997). In particular, the firms can threaten to cut-off the supply of the regularly purchased merchandise if customers do not pay in time (Petersen & Rajan, 1997). This is very important in markets where the operations of buyers depend on few suppliers. By contrast, a financial intermediary can threaten to withdraw future finance, but their activity may have little immediate impact on operations of the buyers (Niskanen & Niskanen, 2006). Besides, in the case of non-payment, selling firms can recover and sell their products to other customers (Petersen & Rajan, 1997). Hence, the ability of firms' access to financing will decide their ability to grant trade credit to customers (Petersen & Rajan, 1997).

Emery (1984) suggests that firms have tendency to use surplus funds to finance their customers rather than earning interest on the financial markets because of the differences between the market lending and market borrowing rates of interest. According to Schwartz (1974), firms that have easier access to capital markets will have an incentive to extend more trade credit to their customers, with the purpose of raising forward sales and supporting the growth of customers. Similarly, Petersen and Rajan (1997) also support that the provision of trade credit has a positive relationship with ability to access financial markets. In this line, a study by Molina and Preve (2009) shows that financially constrained firms will experience cash flow problems and hence, such firms try to get cash by decreasing their investment in clients' credit. According to Petersen and Rajan (1997), SMEs often face restriction on assessing financial markets because asymmetric

information between the firms and the capital market may lead to credit rationing. The different levels of financing constraints faced by firms also impact on the investment in trade credit receivable. García-Teruel and Martínez-Solano (2010b) find that SMEs will grant more trade credit to their customers when they generate more cash flow and have easier access to financial markets. Therefore, it is argued that less financially constrained firms offer more trade credit to customers than more financially constrained ones. Such firms will decrease more the stock of inventories. The study establishes the following hypothesis:

Hypothesis 4: Trade credit provision decrease more inventories within less financially constrained firms.

4.3. Data and Methodology

4.3.1. Data

This study utilises panel data of SMEs for the seven-year period from 2010 to 2016. During this time, liquidity and financial constraints were raised amongst the SMEs in the aftermath of the 2008 financial crisis (Martínez-Sola et al., 2014). Such constraints should make the efficiency of trade credit management even more critical. The selection of SMEs is based on the following criteria. Firstly, these firms must be listed on the SME board of a public equity market in the East Asia and Pacific region. This sample covers nine countries or territories, including China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong. The selection of listed SMEs as a focus is because their financial statements are more accurate and more reliable than those of their non-listed counterparts. Secondly, these firms must meet the definition of small- and medium-sized enterprises (SMEs) set by each country (see Appendix A).

In addition to those selection criteria, this study applies a series of filters based on earlier studies (García-Teruel & Martínez-Solano, 2007; Pais & Gama, 2015; Lyngstadaas & Berg, 2016). Specifically, firms with anomalies in their accounting data

are also excluded. For instance, firms are excluded if their total assets, sales, trade credit receivable and trade credit payable have negative values, and if their total assets differ from total liabilities and equity. Financial firms are excluded from the sample because these firms have very different accounting requirements and asset structures from non-financial ones. The final sample consists of 1,509 non-financial listed SMEs, which amounts to an unbalanced panel of 10,537 firm-year observations. (Table 4.1).

Country	SMEs market	Listed of companies
China	ChiNext	276
Vietnam	HNX	130
Malaysia	ACE market	71
Thailand	MAI	68
Japan	JASDAQ	220
	MOTHER	26
South Korea	KOSDAQ	353
Taiwan	GreTai	164
Singapore	SGX Catalist	125
Hong Kong	GEM	76
Total		**1,509**

Table 4.1:The number of SMEs selected for Chapter Four.

The required financial and accounting firm-level data are retrieved from Bloomberg and DataStream Thomson One. The country-level data, such as Gross Domestic Product (GDP) growth is gathered from the World Bank database, but that of Taiwan is collected from National Statistics (2018). The base currency used for the data analyzed is in terms of the US dollar. Further, both dependent and independent variables are winsorized at 5% and 95% to overcome the influence of outliers.

4.3.2. Variables

This study starts with choosing the dependent variable to measure inventory investment (INV). Based on the previous studies by Deloof and Jegers (1999), Carpenter et al. (1994) and Kestens et al. (2012), this ratio is measured by the ratio of inventories to

total assets. It reflects the inventory investment of a firm. The high level of this ratio indicates that firms accumulate large inventories, which leads to high inventory costs (Kestens et al., 2012). Next, the main independent variable used in this study is trade credit receivable (TCR). It shows the trade credit extended by firms to their customers, which is measured by the ratio of accounts receivable to total sales. Following Ferrando and Mulier (2013) and Petersen and Rajan (1997), this study uses this ratio because it reflects a percentage of sales as trade credit provided to customers. A high amount of trade credit on total sales indicates that firms offer a higher proportion of trade credit to their customers.

Besides the main independent variable, this study also includes control variables that could impact on inventory investment, such as financial leverage (LEV), liquidity ratio (LIQ), firm size (SIZE), Sales growth (SGROWTH)**,** the gross profit margin (GPROF), board size (BOA), capital intensity (CI), and Gross Domestic Product (GDP) (Benito, 2005; Gaur et al., 2005; Guariglia & Mateut, 2006; 2010; Elsayed & Wahba, 2013).

Following the previous studies by Caglayan et al. (2012), financial leverage (LEV) is defined by the ratio of total debt to total liabilities. Firms that have better access to external funding will accumulate more inventories (Caglayan et al., 2012). Otherwise, firms will reduce their accumulation of all assets, including inventories when they face more financial constraints (Carpenter et al., 1994). Therefore, this study expects that financial leverage (LEV) is associated positively with inventory investment (INV). Moreover, liquidity ratio (LIQ) is defined by the ratio of current assets minus inventories and trade credit receivable to total assets (Caglayan et al., 2012). Firms reduce inventory investment when they increase their liquid assets (Caglayan et al., 2012). Hence, this study expects a negative relationship between liquidity ratio (LIQ) and inventory investment (INV).

Firm size (SIZE) is measured as the natural logarithm of total assets of the firm (Mendes-da-Silva & Black, 2005; Eroglu & Hofer, 2011; Elsayed & Wahba, 2013). According to Gaur and Kesavan (2015), a firm growing in size is able to provide frequent shipments to its stores because of economies of scope or scale. Such a firm adds more products to make sure that the demand for existing products is not affected by stock out (Gaur & Kesavan, 2015). Because of the requirements of economies of scale and scope, the supply chain infrastructure of a firm has excess capacity (Gaur & Kesavan, 2015). For instance, transportation logistics should raise the volume of shipments, and distributions centres should satisfy the requirements of new stores being added. In this case, the firms need to raise capacity to ensure growth (Gaur & Kesavan, 2015). Hence, this study expects a positive relationship between firm size (SIZE) and inventory investment (INV).

The sales growth (SGROWTH) is measured by calculated as the annual growth of sales between year t-1 and year t (Gaur & Kesavan, 2015). "A firm might build up inventories in anticipation of future sales growth" (Kieschnick et al., 2006:12). A study by Rotemberg and Saloner (1989) indicates that firms raise inventory investment when demand is high. Hence, sales are positively correlated with inventory investment. Similarly, Blazenko and Vandezande (2003a) also find that the higher demand leads to increasing inventory investment because firms will translate this demand into sales rather than stock outs. Hence, this study expects a positive association between sales growth and inventory holdings.

The gross profit margin (GPROF) is measured as the ratio of gross profit to sales (Gaur et al., 2005). According to Blazenko and Vandezande (2003a), stock out costs are high in a competitive market because there are better alternative sources of supply. In the same vein, Dion and Banting (1995), Dion et al. (1991) and Emmelhainz et al. (1991) also state that firms will lose sales or profit if corporate buyers seek alternative products

in the face of stock out. Hence, firms hold inventories as a hedge against lost profit. Firms with a more significant profit margin will hold higher inventory because it helps firms reduce the likelihood that profits are lost to stock outs (Blazenko & Vandezande, 2003a). Similarly, Gaur et al. (2005) also state that an increase in the gross profit margin will rise the inventory level. Therefore, this study expects a positive association between the gross profit margin and inventory investment.

The board size (BOA) is measured by the number of members on the board of directors (Elsayed & Wahba, 2013). According to Lipton and Lorsch (1992) and Jensen (1993), the board of directors has limited ability to perform its main functions when the board is large. Particularly, a large board experiences difficulties in communication and coordination because of less cohesiveness. This also increases the information sharing costs and the possibility of the CEO controlling the board. On the other hand, Elsayed and Wahba (2013) argue that when board size is large, institutional investors can participate actively in controlling and monitoring management behaviour and they can reduce managerial entrenchment. Hence, the premise of this study expects that the association between Board size (BOA) and inventory investment (INV) is not clear.

Following the study by Gaur et al. (2005), the capital intensity (CI) is defined as the gross fixed assets divided by the inventories plus gross fixed assets. Investment in inventories is associated with investment in warehouse, information technology, and logistics management systems (Gaur et al., 2005). Firms decrease total inventory from the addition of a new warehouse because it allows firms to rebalance store inventories among shipments from suppliers and centralize safety stock (Jackson, 1988). Moreover, Cachon and Fisher (2000) state that firms will decrease inventory level if they implement information systems for the management of inventory. These systems enable firms to allocate inventory to stores more efficiently, shorten order lead times, and minimize cost

of processing orders. Hence, this study forecasts a negative relationship between capital intensity (CI) and inventory investment (INV).

In addition to firm characteristics, country-level variables are included in this study. Gross domestic product (GDP) growth is calculated by the annual change in the gross domestic product (GDP) between year t-1 and year t. According to Hornstein (1998), the changes in inventory investment are positively associated with the changes in Gross Domestic Product (GDP). In recession, firms decrease inventory investment drastically because of the decline in consumption. Hence, this study expects a positive relationship between GDP growth and inventory investment.

4.3.3. Regression models

4.3.3.1.The relationship between trade credit and inventory

This study examines whether or not the provision of trade credit impacts the inventory of SMEs by building models as follows:

$$INV_{it} = \beta_0 + \beta_1 TCR_{it} + \beta_2 LEV_{it} + \beta_3 LIQ_{it} + \beta_4 SIZE_{it} + \beta_5 SGROWTH_{it} + \beta_6 GPROF_{it} + \beta_7 BOA_{it} + \beta_8 CI_{it} + \beta_9 GDP_{jt} + \beta_{10} FD + \eta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where INV_{it} is the inventory investment of firm i at time t; TCR is trade credit provision; LEV is the financial leverage; LIQ is the liquidity ratio; SIZE is the firm size; SGROWTH is the sales growth; GPROF is the gross profit margin; CI is the capital intensity, and GDP is the Gross Domestic Product. The parameter η_i is unobservable heterogeneity and λ_t controls for time impacts. Finally, ε_{it} is a random disturbance. Table 4.2 shows the expected association between dependent and independent variables and how all variables used in this study are measured.

4.3.3.2.The impact of firms' characteristics on the relationship between trade credit and inventories.

According to Petersen and Rajan (1997) and Niskanen and Niskanen (2006), there are three main characteristics of firms that impact the trade credit provision, namely,

change in sales, market power and ability's access to finance. Hence, this study investigates the influence of those characteristics on the relationship between trade credit extension and inventory investment by using the following regression models:

The first equation examines how the association between trade credit provision and inventory investment varies according to the changes in sales.

$$INV_{it} = \beta_0 + (\beta_1 + \beta_2 DSALEVOL_{it}) \times TCR_{it} + \beta_3 DSALEVOL_{it} + \beta_4 LEV_{it} + \beta_5 LIQ_{it} + \beta_6 SIZE_{it} + \beta_7 SGROWTH_{it} + \beta_8 GPROF_{it} + \beta_9 BOA_{it} + \beta_{10} CI_{it} + \beta_{11} GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{it} \quad (2)$$

where all dependent and independent variables are defined in Table 4.2. Based on Petersen and Rajan (1997), this study applies the sales growth for determining the changes in sales. The ratio is defined as the annual growth of sales between year t-1 and year t (Gaur & Kesavan, 2015). A dummy variable (DSALEVOL) is employed in model (2) in order to investigate the effect of changes in sales on the association between trade credit provision and inventory investment. The DSALEVOL takes values 1 if sales growth is greater than the median of sales growth in the sample. In this case, the firms have great change in sales, and $\beta_1 + \beta_2$ accounts for the impacts of great change in sales. Otherwise, the DSALEVOL takes the value 0 when the firms have lower sales growth than the median of sales growth in the sample. The interaction variable is 0, and hence, β_1 accounts for the influence.

The second equation examines the influence of the market power on the relationship between trade credit extension and inventory investment.

$$INV_{it} = \beta_0 + (\beta_1 + \beta_2 DMPOWER_{it}) \times TCR_{it} + \beta_3 DMPOWER_{it} + \beta_4 LEV_{it} + \beta_5 LIQ_{it} + \beta_6 SIZE_{it} + \beta_7 SGROWTH_{it} + \beta_8 GPROF_{it} + \beta_9 BOA_{it} + \beta_{10} CI_{it} + \beta_{11} GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{it} \quad (3)$$

where all dependent and independent variables are defined in Table 4.2. The study uses the Lerner index to measure market power in the product markets. This index is measured by the price-cost margin (PCM) proxied by the firms' gross margin. In particular, it is defined by the ratio of gross profit to sales (Gaur et al., 2005) and it is a

common proxy for market power used in previous studies by Petersen and Rajan (1997), Niskanen and Niskanen (2006) and Gonçalves et al. (2018) . According to Spotts (2015), a firm with a high gross profit margin will have a better margin from its product and have a better pricing power compared to its competitors. Hence, higher profit margins lead to higher market power. A dummy variable (DMPOWER) is included in model (3) to test the effect of market power. Firms will have high market power if their gross profit margin is greater than the median of gross profit margin in the sample. In this case, the dummy variable (DMPOWER) takes the value 1, and hence, $\beta_1 + \beta_2$ accounts for the impacts of high market power. Otherwise, that dummy variable takes the value 0 when firms have lower market power. Therefore, β_1 accounts for the impacts of low market power.

The third model investigates the impact of the firm's ability to access capital markets on the association between provision of trade credit and inventory investment:

$$INV_{it} = \beta_0 + (\beta_1 + \beta_2 FC_{it}) \times TCR_{it} + \beta_3 FC_{it} + \beta_4 LEV_{it} + \beta_5 LIQ_{it} + \beta_6 SIZE_{it} + \beta_7 SGROWTH_{it} + \beta_8 GPROF_{it} + \beta_9 BOA_{it} + \beta_{10} CI_{it} + \beta_{11} GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{it} \quad (4)$$

where all dependent and independent variables are defined in Table 4.2. Following to Baños-Caballero et al. (2014), this study uses cash flow to classify firms that have constrained access to external financing. Cash flow is defined as the ratio of earnings before interest and tax plus depreciations to total assets. In order to examine the influence of firms' access to capital markets, FC is a dummy variable included in model (4). This variable takes the value 1 if cash flow is greater than the median of cash flow in the sample. This means that firms are less likely to face financing constraints. In this case, $\beta_1 + \beta_2$ accounts for the impacts of firm's access to finance. Otherwise, this dummy variable takes the value 0 if cash flow is lower than the median of firm's cash flow in the sample. This indicates that firms are more likely to face financial constraints. Therefore, β_1 accounts for the impacts of a firm's access to finance.

In models (2) – (4), this study includes $DSALEVOL_{it}$, $DMPOWER_{it}$, and FC_{it} because if there is the existence of an endogenous relation, it is more likely to show up in these dummy variables rather than in the interaction with trade credit receivable (Dittmar & Mahrt-Smith, 2007).

Variables	Acronym	Measurement
Inventory investment	INV	The ratio of inventories to total assets
Trade credit receivable	TCR	The ratio of accounts receivable to total sales
Financial leverage	LEV	The ratio of total debt to total liabilities
Liquidity ratio	LIQ	(Current assets – Inventories – Accounts receivable) ÷ Total assets
Firm size	SIZE	Natural logarithm of total assets in $US millions
Sales growth	SGROWTH	$(Sales_t – Sales_{t-1}) \div Sales_{t-1}$
Gross profit margin	GPROF	(Sales – Cost of goods sold) ÷ Sales
Capital intensity	CI	Gross fixed assets ÷ (Gross fixed assets + Inventories)
Board size	BOA	The number of members in board of directors
Gross Domestic Product	GDP	$(GDP_t – GDP_{t-1}) \div GDP_{t-1}$

Table 4.2: Definition of dependent and independent variables in Chapter Four

4.3.4. Methodology

As discussed in Chapter one, Panel data analysis has used as main methodology, comprising three alternative panel data models: Pooling Ordinary Least Squares Model (Pooled OLS), Fixed Effect Model (FEM) and Random Effect Model (REM). In particular, the study's initial method of estimating is the Pooled Ordinary Least Squares (Pooled OLS). However, this method often pools all of the databases together and run an

OLS regression; it does not concern about the difference of unit-specific effects. Thus, this method is straightforward to estimate and interpret. However, each entity will have different characteristics (Brooks, 2008). If it is not taken into considerations, the results will be unrealistic and restrictive because these characteristics will impact on the predictor variables and could lead to bias in the results. In order to control for the presence of individual heterogeneity, the study will use the Fixed Effect Model (FEM) and Random Effect Model (REM).

Then, the study will determine which model is most appropriate among them. First, this study uses the Breusch-Pagan Lagrange multiplier (LM) test to choose between REM and Pooled OLS. The null hypothesis is no variation across entities (Greene & McKenzie, 2012). if the null hypothesis is rejected, the study prefers REM to Pooled OLS because individual-specific effects across the units are not captured in the Pooled OLS. Second, the Hausman (1978) has used to choose between the FEM and REM under the null hypothesis whether there is a correlation between error term with regressors. If this relationship correlates, the REM is not preferred while the FEM will be consistent (Brooks, 2008). If this study applies for FEM, a joint test of time effects will be performed to choose either one-way or two-way fixed effect estimation, where the latter considers the time effect in the model while the former does not (Wooldridge, 2010). If these effects are not jointly significant, it might suggest that each model should not include a set of time indicator variables and therefore, a one-way FEM will be chosen (Baum, 2006). For the FEM, the Woodridge test and modified Wald test will be used to check autocorrelation and heteroscedasticity (Brooks, 2008). If there is the presence of autocorrelation and heteroscedasticity, this model is estimated with be estimated with cluster-robust standard error

4.4. Analysis and Results

4.4.1. Descriptive analysis

The descriptive analysis of all variables across countries and for the full sample, respectively will be presented in Tables 4.3 and Table 4.4 respectively. From Table 4.3, we can see that SMEs from Vietnam, Thailand, and Taiwan have a high investment in inventories (INV) compared to the rest of the countries over the studied period. The numbers of those three countries are 0.1678, 0.1507, and 0.1346 respectively. In contrast, SMEs from Hong Kong have the smallest inventory investment, with 0.0448. Regarding the mean value of trade credit receivable (TCR), China has the highest number, with 0.412. Because Chinese SMEs offer more trade credit to customers in comparison to SMEs in other countries, their inventory investment is low (only 0.1138). Moreover, we can see that the mean value of TCR of SMEs in Hong Kong is 0.2591. Although this number of Hong Kong is lower than those of China and Malaysia, it is higher than for the rest of the countries in the sample. This can explain why the mean value of INV of SMEs in Hong Kong is the lowest.

Table 4.4 reports overall descriptive statistics for all SMEs in East Asia and the Pacific over the studied period. The mean value of inventory investment (INV) is 0.1084, while the median value is 0.0825. INV ranges from a minimum of 0.0000 to a maximum of 0.3580. For independent variables, trade credit receivable (TCR) is on average 0.248. It has a range of 0.0077 minimum and 0.7671 maximum. For control variables, the mean value of the financial leverage (LEV) is 0.2761, which is lower than that of the liquidity ratio (LIQ) with 0.3105. Moreover, the firm size (SIZE) has a mean value of 3.1282 and a median value of 3.3372. The Sales growth (GROWTH) ratio fluctuates from a minimum of -0.4289 to a maximum of 0.9179. The mean and median of this ratio are 0.1079 and 0.0513, respectively. The mean value is higher than the median value of sales growth, hence the sample has a skewed distribution. The gross profit margin (GPROF) has a mean

value of 0.3083 and median value of 0.2712. Board size (BOA) ranges from a minimum of 2.000 to a maximum of 9.000 with an average of 4.7586. Capital intensity (CI) takes a mean value of 0.6075 while the median value is 0.6668. The GDP growth of countries in the East Asia and Pacific Region is on average 0.044.

Country	N	INV	TCR	LEV	LIQ	SIZE	SGROWTH	GPROF	BOA	CI	GDP
China	1,932	0.1138	0.4124	0.2314	0.3685	4.4754	0.2613	0.3798	6.1232	0.6346	0.0810
Vietnam	906	0.1678	0.2084	0.3434	0.2377	0.6739	0.0729	0.1971	3.9238	0.5726	0.0603
Thailand	476	0.1507	0.2029	0.3461	0.2289	2.5611	0.1330	0.2630	6.7206	0.6380	0.0363
Malaysia	491	0.0807	0.3254	0.2028	0.2850	1.9436	0.0786	0.3705	4.8350	0.7454	0.0538
Japan	1,722	0.0824	0.1997	0.2817	0.3766	3.2887	0.0328	0.3560	4.0238	0.7321	0.0166
South Korea	2,461	0.0962	0.1985	0.2675	0.2295	3.3541	0.0665	0.2519	3.9480	0.4820	0.0347
Taiwan	1,144	0.1346	0.1830	0.2822	0.3497	3.0336	0.0796	0.2780	5.0691	0.5167	0.0355
Singapore	875	0.1178	0.2278	0.3279	0.3019	3.1633	0.0814	0.3098	4.6697	0.6298	0.0475
Hong Kong	530	0.0448	0.2591	0.2514	0.4120	2.5949	0.1537	0.3899	5.0057	0.7504	0.0337
All countries	10,537	0.1084	0.2487	0.2761	0.3105	3.1282	0.1079	0.3083	4.7586	0.6075	0.0445

Notes: All variables are defined in Table 4.2

Table 4.3: The mean value of all variables across countries.

Variable	Observation	Mean	Median	Std. Dev	Min	Max
INV	10,537	0.1084	0.0825	0.1032	0.0000	0.3580
TCR	10,537	0.2487	0.2014	0.1959	0.0077	0.7671
LEV	10,537	0.2761	0.2479	0.1744	0.0326	0.6355
LIQ	10,537	0.3105	0.2664	0.2049	0.0347	0.7394
SIZE	10,537	3.1282	3.3372	1.3415	0.1475	5.1721
SGROWTH	10,537	0.1079	0.0513	0.3204	-0.4289	0.9179
GPROF	10,537	0.3083	0.2712	0.2109	0.0000	0.7989
BOA	10,537	4.7586	4.0000	1.9913	2.0000	9.0000
CI	10,537	0.6075	0.6668	0.3243	0.0251	1.0000
GDP	10,537	0.0445	0.0368	0.0273	0.0081	0.1063

Notes: All variables are defined in Table 4.2.

Table 4.4: Summary statistics for the full sample.

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4.4.2. Pearson correlation analysis

The purpose of Pearson correlation analysis is to identify the presence of multi-collinearity in regression analysis. While a high correlation between one of the independent variable and the dependent variable does not show the presence of multi-collinearity, high correlation coefficients among independent variables indicate that the model is suffering from multi-collinearity (Brooks, 2008). When an independent variable is very highly correlated with one or more other independent variables, it will increase the standard error and make the estimates unstable (Allen, 1997). Also, the presence of multi-collinearity increases the sensitivity to change of the regression. Thus, adding or removing any independent variables to or from the model also leads to modify the significance or the coefficient value of the other variables. Besides, this problem will widen confidence intervals for the parameters, leading to an inappropriate conclusion (Brooks, 2008). According to Field (2009), multi-collinearity is a problem in regression analysis when the correlation coefficient between independent variables is higher than 0.80 or 0.90. From the result presented in Table 4.5, the correlation coefficients among independent variables do not exceed this number, so multi-collinearity does not influence the multiple regression analysis.

Table 4.5 reports the correlation matrix for all variables. Trade credit receivable (TCR) has a significant negative correlation with inventory investment (INV). This means that firms decrease inventories by increasing trade credit provision. Financial leverage (LEV) is positively and significantly related to inventory investment (INV) while the liquidity ratio (LIQ) is negatively and significantly associated with inventory investment (INV). There is a positive association between firm size (SIZE) and inventory investment (INV) but it is not significant. Sales growth (SGROWTH) has a significant positive relationship with inventory investment (INV). Similarly, board size (BOA) has a positive association with inventory investment (INV). However, the relationship

between gross profit margin (GPROF) and inventory investment (INV) is significantly negative. Furthermore, the capital intensity (CI) has a negative and significant association with inventory investment (INV) while the GDP has a positive and significant relationship with inventory investment (INV).

	INV	TCR	LEV	LIQ	SIZE	SGROWTH	GPROF	BOA	CI	GDP
INV	1.000									
TCR	-0.039***	1.000								
LEV	0.325***	0.029***	1.000							
LIQ	-0.317***	-0.042***	-0.242***	1.000						
SIZE	0.011	0.270***	-0.017*	0.038***	1.000					
SGROWTH	0.020**	0.072***	0.051***	-0.0002	0.159***	1.000				
GPROF	-0.224***	0.096***	-0.271***	0.320***	0.148***	0.116***	1.000			
BOA	0.013	0.177***	-0.010	0.040***	0.245***	0.113***	0.070***	1.000		
CI	-0.586***	0.033***	-0.145***	0.194***	0.059***	0.020**	0.274***	0.076***	1.000	
GDP	0.083***	0.230***	-0.070***	0.006	0.008	0.208***	0.034***	0.101***	-0.058***	1.000

Notes: All variables are defined in Table 4.2. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 4.5: Pearson Correlation Matrix.

4.4.3. Trade credit and inventory investment

Table 4.6 shows the results of the association between trade credit receivable (TCR) and inventory investment (INV) under three models, namely the Pooled Ordinary Least Squares Model (Pooled OLS), Random Effect Model (REM), and Fixed Effect Model (FEM). Especially, this study considers the influence of industry on the relationship between trade credit receivable (TCR) and inventory investment (INV). According to Martínez-Sola et al. (2014), Fisman and Love (2003), Smith (1987) and Ng et al. (1999), firms within a industries offer uniform trade credit terms while they provide different trade credit term across different industries. This is because market conditions are similar within an industry compared to across different industries where the market conditions may vary significantly (Smith, 1987). Firms maintain their market competitiveness by matching normal industry terms (Paul & Boden, 2008). If the credit provided by firms is lower than that provided by others in the same industry, it affects firms' competitiveness negatively. This study uses variable ADJUSTEDTCR in order to investigate the industry effect. The variable is measured by firm accounts receivable minus industry mean accounts receivable (Martínez-Sola et al., 2014).

In Table 4.6, columns (1), (3), and (5) present the association between TCR and INV while columns (2), (4), and (6) present the association between ADJUSTEDTCR and INV. In general, under the results of the three models, the association between TCR and ADJUSTEDTCT and INV are negative and significant at the 1 percent level. This study needs to conduct diagnostic tests to identify which model is the most appropriate to apply. First, this study conducts the Breusch-Pagan Lagrange multiplier (LM) test to select between Random Effect Model (REM) and Pooled Ordinary Least Squares Model (Pooled OLS). According to the result of this test presented in columns (3) and (4), the p-value of this test is 0.000, which is less than 0.01. This implies that null hypothesis of

no variation across entities will be rejected (Greene & McKenzie, 2012). Hence, this study selects the REM.

Next, this study will choose between the FEM and REM by using the Hausman (1978) test. This test checks the correlation between the intercept term and one or more of the explanatory variables. In the case, if this test points out the significant result, it implies that the intercept term correlates with one or more of the explanatory variables (Brooks, 2008). This conflicts with the assumption of REM in which intercept term and any of explanatory variable do not correlate together. Thus, if the p-value of the Hausman test is significant, the FEM will be consistent rather than REM (Brooks, 2008). According to the columns (5) and (6) of Table 4.6, the p-value of Hausman test is significant at the 1 percent level so the FEM will be an appropriated model for this study.

From the result of the Hausman test, FEM is used in this study. Next, two diagnostic tests have been conducted, namely: Modified Wald test for heteroscedasticity, and Wooldridge test for autocorrelation in FEM. As the results of these two tests presented in Table 4.6, the p-value of both tests is less than 0.01, which indicates that heteroskedasticity and autocorrelation occur in FEM. Hence. This study will control two issues by using FEM with cluster-robust standard errors (Greene, 2012)

After choosing FEM with cluster-robust standard errors, another diagnostic test will be conducted to decide either one-way or two-way fixed effect estimation, where the latter considers the time effect in the model while the former does not (Wooldridge, 2010). If these effects are not jointly significant, it might suggest that each model should not include a set of time indicator variables and therefore, a one-way fixed effect (i.e. no time fixed effects) will be chosen (Baum, 2006). As can be seen in columns (5) and (6), the p-value of a joint test for time-fixed effects is lower than 0.01, hence time-fixed effects are needed in FEM.

Variables	OLS	OLS	RE	RE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)
TCR	-0.0436***		-0.0348***		-0.0387***	
	(0.000)		(0.000)		(0.000)	
ADJUSTEDTCR		-0.0435***		-0.0350***		-0.0390***
		(0.000)		(0.000)		(0.000)
LEV	0.133***	0.133***	0.139***	0.139***	0.128***	0.128***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	-0.0901***	-0.0902***	-0.0808***	-0.0808***	-0.0821***	-0.0821***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.0045***	0.0045***	0.0184***	0.0184***	0.0228***	0.0228***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0039	-0.0039	-0.00452***	-0.00451***	-0.0050***	-0.0050***
	(0.113)	(0.114)	(0.000)	(0.000)	(0.001)	(0.001)
GPROF	0.0162***	0.0161***	0.0458***	0.0458***	0.0538***	0.0538***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BOA	0.00277***	0.00276***	-0.0023***	-0.0023***	-0.0039***	-0.0039***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CI	-0.168***	-0.168***	-0.120***	-0.120***	-0.110***	-0.110***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Variables	OLS	OLS	RE	RE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)
GDP	0.315***	0.315***	0.0573**	0.0573**	0.0394	0.0395
	(0.000)	(0.000)	(0.022)	(0.022)	(0.142)	(0.141)
Constant	0.167***	0.154***	0.114***	0.104***	0.105***	0.0935***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LM test			0.000***	0.000***		
Hausman					0.000***	0.000***
Modified Wald					0.000***	0.000***
Wooldridge					0.000***	0.000***
Joint test					0.000***	0.000***
R-squared	0.443	0.443	0.314	0.313	0.320	0.320
Observation	10,537	10,537	10,537	10,537	10,537	10,537

Notes: All independent and dependent variables are defined in Table 4.2. LM test is the p-value of the Breusch-Pagan Lagrange multiplier (LM) test used to choose between Random Effect Model (REM) and Pooled Ordinary Least Squares model (Pooled OLS) . Hausman is the p-value of the Hausman (1978) test used to choose between Fixed Effect Model (FEM) and Random Effect Model (REM). Modified Wald is the p-value of the Modified Wald test for heteroscedasticity. Wooldridge is the p-value of the Wooldridge test for autocorrelation. Joint test is the p-value of a Joint test for time-fixed effects. The p-value in parentheses; ***, **, *** i**ndicates significance at the 10, 5, 1 percent level.

Table 4.6: Regression results between trade credit receivable and inventory investment.

Table 4.7 presents the estimated results of the relationship between trade credit receivable (TCR) and inventory investment (INV) under FEM. In column (1), the coefficient of TCR in association with INV is negative and significant at the 1 percent level. This finding indicates that firms will decrease accumulation of inventories by offering more trade credit to their customers. By so doing, they will decrease the costs of holding inventory. This result is consistent with the transaction cost theory developed by Emery (1988) who indicate that higher trade credit provision leads to lower cost of holding inventories.

In column (2) of Table 4.7, when taking into account the industry effect, ADJUSTEDTCR have negative and significant association with inventory investment (INV). This finding indicates that firms which provide more trade credit to their customers than others in their industry will decrease more cost of holding inventories. It is consistent with Niskanen and Niskanen (2006) and Kieschnick et al. (2006) who argue that firms which are willing to growth hold high inventories, so they choose a strategy of offering more trade credit than the average firms in their industry in order to decrease inventories and increase their sales.

For control variables, the financial leverage (LEV) has a positive and significant relationship with inventory investment (INV). This result is consistent with Caglayan et al. (2012) who suggest that firms will accumulate more inventories when they have better access to external funding. The liquidity ratio (LIQ) is negatively and significantly associated with inventory investment (INV), which is consistent with Caglayan et al. (2012) who argue that firms reduce inventory investment when they increase their liquid assets. This study also finds a positive and significant association between firm size (SIZE) and inventory investment (INV). It means that a firm growing in size is able to provide frequent shipments to its stores because of economies of scope or scale (Gaur & Kesavan, 2015). Such a firm adds more products to make sure that the demand for existing products

is not affected by stock out. Also, they need to raise capacity to ensure growth (Gaur & Kesavan, 2015). Unlike Gaur and Kesavan (2015), this study finds a negative association between sale growth (SGROWTH) and inventory investment (INV). The gross profit margin (GPROF) is positively associated with inventory investment (INV). Firms with a greater profit margin will hold higher inventories because it helps firms reduce the likelihood that profits are lost to stock outs (Blazenko & Vandezande, 2003a). Furthermore, this study finds a positive and significant association between board size (BOA) and inventory investment (INV). This finding is consistent with Elsayed and Wahba (2013) who suggest that when board size is large, institutional investors can participate actively in controlling and monitoring management behaviour and they can reduce managerial entrenchment in making investment decision. Capital intensity (CI) is negatively and significantly related to inventory investment (INV). In this sense, Gaur et al. (2005) argue that firms decrease total inventories from the addition of new warehouse because it allows firms to rebalance store inventories among shipments from suppliers and centralize safety stock (Jackson, 1988). Moreover, Cachon and Fisher (2000) argue that firms decrease inventory level if they implement information systems for the management of inventor. This systems enable firms to allocate better inventory to stores, shorten ordering lead times, and minimize cost of processing orders. Finally, this study finds that Gross Domestic Product (GDP) growth is positively and significantly associated with inventory investment (INV). The result is consistent with Hornstein (1998) who finds a positive association between inventory investment and Gross Domestic Product (GDP). In particular, firms decrease inventory investment because of the declined consumption during a recession period.

Variables	(1) FE	(2) FE
TCR	-0.0372***	
	(0.000)	
ADJUSTEDTCR		-0.0375***
		(0.000)
LEV	0.125***	0.125***
	(0.000)	(0.000)
LIQ	-0.0838***	-0.0839***
	(0.000)	(0.000)
SIZE	0.0239***	0.0239***
	(0.000)	(0.000)
SGROWTH	-0.00346*	-0.00345*
	(0.064)	(0.064)
GPROF	0.0498***	0.0498***
	(0.000)	(0.000)
BOA	-0.0001	-0.0001
	(0.848)	(0.849)
CI	-0.111***	-0.111***
	(0.000)	(0.000)
GDP	0.0751	0.0751
	(0.115)	(0.115)
Constant	0.0835***	0.0726***
	(0.000)	(0.000)
R-squared	0.332	0.332
Observations	10,537	10,537

Notes: Column (1) presents the association between trade credit receivable (TCR) and inventory investment. Column (2) present the influence of industry on the relationship between trade credit receivable (TCR) and inventory investment (INV). All independent and dependent variables are defined in Table 4.2. All models are estimated with robust standard errors. Time dummies are included in model. P-value in parentheses. ***, **, *** i**ndicates significance at the 10, 5, 1 percent level.

Table 4.7: The relationship between trade credit receivable and inventory investment in FEM.

4.4.4. The impact of firms' characteristics on the relationship between trade credit and inventory management

Table 4.8 shows the regression results of the impact of firms' characteristics on the association between trade credit receivable (TCR) and inventory investment (INV). In particular, column (1) presents result of the influence of changes in sales (DSALEVOL)

on the association between trade credit receivable (TCR) and inventory investment (INV), while column (2) presents result of the impact of market power (DMPOWER) on that association. Column (3) presents the effect of financial constraints (FC) on the association between trade credit receivable (TCR) and inventory investment (INV).

In column (1), this study uses sales growth to measure the changes in sales based on the previous studies by Petersen and Rajan (1997) and Niskanen and Niskanen (2006). The coefficient of trade credit receivable (TCR) is negative and significant at the 1 percent level for firms with a low change in sales (DSALEVOL=0). For firms with a high change in sales (DSALEVOL = 1), the coefficient of TCR equals the TCR coefficient plus the TCR * DSALEVOL coefficient. As a result, the coefficient of TCR is negative**.** Moreover, this study also conducts an F-test to investigate whether the coefficient of TCR is significant for firms with a high change in sales. In particular, F-test investigates whether the TCR coefficient (i.e. ($\beta_1 + \beta_2$)) is significant. From the result of the p-value of F-test presented in column (1), the coefficient of TCR is significant at the 1 percent level. In general, the trade credit provision (TCR) is negatively and significantly associated with inventory investment (INV) within the context of firms that have a low and a high change in sales. However, firms with a high change in sales decrease more inventories rather than firms with a low change in sales. In column 1, the coefficient of TCR of firms with a low change in sales (DSALEVOL = 0) is -0.0237. This means that a one unit increase in trade credit provision will lead to decrease by 0.0231 in inventory. On the other hand, the magnitude of the coefficient of TCR of firms with a high change in sales (DSALEVOL = 1) is -0.0237 + (-0.0405) = (- 0.0642). This informs that a one unit increase in trade credit will decrease inventory by 0.0642. Consequently, firms with a high change in sales or a high variability in sales will provide more trade credit to customers, leading to decrease inventories more than firms with a low change in sales. This finding is consistent with the hypothesis 2, where firms that experience variabilities

in sales decrease more inventories because those firms seem to extend more trade credit to customers than firms with high sales growth. This finding is consistent with Long et al. (1993) who suggest that firms with stable demand extend trade credit less than those with more variable demand. Moreover, this study also finds that the coefficient of DSALEVOL has a significant and positive association with inventory investment (INV). This means that firm with a high change in sales hold high inventories in comparison to firms with a low change in sales. This finding is consistent with Caglayan et al. (2012), who indicates that firms retain larger inventories when they experience higher sales uncertainty. This finding leads to a possible explanation of why firm with a high change in sales will offer more trade credit than firm with a low change in sales.

In column (2) of Table 4.8, this study shows the association between trade credit provision (TCR) and inventory investment (INV) within firms that have a high and low market power. For firms that have a low market power (DMPOWER = 0), the association between TCR and INV is negative and significant at the 5 percent level. The magnitude of the coefficient of trade credit provision (TCR) is (-0.0188) when the trade credit provision (TCR) increases by one unit. For firms with a high market power (DMPOWER = 1), the coefficient of TCR equals the TCR coefficient plus the TCR * DMPOWER coefficient. The magnitude of the coefficient of trade credit provision of those firms is (–0.0188) + (-0.0395) = (-0.0583). Hence, the coefficient of TCR of firms with a high market power is negative. Furthermore, this study also conducts an F-test to investigate whether the coefficient of TCR is significant for firms with a high market power (DMPOWER = 1). From the result of the p-value of the F-test presented in column 2, the coefficient of TCR is significant at the 1 percent level. Hence, the trade credit provision (TCR) is negatively and significantly associated with inventory investment (INV) within firms that have a high market power. When comparing the coefficient of TCR between firms that have a low and a high market power, it is clear that firms with a high market

power decrease inventories more than firms with a low market power. This finding is consistent with Petersen and Rajan (1997) and Niskanen and Niskanen (2006). Firms with a high market position often maintain different profit margins by selling their products in different markets (Cowan, 2018). They offer more trade credit to customers in order to enhance their competitive position in the market as well as to increase the higher return from exploiting market power (Cheng & Pike, 2003; Ferrando & Mulier, 2013). Hence, firms with a high market power will decrease more inventories than those with a low market power. Moreover, the coefficient of DMPOWER is positive and significant at the 1 percent level, implying that firms with a high market power hold higher inventory than firms with a low market power. Amihud and Medenelson (1989) state that firms with higher market power tend to hold more inventories. This allows those firms to smooth potential price fluctuations and limit demand and supply shock. Because of holding more inventories, firms with greater market power will offer more trade credit to their customers.

In column (3), this study uses cash flow in order to categorise less and more financial constrained firms. The coefficient of TCR of more financially constrained firms (FC = 0) is negative and significant at the 1 percent level. In particular, the magnitude of the coefficient of trade credit provision (TCR) is (- 0.0203). That is, when firms increase trade credit provision by one unit, their inventory investment will decrease by 0.0203. For less financially constrained firms (FC =1), the coefficient of TCR equals the TCR coefficient plus the TCR*FC coefficient. From the results presented in Table 4.8, the magnitude of the coefficient of trade credit provision (TCR) of less financially constrained firms is (-0.0203) + (-0.0463) = (-0.0666). Moreover, this study uses an F-test in order to investigate whether the TCR coefficient (i.e. ($\beta_1 + \beta_2$)) of less financially constrained firms is significant. In column (3), the p-value of the F-test is 0.000, which indicates that the TCR coefficient of those firms is significant at the 1 percent level.

Consequently, the trade credit provision (TCR) has negative and significant association with inventory investment (INV) within less financially constrained firms. When comparing the influence of financial constraints on the relationship between trade credit provision (TCR) and inventory investment (INV) among less and more financially constrained firms, we can see that less financially constrained firms offer more trade credit than more financially constrained ones and hence, they decrease more inventory. This finding is consistent with Schwartz (1974) who suggests that firms that have easier access to capital markets will have an incentive to extend more trade credit to their customers, with the purpose of raising forward sales and supporting the growth of customers. Similarly, Petersen and Rajan (1997) also support that the provision of trade credit has a positive relationship with ability to access to financial market. More financially constrained firms will experience the cash flow problems, and hence, they try to get cash by decreasing their investment in client's credit (Molina & Preve, 2009). Moreover, the coefficient of FC is positive and significant at the 1 percent level. This explains that less financially constrained firms hold more inventories than more financially constrained firms. Dasgupta et al. (2018) state that more financially constrained firms face a corporate cash flow shortage, so they are likely to decrease inventory investment compared to less financially constrained firms. In the same line, Guariglia (1999) state that more financially constrained firms face high cost of borrowing because the weakening of their financial information does not meet the standard requirements in terms of collateral and financial rates. Hence, limitation of accessing to credit markets decrease inventory investment in more financially constrained firms.

Among the control variables in Table 4.8, financial leverage (LEV) is positively and significantly related to inventory investment (INV). Firms that have better access to external funding will invest in more inventories (Caglayan et al., 2012). The liquidity ratio (LIQ) has negative and significant association with inventory investment (INV).

Firms which have more investment in liquid assets will invest less in holding inventory (Caglayan et al., 2012). Moreover, firm size (SIZE) is positively and significantly associated with inventory investment (INV). It is consistent with a study by Gaur and Kesavan (2015) who find growing firms add more products in order to ensure that the existing products are not stock out and those firms need to increase their capacity for growth. This study finds a negative relationship between sales growth (SGROWTH) and inventory investment (INV), which is inconsistent with Kieschnick et al. (2006) and Gaur and Kesavan (2015) who indicate that firms with higher sales growth will build up more inventories. The gross profit margin (GPROF) has a positive and significant association with inventory investment (INV). This means that firms with a greater profit margin will hold higher inventories (Blazenko & Vandezande, 2003a). The relationship between Capital intensity (CI) and inventory investment (INV) is negative and significant at the 1 percent level in all columns. This means that firms decrease inventory level if they improve information systems for managing inventories. This is because this systems allow firms to allocate inventory to stores more efficiently, shorten ordering lead times, and minimize cost of processing orders (Cachon & Fisher, 2000). Finally, Gross Domestic Product (GDP) growth has a positive relationship with inventory investment (INV).

Variables	FE	FE	FE
	(1)	(2)	(3)
TCR	-0.0237***	-0.0188**	-0.0203***
	(0.001)	(0.019)	(0.005)
TCR * DSALEVOL	-0.0405***		
	(0.000)		
DSALEVOL	0.0123***		
	(0.000)		
TCR * DMPOWER		-0.0395***	
		(0.000)	
DMPOWER		0.00876**	
		(0.017)	
TCR * FC			-0.0463***
			(0.000)
FC			0.0178***
			(0.000)
LEV	0.123***	0.122***	0.123***
	(0.000)	(0.000)	(0.000)
LIQ	-0.0857***	-0.0850***	-0.0877***
	(0.000)	(0.000)	(0.000)
SIZE	0.0235***	0.0235***	0.0231***
	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0059**	-0.00316*	-0.0045**
	(0.018)	(0.091)	(0.016)
GPROF	0.0473***	0.0501***	0.0449***
	(0.000)	(0.000)	(0.000)
BOA	-0.0001	-0.0002	-0.0001
	(0.897)	(0.801)	(0.872)
CI	-0.111***	-0.112***	-0.111***
	(0.000)	(0.000)	(0.000)
GDP	0.0700	0.0725	0.0729
	(0.139)	(0.129)	(0.122)
Constant	0.0824***	0.0829***	0.0817***
	(0.000)	(0.000)	(0.000)
F- test	0.000***	0.000***	0.000***
R-squared	0.337	0.335	0.340
Observations	10,537	10,537	10,537

Notes: All models are estimated with robust standard errors. Time dummies are included in all regressions. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and β_2 is zero. DSALEVOL is a dummy variable presenting changes in sales and it takes value of one when firm's sales growth is greater than the median of firm's sales growth in the sample and zero otherwise. DMPOWER is a dummy variable presenting market power and it takes value of one when firm's gross profit margin is greater than the median gross profit margin in the sample and zero otherwise. FC is a dummy variable presenting financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All other variables are defined in Table 4.2. P-value is in parentheses. *, **, *** indicate significant at the 10, 5, and 1 percent levels, respectively

Table 4.8: The influence of firms' characteristics on relationship between trade credit receivable and inventory investment in FEM.

4.5. Robustness Checks

4.5.1. Endogeneity problem

In this section**,** this study will use the two-stage least squares (2SLS) regression to control the potential endogeneity problem, which could seriously affect the estimation results. According to Martínez-Sola et al. (2014), this problem arises in financial decisions. In this study, it is possible that the association between trade credit provision and inventory investment reflects not only the effect of trade credit provision on inventory investment of firms but also the influence of inventory investment on trade credit provision. The first lag of the independent variables TCR is used as an instrumental variable. Moreover, in order to examine whether a variable presumed to be endogenous could be exogenous, this study performs the Durbin and Wu-Hausman test in order to compare the coefficient of estimation obtained by Ordinary least squares (OLS) and by the Two-Stage Least Squares (2SLS) (Davidson et al., 1993). If this study does not reject the null hypothesis of exogeneity of the explanatory variables, the OLS estimate is consistent. Otherwise, the 2SLS estimate is more consistent. With the results of p-value of Durbin-Wu Hausman presented in Table 4.9, the null hypothesis of exogeneity of the explanatory variables will be rejected at the 1 percent significance level (p=0.000). Hence, the 2SLS estimates are consistent.

From Table 4.9, the coefficient of trade credit provision (TCR) in association with inventory investment (INV) is negative and significant at the 1 percent level, which implies that offering more trade credit helps firms to decree accumulation of inventories. It is consistent with Emery (1988) who finds that firms which offer more trade credit to customers decrease inventories of finished goods. Moreover, this study considers how the difference in trade credit provision of firms in comparison to other firms in an industry impacts inventory investment. As can be seen in column (2), the association between ADJUSTEDTCR and INV is negative and significant at the 1 percent level. Firms

decrease inventories more than other firms in their industries when they offer more trade credit to customers. In this sense, Niskanen and Niskanen (2006) and Kieschnick et al. (2006) argue that firms which are willing to growth hold high inventories, so they choose a strategy of offering more trade credit than the average firms in their industry in order to decrease cost of holding inventories and increase their sales. In general, the results do not change when using 2SLS regression.

Among control variables, this study also finds positive and significant association between financial leverage (LEV) and inventory investment (INV) in two columns. Firms that have a high ability to access external funding will invest more in inventories (Caglayan et al., 2012). Besides, the liquidity ratio (LIQ) is negatively and significantly associated with inventory investment (INV). Firms tend to decrease inventory investment when they increase their liquid assets (Caglayan et al., 2012). The association between firm size (SIZE) and inventory investment (INV) is negative and significant at the 1 percent level. This study also shows a negative relationship between sales growth (SGROWTH) and inventory investment (INV). The gross profit margin (GPROF) is negatively associated with inventory investment (INV), but this association is not significant. Furthermore, this study finds a positive and significant association between board size (BOA) and inventory investment (INV). This finding is consistent with Elsayed and Wahba (2013) who suggest that when board size is large, institutional investors can participate actively in controlling and monitoring management behaviour and they can reduce managerial entrenchment in making investment decisions. Capital intensity (CI) is negatively and significantly related to inventory investment (INV). Cachon and Fisher (2000) argue that firms decrease inventory level if they implement information systems for the management of inventor. These systems enable firms to allocate better inventory to stores, shorten order lead times, and minimize cost of processing orders. Finally, this study finds that Gross domestic product (GDP) growth is

positively and significantly associated with inventory investment (INV). The result is consistent with Hornstein (1998) who finds a positive association between inventory investment (INV) and Gross Domestic Product (GDP).

Variables	2SLS	2SLS
	(1)	(2)
TCR	-0.0782***	
	(0.000)	
ADJUSTEDTCR		-0.0795***
		(0.000)
LEV	0.0707***	0.0708***
	(0.000)	(0.000)
LIQ	-0.121***	-0.121***
	(0.000)	(0.000)
SIZE	-0.0027***	-0.0026***
	(0.000)	(0.000)
SGROWTH	-0.0028	-0.0028
	(0.267)	(0.261)
GPROF	-0.0048	-0.0049
	(0.230)	(0.223)
BOA	0.0036***	0.0036***
	(0.000)	(0.000)
CI	-0.189***	-0.189***
	(0.000)	(0.000)
GDP	0.582***	0.585***
	(0.000)	(0.000)
Constant	0.229***	0.206***
	(0.000)	(0.000)
Durbin – Wu Hausman	0.000***	0.000***
Observations	9,025	9,025
R-squared	0.523	0.523

Notes: All models are estimated with robust standard errors. All variables are defined in Table 4.2. Time dummies are included in all regressions. Durbin – Wu Hausman is the p-value of the Durbin and Wu Hausman test used to compare between OLS and 2SLS estimates. P-value is in parentheses. *, **, *** indicate significant at the 10, 5, and 1 percent levels, respectively.

Table 4.9: The influence of the firm's trade credit provision on inventory investment in 2SLS estimation.

In Table 4.10**,** this study investigates the influence of changes in sales, market power and financial constraints on the association between trade credit provision (TCR) and inventory investment (INV) with the use of the Two-Stage Least Squares (2SLS) estimate.

In column (1), this study presents the influence of changes in sales on the relationship between trade credit provision (TCR) and inventory investment (INV). For firms with a low change in sales (DSALEVOL = 0), the coefficient of TCR is negative (-0.090) and significant at the 1 percent level. This means that firms decrease inventories by 0.09 when they increase trade credit provision by one unit. On the other hands, firms that have a high change in sales (DSALEVOL = 1) have a negative coefficient of TCR (-0.1122). Moreover, this study performs an F-test in order to investigate whether the coefficient of TCR is significant for firms with a high change in sales. With the result of the F-test presented in column (1), the coefficient of TCR is significant at the 1 percent level**.** Firms with a high change in sales decrease inventories by 0.1122 when they increase trade credit provision by one unit**.** Hence, firms with a high change in sales decrease inventories more than firms with a low change in sales because those firms provide more trade credit. Moreover, the coefficient of DSALEVOL is positive, which shows that firms with a high change in sales have higher inventory investment than firms with a low change in sales. This explains why the formers offer trade credit more than the latter.

For firms that have a low market power (DMPOWER = 0), the association between TCR and INV is negative and significant at the 1 percent level. In such firms, increasing trade credit extension by one unit will decrease inventory by 0.0531. On the other hand, the magnitude of the coefficient of TCR of firms with high market power is -0.0797. That is, one unit increase in trade credit provision will cause a decrease of -0.0797 in inventory investment. This study applies an F-test in order to investigate whether the

coefficient of TCR is significant for firms with high market power **(**DMPOWER =1)**.** With the result of the F-test presented in column (2), the coefficient of TCR is significant at the 1 percent level**.** Hence, there is a negative and significant association between TCR and INV within firms with high market power. However, firms with a high market power will decrease inventories more than those with a low market power. This can be explained that firms with a high market position often maintain different profit margins by selling their products in different markets (Cowan, 2018). Thus, they offer more trade credit to customers in order to enhance their competitive position in the market as well as to increase the higher return from exploiting market power (Cheng & Pike, 2003; Ferrando & Mulier, 2013)**.** Moreover, the coefficient of DMPOWER is positive and significant, which show that firms with a high market power increase inventory investment rather than firms with low market power. This is because those firms need to smooth potential price fluctuations and limit demand and supply shock (Amihud & Medenelson, 1989).

In column (3), this study presents the influence of financial constraints on the relationship between trade credit provision (TCR) and inventory investment (INV). The coefficient of TCR of more financially constrained firms (FC = 0) is negative and significant at the 1 percent level. Particularly, the coefficient of TCR of more financially constrained firms is -0.0617, which informs that those firms decrease inventories by 0.0617 when they offer one unit trade credit to customers. In contrast, the coefficient of TCR of less financially constrained firms (FC=1) is negative (-0.1002). The results of the F-test indicate a significant association between TCR and INV. This finding explains that less financially constrained firms decrease inventories by 0.1002 when they offer one unit of trade credit to customers. In general, two kinds of firms have a negative and significant association between TCR and INV. However, the magnitude of coefficient of TCR of less financially constrained firms is lower than that of more financially constrained ones. That is, less financially constrained firms decrease inventories more than more financially

constrained ones because those firms offer more trade credit to customers. Petersen and Rajan (1997) also support that the provision of trade credit has a positive relationship with ability of access to the financial market. More financially constrained firms will experience cash flow problems, and hence, they try to get cash by decreasing their investment in clients' credit (Molina & Preve, 2009). In contrast, Schwartz (1974) suggests that firms that have easier access to capital markets will have an incentive to extend more trade credit to their customers, with the purpose of raising forward sales and supporting the growth of customers. Moreover, less financially constrained firms offer more trade credit because they hold inventories higher than more financially constrained firms. We can see that the coefficient of FC is positive. It implies that less financially constrained firms keep high inventories compared to more financially constrained ones. This is because the former are likely to easier access to credit market, so they do not face a cash flow shortage (Dasgupta et al., 2018).

Among control variables, the financial leverage (LEV) is positively and significantly associated with inventory investment (INV). There is a significantly negative association between the liquidity ratio (LIQ) and inventory investment (INV). The relationship between firm size (SIZE) and inventory investment (INV) is negative and significant at the 1 percent level. The gross profit margin (GPROF) has significantly positive association with inventory investment (INV). Board size (BOA) is positively related to inventory (INV). Capital intensity (CI) is negatively and significantly related to inventory investment (INV). Finally, GDP has a significant and positive association with inventory investment (INV).

Variables	2SLS	2SLS	2SLS
	(1)	(2)	(3)
TCR	-0.090***	-0.0531***	-0.0617***
	(0.000)	(0.000)	(0.000)
TCR*DSALEVOL	-0.0222		
	(0.107)		
DSALEVOL	0.0018		
	(0.657)		
TCR*DMPOWER		-0.0266**	
		(0.031)	
DMPOWER		0.0180***	
		(0.000)	
TCR*FC			-0.0385***
			(0.002)
FC			0.0174***
			(0.000)
LEV	0.0827***	0.0830***	0.0728***
	(0.000)	(0.000)	(0.000)
LIQ	-0.140***	-0.140***	-0.121***
	(0.000)	(0.000)	(0.000)
SIZE	-0.0030***	-0.0039***	-0.0025***
	(0.000)	(0.000)	(0.000)
SGROWTH	0.0034**	0.0016	-0.0044*
	(0.049)	(0.284)	(0.079)
GPROF	0.0079*	-0.0128*	-0.0075*
	(0.098)	(0.069)	(0.060)
BOA	-0.0045***	0.0042***	0.0036***
	(0.000)	(0.000)	(0.000)
CI	-0.213***	-0.212***	-0.188***
	(0.000)	(0.000)	(0.000)
GDP	0.607***	0.549***	0.550***
	(0.000)	(0.000)	(0.000)
Constant	0.248***	0.245***	0.222***
	(0.000)	(0.000)	(0.000)
Durbin – Wu Hausman	0.000****	0.000***	0.032**
F-test	0.000***	0.000***	0.000***
R-square	0.492	0.488	0.527
Observations	9,025	9,025	9,025

Notes: All models are estimated with robust standard errors. Time dummies are included in all regressions. Durbin – Wu Hausman is the p-value of Durbin and Wu Hausman test used to compare between OLS and 2SLS estimates. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and β_2 is zero. DSALEVOL is a dummy variable presenting changes in sales and it takes value of one when firm's sales growth is greater than the median of firm's sales growth in the sample and zero otherwise. DMPOWER is a dummy variable presenting market power and it takes value of one when firm's gross profit margin is greater than the median gross profit margin in the sample and zero otherwise. FC is a dummy variable presenting financial constraints and it takes the value one for firms more likely to be financially constrained and zero otherwise. All other variables are defined in Table 4.2. P-value is in parentheses. *, **, *** indicates significant at the 10, 5, and 1 percent levels, respectively.

Table 4.10: The influence of the firm's characteristics on the association between trade credit provisions and inventory investment in 2SLS estimation.

4.5.2. Different proxies for change in sales, market power, and financial constraints.

In this section, the study will use different proxies to classify firms in terms of changes in sales, market powers, and financial constraints. In particular, demand variability is used to classify firms that have a high change in sales, and those have a low change in sales**.** When firms' demand fluctuates, they will vary price and production in order to meet this variation (Long et al., 1993). This leads to variation in sales. According to Long et al. (1993), the demand variability is measured by using the coefficient of variation of sales. It is the ratio of standard deviation of sales (3 years) to mean sales over a 3-year period. The DSALESVOL takes the values 1 if variation in sales is higher than the median sales variation in the sample. Otherwise, the DSALESVOL take the values 0.

Moreover, **t**his study uses market share to measure market power. According to Rhoades (1985), firms that have a high market share will have a high market power. In this study, market share is defined as the ratio of annual firm sales to annual industry sales based on study by Martínez-Sola et al. (2014). A firm's DMPOWER takes the value 1 if market share is higher than the median of market share in the sample. It will has a high market power. In contrast, if a firm's market share is lower than the median of market share in the sample, DMPOWER takes the value 0. Furthermore, this study uses firm size to classify firms that are suffering from financial constraints and those that are not**.** This ratio is employed as a proxy of financial constraints in many studies (Fazzari & Petersen, 1993; Carpenter et al., 1994; Faulkender & Wang, 2006). Smaller firms will be more financially constrained because these firms face higher informational asymmetry and agency costs (Baños-Caballero et al., 2014). Otherwise, larger firms face lower borrowing constraints and lower costs of external financing because of better access to the capital market (Whited, 1992). In this study, firm size is measured by the natural logarithm of sales (Baños-Caballero et al., 2014). Firms are considered more financially constrained when their size is smaller than median firm size in the sample. In this case,

the FC takes the value 0. In contrast, if firm size is higher than the median firm size, it is less likely to face financial constraints. Hence, the FC takes the value 1.

In column (1) of Table 4.11 this study presents the result of the influence of change in sales (DSALESVOL) on the relationship between trade credit provision (TCR) and inventory investment (INV). Trade credit provision (TCR) has a negative association with inventory investment (INV) for firms with a low change in sales (DSALESVOL = 0). This relationship is significant at the 1 percent level. The magnitudes of the coefficient of trade credit provision (TCR) are (-0.0297), which means that a one unit increase in trade credit provision will reduce inventories by 0.0297. For firms with a high change in sales (DSALESVOL = 1), the magnitude of the coefficient of TCR is (-0.0473). This number also indicates a negative relationship between trade credit provision (TCR) and inventory investment (INV) in those firms. Moreover, this study applied an F-test in order to investigate whether the coefficient of TCR is significant for firms with a high change in sales (DSALESVOL = 1). Based on the results of the p-value of the F-test presented in columns (1), this association is significant at the 1 percent level within firms with a high change in sales (DSALESVOL = 1). Hence, offering trade credit to customers helps firms with a high change in sales to decrease inventories by 0.0473. When compared with firms with a low change in sales, firms with a high change in sales decrease more significant inventories. This is because firms with high change in sales offer more trade credit customers than firms with low change in sales (Niskanen & Niskanen, 2006).

Column (2) of Table 4.11 presents the impact of market power (DMPOWER) on the association between trade credit provision (TCR) and inventory investment (INV). The trade credit provision (TCR) is significantly and negatively associated with inventory investment (INV) in firms with a low market power (DMPOWER = 0). The magnitudes of the coefficient of trade credit provision (TCR) is (-0.0176). This informs that a one unit increase in trade credit provision will reduce inventories by 0.0176. For firms with a

high market power (DMPOWER = 1), this study also finds a negative relationship between trade credit provision (TCR) and inventory investment (INV). Particularly, the magnitudes of the coefficient of TCR of firms with a high market power is (- 0.1048). That is, those firms decrease inventories by 0.1048 when trade credit provision increases one unit. Besides, this study conducts an F-test in order to investigate whether the coefficient of TCR is significant for firms with a high market power (DMPOWER = 1). Based on the p-value of results of the F-test presented in columns (2), this association between trade credit provision (TCR) and inventory investment (INV) is significant at the 1 percent level. Hence, firms with a high market power will decrease more inventories than firms with a low market power because those firms offer more trade credit to customers. Amihud and Medenelson (1989) state that firms with high market power tend to hold more inventories. This allows those firms to smooth potential price fluctuations and limit demand and supply shock. Because of holding more inventories, firms with higher market power will offer more trade credit to their customers.

In column (3) of Table 4.11, presents the result of the influence of financial constraints on the association between trade credit provision (TCR) and inventory investment (INV) by using firm size to classify firms that are suffering from financial constraints and those that are not. This study also shows a significant negative association between trade credit provision (TCR) and inventory investment (INV) within more financially constrained firms (FC = 0). The magnitudes of coefficients of trade credit provision (TCR) is -0.0260, which means that one unit increase in trade credit provision will reduce inventories by 0.0260. For less financially constrained firms (FC = 1), this study also finds negative relationship between trade credit provision (TCR) and inventory investment (INV). Particularly, the magnitude of coefficients of TCR of less financially constrained firms is (-0.1252). Besides, this study also uses an F-test in order to investigate whether the TCR coefficient (i.e. ($\beta_1 + \beta_2$)) of less financially constrained

firms is significant. Based on the results of the F-test presented in column (3), this association between trade credit provision (TCR) and inventory investment (INV) is significant at the 1 percent level within less financially constrained firms (FC = 1). Hence, trade credit provision has an influence on inventory investment. In effect, offering trade credit to customers help less financially constrained firms to decrease inventories by 0.1252. When comparing the effect between less and more financially constrained firms, it is clear that the less financially constrained firms decrease inventories more than less financial constrained firms. This is because firms with easier access to financial markets will offer more trade credit to their customers.

Among control variables, this study also finds that financial leverage (LEV) is positively and significantly associated with inventory investment (INV). This result is consistent with Caglayan et al. (2012) who suggest that firms will accumulate more inventories when they have better access to external funding. The liquidity ratio (LIQ) has a significantly negative association with inventory investment (INV). Caglayan et al. (2012) argue that firms reduce inventory investment when they increase their liquid assets. The relationship between firm size (SIZE) and inventory investment (INV) is positive and significant at the 1 percent level. A firm growing in size is able to provide frequent shipments to its stores because of economies of scope or scale (Gaur & Kesavan, 2015). Such a firm adds more products to make sure that the demand for existing products is not affected by stock out. This study finds a significant and negative relationship between sales growth (SGROWTH) and inventory investment (INV). The gross profit margin (GPROF) has a significantly positive association with inventory investment (INV). Firms with greater profit margin will hold higher inventories because it helps firms reduce the likelihood that profits are lost to stock outs (Blazenko & Vandezande, 2003a). Board size (BOA) is positively related to inventory investment (INV). Capital intensity (CI) is negatively and significantly related to inventory investment (INV). Gaur et al. (2005)

suggest that firms decrease total inventories from the addition of new warehouse because it allows firms to rebalance store inventories among shipments from suppliers and centralize safety stock (Jackson, 1988). Finally, this study finds that Gross domestic product (GDP) growth is positively and significantly associated with inventory investment (INV). The result is consistent with Hornstein (1998) who finds a positive association between inventory investment and Gross Domestic Product (GDP).

Variables	FE	FE	FE
	(1)	(2)	(3)
TCR	-0.0297***	-0.0176**	-0.0260***
	(0.000)	(0.023)	(0.006)
TCR*DSALEVOL	-0.0176**		
	(0.015)		
DSALEVOL	0.0031		
	(0.181)		
TCR*DMPOWER		-0.0872***	
		(0.000)	
DMPOWER		0.0186***	
		(0.000)	
TCR*FC			-0.0992***
			(0.000)
FC			0.0177***
			(0.000)
LEV	0.125***	0.124***	0.137***
	(0.000)	(0.000)	(0.000)
LIQ	-0.0845***	-0.0890***	-0.110***
	(0.000)	(0.000)	(0.000)
SIZE	0.0238***	0.0240***	0.0281***
	(0.000)	(0.000)	(0.000)
SGROWTH	-0.0030	-0.0033*	-0.00390*
	(0.104)	(0.076)	(0.091)
GPROF	0.0486***	0.0460***	0.0534***
	(0.000)	(0.000)	(0.000)
BOA	-0.0002	-0.00002	-0.000785
	(0.822)	(0.972)	(0.365)
CI	-0.112***	-0.112***	-0.129***
	(0.000)	(0.000)	(0.000)
GDP	0.0738	0.0734	0.0229
	(0.122)	(0.122)	(0.707)
Constant	0.0830***	0.082***	0.0966***
	(0.000)	(0.000)	(0.000)
F-test	0.000***	0.000***	0.000***
R-square	0.333	0.341	0.331
Observations	10,537	10,537	10,537

Notes: All models are estimated with robust standard errors. Time dummies are included in all regressions. The F-test refers to p-value of an F-test on the null hypothesis that the sum of β_1 and β_2 is zero. DSALEVOL is a dummy variable presenting changes in sales and it takes value of one when firm's demand variability is greater than the median of the demand variability in the sample and zero otherwise. DMPOWER is a dummy variable presenting market power and it takes the value of one when firm's market share is greater than the median market share in the sample and zero otherwise. FC is a dummy variable presenting financial constraints and it takes the value of one when a firm's size is greater than the median firm size in the sample and zero otherwise. All other variables are defined in Table 4.2. P-value is in parentheses. *, **, *** indicates significant at the 10, 5, and 1 percent levels, respectively.

Table 4.11: The influence of the firm's characteristics on the association between trade credit provisions and inventory investment in FEM.

4.6. Conclusion

The objective of this chapter is to investigate how trade credit provision influences inventory investment in Small and Medium-sized enterprise (SMEs). By using data for 1,509 non –financial listed SMEs across nine countries or territories in East Asia and the Pacific, namely, China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong, over the seven-year period from 2010 to 2016, the study provides empirical evidence for the association between trade credit provision and inventory investment. In particular, firms will decrease inventories when they offer trade credit to their customers. Moreover, when comparing with other firms operating within an industry, firms that provide more trade credit to their customers than other firms will decrease more inventories. This finding shows the benefits of trade credit extension in inventory management.

Moreover, this study also considers the influence of trade credit provision on inventory investment according to different characteristics of firms, namely changes in sales, market power, and financial constraints. Firms with a high change in sales will decrease inventories more than firms with a low change in sales. This is due to the fact that firms with high change in sales tend to extend more trade credit to customers. It can be seen that those firms obtain greater advantage from investment in trade credit receivable. Furthermore, firms with greater market power will decrease inventories more than firms with low market power because they provide more trade credit to customers. Moreover, further evidence supports the impact of financial constraints on the association between trade credit provisions and inventory investment. In particular, less financially constrained firms decrease inventories more than more financially constrained firms because those firms with easier access to financial markets will offer more trade credit to their customers. Actually, the use of trade credit is more beneficial for less financially constrained firms in inventory management than more financially constrained firms. In

robustness tests, the results remain unchanged when the study solves the endogeneity problem and uses different proxies to measure changes in sales, market power and financial constraints.

Although this study shows the benefits of trade credit provision in inventory management, it has some limitations that may warrant investigation in the future. First, this study has analysed trade credit provision in general, but it does not consider the trade credit policy which firms are using. According to García-Teruel and Martínez-Solano (2007), there are two working capital policies, namely aggressive policy and conservative policy, in which the former stimulates an increase in using trade credit provisions while the latter is sort of the opposite. Hence, different types of working capital policies impact the inventory investment of SMEs. Moreover, because of limitation of database, this study does not analyse the impact of the business cycle on the association between trade credit policy and inventory investment. In a period of economic downturn, firms face the variation of demand and must vary production. This also influences firms' trade credit provisions and inventory investment.

CHAPTER 5 - CONCLUSION, RECOMMENDATIONS AND FUTURE RESEARCH

5.1. Summary of Main Findings

This study investigates the trade credit in SMEs by conducting three empirical studies. The main findings of each empirical study are presented as follows:

5.1.1. Chapter Two

The first empirical chapter investigates whether there is a non-linear relationship between trade credit and SMEs' profitability and whether the financial constraints of SMEs impact this non-linear association. This study provides evidence that trade credit has a nonlinear association with firm profitability, for both aspects of trade credit, namely trade credit receivable and trade credit payable. In particular, the shape of this association is concave. This means that trade cerdit receivable and trade credit payable increase firm profitability up to the optimal point, after which, increase in trade credit receivable and trade credit payable reduces firm profitability. At low levels of trade credit receivable, trade credit provision increases firm profitability because it helps firms to increase their sales by reducing the information asymmetry about product quality between suppliers and buyers (Smith, 1987; Long et al., 1993), to maintain a long-term relationship with their customers (Ng et al., 1999; Wilner, 2000), and to offer various prices by changing the period of credit or the discount for prompt payment (Martínez-Sola et al., 2014). On the contrary, at high levels of trade credit receivable, firms meet the financial risks of no payment or late payment from customers (Petersen & Rajan, 1997), incur high administrative costs for assessing credit risk and structuring delayed payment contracts (Kim & Atkins, 1978; Sartoris & Hill, 1981; Emery, 1984) and forgo value-enhancing investment projects because of insufficient funds (Nadiri, 1969). Similarly, at low levels of trade credit payable, trade credit received from suppliers allows firms to have sufficient cash flow for investment in high-value projects (Cheng & Pike, 2003), and to decrease

payment transaction costs by separating the exchange of the product from the immediate use of money (Ferris, 1981). Hence, high trade credit payable will increase firm profitability. However, at high levels of trade credit payable, the association between trade credit payable and firm profitability is negative. If firms increase trade credit payable by stretching payment, they will damage the long-term relationship with suppliers, and a firm may incur extra cost to find alternative suppliers (Cunat, 2006). Besides, they not only lose the amount of discount from early payment but also pay the highest rate of interest for the use of this fund (Ng et al., 1999)

Given that restriction on access to finance is a more severe a problem for SMEs, this study finds the impact of financial constraints of SMEs on the association between trade credit and firm profitability. There exists a concave association between trade credit and firm profitability in both less and more financially constrained firms. However, the optimal level of trade credit differs between the two types of firms. Less financially constrained firms have a higher optimal level than more financially constrained ones. For trade credit receivable, firms suffering from financial constraints offer less trade credit than firms with financial stability (Schwartz, 1974). This is because the former tend to keep a lower level of trade credit provisions in order to ensure available sources of internal finance for their operations (Molina & Preve, 2009). Hence, the optimal level of trade credit receivable of more financially constrained firms is lower than that of less financially constrained firms. As regards trade credit payable, more financially constrained firms receive more trade credit from suppliers (Petersen & Rajan, 1997). However, the cost of use of trade credit from suppliers is more expensive (Ng et al., 1999; Psillaki & Eleftheriou, 2015; Carbó-Valverde et al., 2016). When firms use more trade credit from suppliers, they incur higher financial costs. This decreases their profitability. Hence, the optimal point of trade credit payable of more financially constrained firms is lower than that of less financially constrained ones.

5.1.2. Chapter Three

The second empirical study examine whether cultural differences have direct influence on the variations in trade credit usage of SMEs across different countries. In particular, the paper employs Hofstede's culture dimensions to investigate whether the degree of collectivism and uncertainty avoidance can explain the variation in trade credit receivable and trade credit payable of SMEs across countries. The result of this study shows that collectivism has a positive influence on trade credit receivable. That is, firms in collectivistic countries tend to offer more trade credit to their customers because they can obtain more information on customers as a result of building a strong network with other firms and suppliers (McMillan & Woodruff, 1999). This allows them to evaluate the reliability of customers and reduce the risks related to customers' asymmetric information before offering trade credit (McMillan & Woodruff, 1999). This study finds that the association between uncertainty avoidance and trade credit receivable is negative. This means that firms from a high uncertainty-avoidance culture offer less trade credit provision because they would tend to be less comfortable with ambiguous and uncertain situations. When they allow buyers to delay payment as a product quality guarantee, they experience uncertainty about when they will receive payment from customers (Smith, 1987; Long et al., 1993). If the buyers default and fail to pay their suppliers on time, firms will face difficulties to pay their loans from banks (Biais & Gollier, 1997).

With regard to trade credit payable, the study indicates that collectivism has a negative association with trade credit payable. This means that firms from countries with a high value on collectivism reduce trade credit received from suppliers. In such countries, firms have close-knit networks with others, and hence, their managers always try to preserve public image (Chen et al., 2015). If firms have the habit of paying suppliers late, suppliers will consider them as high default-risk and low creditworthy customers and may share information about it to others (Cunat, 2006). This can result in increased monitoring

or stricter terms on future sales. Moreover, uncertainty avoidance has a negative relationship with trade credit payable. This means that firms from countries with a high uncertainty avoidance decrease to provide trade credit to their customers. This is because firms from such countries would tend to protect themselves against uncertainty and hence they prefer to hold more cash as a precaution against unexpected difficulties in the future (Bae et al., 2012; Chen et al., 2015).

Moreover, this study also investigates whether the two cultural dimensions of collectivism and uncertainty avoidance have an indirect influence on the variations in trade credit receivable and trade credit payable across countries through the use of short-term bank credit and cash holdings. The study finds that firms in countries with a highly collectivistic culture will have high ability of access to short-term bank credit because they have well-established relationships with financial institutions (Petersen & Rajan, 1997; Zheng et al., 2013). This stimulates them to offer more trade credit to customers and to reduce demand for trade credit from suppliers compared to firms in countries with a low level of collectivism. Moreover, in collectivistic countries, firms feature higher self-monitoring (Biais et al., 2005). They want to send a positive signal to the public by holding a high level of cash (Chen et al., 2015). This reflects to the outside that firms are well-managed. When holding a high level of cash, firms in such societies provide more trade credit to customers as well as decrease trade credit received from suppliers.

Moreover, this study shows that firms in countries with high uncertainty avoidance tend to use less debt finance because they are more likely to avoid the greater refinancing risk that may result from that debt (Chang et al., 2012). Thus, they offer less trade credit to customers and receive more trade credit from suppliers in countries. Moreover, Ramirez and Tadesse (2009) find that a firm's cash holdings has a positive association with the level of uncertainty avoidance of a country. That is, managers of firms located in societies with high levels of uncertainty avoidance will retain high cash

as an instrument to hedge against future because they will be less willing to take risks. Hence, this study finds that firms in countries with a high level of uncertainty avoidance prefer to hold more cash and hence, they reduce provision and receipt of trade credit in comparison with firms in countries with a low level of uncertainty avoidance

5.1.3. Chapter Four

The third empirical study investigates whether trade credit provision influences inventory investment in SMEs. This study provides empirical evidence that firms decrease inventory when they provide trade credit to their customers. This result is consistent with the transaction cost theory developed by Emery (1988) who indicates that higher trade credit provision leads to lower cost of holding inventories. When considering the difference between firms in an industry, this study provides evidence that firms decrease inventory more when they offer more trade credit than their competitors in same industry. These findings suggest that the benefit of trade credit provision decreases the costs associated with inventory investment.

According to Petersen and Rajan (1997) and Martínez-Sola et al. (2014) , SMEs provide trade credit to customers when they experience changes in sales, low market power and greater ability of access the capital market. In the second aim, this study investigates how those characteristics of SMEs impact on the association between trade credit provision and inventory investment. With regard to changes in sales, this study finds that firms with a high change in sales decrease inventory more because they will extend more trade credit to customers than firms with a low change in sales (Long et al., 1993). Moreover, firms with high market power will decrease inventory more than firms with low market power because those firms extend more trade credit (Cheng & Pike, 2003; Ferrando & Mulier, 2013). This study also finds evidence consistent with the view that trade credit provision brings more advantages in managing inventory for less financially constrained firms than for more financially constrained ones. In particular,

less financially constrained firms decrease inventory more than more financially constrained firms because those firms with easier access to financial markets will offer more trade credit to their customers (Schwartz, 1974).

5.2. Summary of Key Contributions

The new findings of this thesis can make a number of contributions to existing literature as follows:

In Chapter Two, the study offers new evidence on the relationship between trade credit and SMEs' profitability. In particular, it shows the possible existence of a concave association between these two variables. Moreover, this study considers both aspects of trade credit: trade credit receivable and trade credit payable, when evaluating the relationship between trade credit and firm profitability. Finally, given that financial constraints faced by SMEs play a key role in trade credit investment decisions, this study provides evidence of the variation of relationship between trade credit and SMEs' profitability according to the level of SMEs' financial constraints.

In Chapter Three, the first contribution is that this study contributes to the current literature on the determinants of SMEs' trade credit. Most of the previous studies on the determinants of SMEs mainly focus on a single country such as the USA (Petersen & Rajan, 1997; Nilsen, 2002), the United Kingdom (Wilson & Summers, 2002; García-Teruel & Martínez-Solano, 2010c) , Belgium (Huyghebaert, 2006), Finland (Niskanen & Niskanen, 2006), Ireland (McGuinness & Hogan, 2016), Italy (Agostino & Trivieri, 2014) and Spain (García-Teruel & Martínez-Solano, 2010b; Carbó-Valverde et al., 2016). However, cross-country studies are relatively scarce. For a sample of SMEs from seven European countries, García-Teruel and Martínez-Solano (2010a) compare the influence of firm-level factors on trade credit granted and received across those countries. Moreover, studies by Casey and O'Toole (2014) and Palacín-Sánchez et al. (2019) demonstrate the substitutive relationship between trade credit and bank credit in SMEs

operating across the European Union. In another study, Demirgüç-Kunt and Maksimovic (2001) use a sample of publicly traded firms from forty countries and demonstrate the impact of two formal institutions: the level of development of a country's legal infrastructure and banking systems on the use of trade credit. Similarly, Beck et al. (2008) use a sample of firms in forty-eight countries to demonstrate the relationship between firms' external financing and a country's financial and legal institutions Meanwhile, Andrieu et al. (2018) also document a link between the development of the financial system and SMEs' capacity to access trade credit by using data for SMEs in 11 countries in Europe. Unlike previous studies, this study shows that an informal country-level institution, national culture, is an important determinant of variation in trade credit in SMEs across countries. Specifically, by studying a diverse group of countries in East Asia and the Pacific, the study provides empirical evidence that national culture significantly influences the cross-country variation in SMEs' investment in trade credit receivable and trade credit payable.

Second, to the author's best knowledge, there are few previous studies which demonstrate the impact of national culture on financial decision-making in SMEs. In particular, Kreiser et al. (2010) investigate the influence of national culture on risk-taking and proactiveness, while Mac an Bhaird and Lucey (2014) examine the relationship between national culture and capital structure. Recently, El Ghoul et al. (2016) and Gaganis et al. (2019) demonstrate the influence of national culture on profit reinvestment and profitability of SMEs, respectively. This study contributes to this literature by providing a demonstration of the effect of national culture on trade credit - another firm financial decision.

Third, this study extends the study by El Ghoul and Zheng (2016) by demonstrating this association in SMEs and considering their trade credit under two aspects, namely, provision of trade credit (i.e. suppliers) and receipt of trade credit (i.e.

customers). Finally, the previous studies indicate that decisions on trade credit depend on ability to access short-term bank credit and the level of cash holdings (Petersen & Rajan, 1997; García-Teruel & Martínez-Solano, 2010a; 2010b; 2010c; Love & Zaidi, 2010) . However, the authors do not investigate how the cultural difference across countries impacts those relationships. Hence, the investigation of the indirect effect of national culture on the variation in trade credit among countries through the use of short-term bank credit and cash holdings is new to the literature. In particular, the study examines the influence of short-term bank credit and cash holdings on SMEs' investment in trade credit according to the different scores on dimensions of national culture across countries.

In Chapter Four, the first contribution is that this study offers evidence that trade credit extended to customers is an important factor that impacts inventory investment. This finding contributes to current studies on determinants of inventory investment, which focus mostly on factors such as financial leverage, liquidity assets, firm size, sales growth, gross profit margin, and capital intensity (Benito, 2005; Gaur et al., 2005; Guariglia & Mateut, 2006; 2010; Elsayed & Wahba, 2013; Gaur & Kesavan, 2015). Second, the empirical findings of this study support the study by Emery (1988) who follows a transaction costs approach to develop a positive theory of passing trade credit to customers in inventory investment but does not provide empirical evidence to demonstrate this association in SMEs**.** Third, to the best of the author's knowledge, although previous studies indicate the important role of trade credit provision in performance of SMEs (Martínez-Sola et al., 2014; Hoang et al., 2019), this is the first empirical study that provides evidence on the benefits of trade credit provisions to inventory management in SMEs. Finally**,** this study shows how the association between trade credit provision and inventory investment varies according to SMEs' charateristics, namely changes in sales, market power and ability to access the capital market.

5.3. Managerial Implications

There are many implications of the findings reported in this thesis. First, the findings of Chapter Two will help managers of SMEs understand that the management of trade credit is an important element because it impacts their profitability. From that point, they could set out appropriate policies to keep trade credit at the target level to avoid the erosion of the profitability of SMEs by lost sales or uncollected sales. Moreover, when managers design the trade credit policies for SMEs, they should take into account their ability to raise funds in the capital market. If firms are more likely to face financing constraints, they have limited ability to extend trade credit to customers and increase trade credit received from suppliers. Hence, the profitability of trade credit will be lower for those firms.

Second, the findings of Chapter Three suggest that managers should consider country-level factors which impact on attaining optimal trade credit policies. In particular, beyond the development level of the banking system and the legal infrastructure, national culture is an important factor which managers need to take into account because it impacts on the trade credit deicisions in SMEs. For example, in collectivistic countries where people have strong interdependence, managers of SMEs should collect information on customers' creditworthiness from their partners or other suppliers before offering trade credit. This will help them to reduce the risks associated with customers' asymmetric information. Moreover, in such countries, SME managers have higher ability of access to short-term bank credit and higher level of cash holdings, and hence, they are more likely to feel comfortable providing trade credit in order to take full advantage of it for increasing profitability.

Third, the findings of Chapter Four suggest that SME managers benefit from trade credit provision in inventory management. In particular, providing trade credit to customers allows firms to shift their inventories to their buyers. This helps them to

minimise the stock of inventory, and hence, trade credit provision will decrease the storage costs of holding inventory. Moreover, this study suggest that managers should consider the firm's characteristics when they design the firm's trade credit provision. Firms with high changes in sales, stronger market power, and high ability to raise funds from the financial market need to provide more trade credit to customers because those firms hold high amounts of inventory.

5.4. Limitations of the Research

While the research findings have important implications, this study may suffer from general limitations, that is, data collection. In particular, this study uses panel data for listed SMEs across nine countries or territories, including China, Vietnam, Malaysia, Thailand, Japan, South Korea, Taiwan, Singapore and Hong Kong. While a few countries have developed financial markets for SMEs, namely Japan, South Korea, Singapore and Hong Kong, the rest of the countries, namely China, Vietnam, Malaysia, Thailand and Taiwan, have developing financial markets for SMEs. For example, in Malaysia, the ACE (Access, Certainty, Efficiency) market was organized in 2009, with only 130 firms listed in 2019. Similarly, in China, the ChiNext market was organized in 2009 with 464 listed firms in 2015. Hence, the database of SMEs' financial data before the year 2009 was limited. It does not allow a very deep analysis, such as comparison of provision and receipt of trade credit by SMEs between the periods before and after the crisis. Moreover, the researcher would have liked to include some variables to measure the influence of corporate governance on trade credit decisions, for example, CEO tenure and remuneration of directors. However, this data is often limited and not available in SMEs.

In addition to these general limitations, each empirical chapter also has the following limitations which need to be acknowledged. In Chapter Two, this study focuses only on listed SMEs in East Asia and the Pacific, and so the findings cannot be blindly applied to all SMEs in this region, especially unlisted SMEs. In fact, for non-listed SMEs,

access to the financial markets is even harder than for listed ones; hence, managing their trade credit maybe even more important. Second, because of the limitations of the database, this research only uses a sample of listed SMEs for a seven-year period from 2010 to 2016 – a calmer period after the financial crisis. However, problems of liquidity and financial constraints will increase in times of general financial crisis, and hence, provision and receipt of trade credit by SMEs will be different from the periods before and after the crisis. Third, this studies only focus on trade credit receivable and trade credit payable, but it does not take account into the net trade credit which is measured by the difference between trade credit receivable and trade credit payable. According to Love et al. (2007), this ratio means that firms that obtain more credit from their suppliers are likely to extend more credit to their customers. In this sense, net credit reflects the relative willingness of firms to extend trade credit, net of the credit that firms receive themselves. Forth, further studies can use return on equity (ROE) as a cleaner proxy for profitability than gross profit (Novy-Marx, 2010), and investigate the influence of trade credit on ROE. Fifth, because of the limitation of the database, this study only uses cash flow and the cost of external financing as proxies for the existence of financial constraints. Further studies can use the alternative measures of financial constraints such as dividends, and White and Wu index (Baños-Caballero et al., 2014). Finally, one of the limiting factors of this research was that the ownership structure of SMEs is not considered. Hence, further studies can investigate how the proportion of equity held SME managers impact the association between trade credit and firm profitability.

In Chapter Three, the study provides strong support for the importance of cultural effect in determining variations in trade credit of SMEs across countries. However, it only focuses on analysing two cultural dimensions, collectivism and uncertainty avoidance. According to Hofstede (1991), there are five cultural dimensions, including individualism versus collectivism, masculinity versus femininity, power distance, uncertainty

avoidance and long-term versus short-term orientation. Hence, it is possible to consider the influence of masculinity versus femininity, power distance, and long-term versus short-term orientation on the variation in trade credit decision across countries in East Asia and the Pacific. Moreover, this study analysed the indirect effect of national culture on trade credit through the use of short-term bank credit and cash holdings. Williamson (2000) indicates a four-level framework of economic and social analysis where informal institutions such as culture at level 1 force constraints on formal institutions at level 2 and in turn governance structures at level 3 and firm level decisions at level 4. This means that culture (level 1) not only indirectly affects trade credit through its effect on short-term bank credit and cash holdings but also through its effect on formal institutions (level 2), for example economic development and development of financial markets. Hence, it is possible to analyse the impact of culture on formal institutions. Furthermore, based on the framework of Williamson (2000), further studies can explore the influence of formal institutions , such as creditor rights, on the trade credit decisions. Finally, this study only focuses on East Asia and the Pacific and hence the result cannot be applied to other regions, such as Europe, Central Asia, etc., which have different cultures from East Asia and the Pacific.

In Chapter Four, although this study shows the benefits of trade credit provision in inventory management, it has some limitations. First, this study has analysed trade credit provision in general, but it does not consider the trade credit policy which firms are using. According to García-Teruel and Martínez-Solano (2007), there are two working capital policies, namely aggressive policy and conservative policy, in which the former stimulates an increase in using trade credit provisions, while the latter has a contrary effect. Hence, different types of working capital policies impact the inventory investment of SMEs. Moreover, because of the limitations of the database, this study does not analyse the impact of the business cycle on the association between trade credit policy and

inventory investment. In a period of economic downturn, firms face the variation of demand and must vary production. This would also influence firms' trade credit provisions and inventory investment.

5.5. Suggestions for Further Research

In view of the limitations of this thesis, which are listed above, this study presents several potential avenues for future research. First, this study can be replicated on non-listed SMEs companies in East Asia and the Pacific. The characteristics and features of those firms would be likely to be different from the listed ones. In particular, unlisted SMEs are limited to owners' equity and finance from friends and families. This may influence the use of trade credit. Hence, it may be interesting to know whether same pattern of results would be found in non-listed SMEs. Second, a further study could assess the influence of financial crisis on the association between trade credit and firm profitability, and between trade credit and inventory management. Love et al. (2007) indicates that use of trade credit changes during financial crises. In particular, firms increase the amount of trade credit received and provided immediately after a crisis, while firms with a more vulnerable financial position are more likely to be affected by a crisis and, in turn, are more likely to increase their use of credit from suppliers and cut their supply of credit to customers. Hence, it would be interesting to consider how the results of those associations differ from the periods before and after the crisis. Third, this thesis uses two cultural dimensions: collectivism and uncertainty avoidance. However, the other cultural dimensions of Hofstede (1991), namely masculinity versus femininity, power distance, and long-term versus short-term orientation, can be explored to determine if they affect the trade credit across countries in East Asia and the Pacific. Hence, further studies can explore the influence of those dimensions on trade credit. Fourth, this study analyses the impact of national culture on trade credit through its effect on short-term bank credit and cash holdings. However, culture not only impacts firm-level decisions

but also formal institutions (Williamson, 2000). Hence, further studies can explore the indirect influence of national culture on trade credit through its effect on formal institutions. Finally, a further study could consider the trade credit policy which firms are using and analyse the impact of this policy on the inventory management of SMEs.

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Appendix

Appendix A. Definition of SMEs in the sampled countries.

Country	Industry	Criteria and the country's official definition					
		Employees	Operating income	Total capital	Sales turnover	Fixed assets	Stated capital
China	Agriculture, Forestry, Animal husbandry, and Fisher	≤ 1000	≤ 20 million yuan				
	Manufacturing	≤ 1000	≤ 400 million yuan				
	Construction	≤ 1000	≤ 800 million yuan				
	Transportation and postal industry	≤ 1000	≤ 300 million yuan				
	Wholesale Businesses	≤ 200	≤ 400 million yuan				
	Warehousing	≤ 200	≤ 300 million yuan				
	Retail	≤ 300	≤ 200 million yuan				
	Hotel service and catering	≤ 300	≤ 100 million yuan				
Vietnam	Agriculture, forestry, fisheries, industry and construction	10 - 300		20 billion - 100 billion VND			
	Trade and services	10 - 100		10 billion - 50 billion VND			

Country	Industry	Criteria and the country's official definition					
		Employees	Operating income	Total capital	Sales turnover	Fixed assets	Stated capital
Malaysia	Manufacturing	5 - 200			300.000 – 50 million RM		
	Non-manufacturing	5 - 75			300.000 – 20 million RM		
Thailand	Manufacturing and Service	≤ 200				≤ 200 million THB	
	Wholesale	≤ 50				≤ 100 million THB	
	Retail	≤ 30				≤ 60 million THB	
Japan	Manufacturing, construction, transportation, and other industries	≤ 300					≤ 300 million Yen
	Wholesale trade	≤ 100					≤ 100 million Yen
	Service and retail trade	≤ 100					≤ 50 million Yen

Country	Industry	Criteria and the country's official definition					
		Employees	Operating income	Total capital	Sales turnover	Fixed assets	Stated capital
South Korea	Manufacturing industries (6)				≤ 150 billion KRW		
	Manufacturing industries (12), agriculture/ forestry/ fishery, electricity, gas, water business, wholesale/ retail business, mining industry, and construction industry				≤ 100 billion KRW		
	Others manufacturing industries (6), transportation business, sewage disposal/ environment remediation business, publication/ information service business				≤ 80 billion KRW		

Country	Industry	Criteria and the country's official definition					
		Employees	Operating income	Total capital	Sales turnover	Fixed assets	Stated capital
South Korea	Repair / other personal service business; Business-supporting service business; Science/technology service business; Health / social welfare business; Art/sports service business				≤ 60 billion KRW		
	Lodging/restaurant business; Educational service business				≤ 40 billion KRW		
Taiwan	Manufacturing, construction, mining and quarrying industries	≤ 200					≤ 80 million TWD
	Commerce, transportation services, and other services	≤ 100					≤ 100 million TWD

Country	Industry	Criteria and country's official definition					
		Employees	Operating income	Total capital	Sales turnover	Fixed assets	Stated capital
Singapore	Manufacturing and Non-Manufacturing	≤ 200			≤ 100 million SGD		
Hong Kong	Manufacturing	≤ 100					
	Non – Manufacturing	≤ 50					

Sources: The National Bureau of Statistics of China (OECD, 2016), Vietnamese Ministry of Planning and Investment (2009), National SME Development Council (NSDC), Office of Small and Medium Enterprises Promotion (2004), Small and Medium Enterprise Agency (2016), Ministry of SMEs and Startups (2015), Small and Medium Enterprise Administration (2017), Spring Singapore (2014), and Trade and Industry Department (2012).