

INTRA-FIRM AND ARM'S LENGTH EXPORT PROPENSITY AND INTENSITY OF MNE FOREIGN SUBSIDIARIES

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ABSTRACT

In this study, we build upon internalisation theory in the international business literature and international trade finance in the international economics literature to examine how financial capital affects the decision to export (export propensity) and the share of exports over total sales (export intensity) by the foreign subsidiaries of multinational enterprises. We dissect exports into intra-firm exports (exports to sister affiliates and parent firms) and arm's length exports (exports to third-party external customers), and we focus on the types of capital that can be used for financing exports, namely intra-firm loans and bank loans. We theorise that these two financing sources have different impacts on subsidiary export behaviour. To test our hypotheses, we use a survey dataset of subsidiaries, host-country data, and two-part models. Our findings show that intra-firm loans are positively related to arm's length export propensity and intensity; however, intra-firm loans have no significant relationship with intra-firm export propensity and export intensity. Additionally, on the one hand, bank loans have a positive impact on the likelihood of subsidiaries becoming arm's length exporters, but they do not help subsidiaries with arm's length export intensity. On the other hand, bank loans negatively impact the likelihood of subsidiaries becoming intra-firm exporters; however, once subsidiaries participate in intra-firm exports, bank loans are positively associated with intra-firm export intensity. We discuss the implications of our findings for theory and practice.

Keywords: financing subsidiary exports; intra-firm exports; arm's length exports; export propensity; export intensity.

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1. Introduction

Multinational enterprises (MNEs) are central to the world's international trade (Rugman & Collinson, 2012). They establish a network of foreign subsidiaries in multiple host countries and trade with internal units and external customers (Casson, 2000). Foreign subsidiaries are assigned to export by their parent firms, or they make the effort to undertake export responsibilities (Birkinshaw, 1996). They play an important role in exporting (Estrin, Meyer, Wright, & Foliano, 2008; Nguyen, 2014, 2015; Nguyen & Almodóvar, 2018; Nguyen & Rugman, 2015a, 2015b) and account for an increasing share of the total exports of MNEs (Blomström & Lipsey, 1990; Hanson, Mataloni Jr, & Slaughter, 2005). A proportion of subsidiary-level exports consists of intra-firm exports, defined as the shipment of products or the provision of services to sister affiliates and/or parent firms. Arm's length exports constitute another proportion, pertaining to the shipment of products and the provision of services to third-party external customers.

Financing is critical to the success of the exports of foreign subsidiaries (for a comprehensive literature review, see Foley and Manova (2015) and Vaubourg (2016)). Exporting involves two main decisions: first, the decision to export (i.e., export propensity) and second, the share of exports over total sales (i.e., export intensity) (Bhat & Narayanan, 2009; Rodríguez & Rodríguez, 2005). Engaging in exports, as well as developing and growing business in foreign markets, incur large upfront sunk entry costs, fixed costs, and variable costs. Thus, exporting requires significant financial resources, and additional working capital and liquidity (Manova, 2013; Manova, Wei, & Zhang, 2015; Muûls, 2015). The importance of external finance in facilitating international trade in both normal and crisis times is well-documented in the international economics (IE) literature (Foley & Manova, 2015).

Yet, little is known about the impacts of finance on the exports of foreign subsidiaries whereas they contribute to the overall exporting strategy of their parent firms. (Nguyen & Almodóvar, 2018). Additionally, prior research has not distinguished the sources of finance to support subsidiary exports, although this issue is identified to be important (Foley & Manova, 2015). Furthermore, research on

foreign subsidiaries' intra-firm and arm's length exports is scarce (Haller, 2012; Morikawa, 2019). One plausible explanation for the dearth of research on this phenomenon is the lack of available data on intra-firm and arm's length exports, as well as internal and external debt finance sources at the subsidiary level. In addition, previous studies on international trade and finance primarily focused on domestic enterprises and the characteristics of the firm (for a review, see Chen, Sousa and Xinming (2016)). These studies' insights may not be transferable to foreign subsidiaries, which are influenced by their MNE parent firms and host-country environments (Estrin et al., 2008).

The present study aims to fill these notable research gaps in the extant literature. Specifically, we focus on subsidiary-level factors as explanatory variables rather than parent-level or host country-level factors. The central research questions are as follows:

- (1) Which types of financial capital can be used for financing intra-firm and arm's length exports by MNE foreign subsidiaries?
- (2) How do these financial resources affect two exporting decisions, namely the export propensity and the export intensity of the aforementioned two types of exports?

To answer our research questions, we build upon classic internalisation theory (Buckley and Casson 1976; Rugman 1981) in the international business (IB) literature (Rugman & Verbeke, 2001, 2003) and international trade finance research in the IE literature for our theoretical development. We theorise that financing foreign subsidiaries' intra-firm and arm's length exports requires the availability of both intra-firm loans (also known as internal debts or amounts owed to group undertakings), defined as internal borrowing from parent firms and/or sister affiliates through MNEs' internal capital markets, and bank loans (also known as external debts), defined as external borrowing from financial institutions. In practice, the global or regional corporate treasuries of MNEs often function as in-house banks and provide internal financing sources and corporate financial services. We argue that these two types of debt financing sources have different impacts on foreign subsidiaries' decisions to become exporters (i.e., export propensity) and the share of their exports (i.e., export intensity).

We empirically test our conceptual model and a set of hypotheses using a primary dataset collected by a questionnaire survey with the subsidiary managers of British MNEs in six Southeast Asian countries. We also supplement our study with country-level secondary data from publicly available sources.

Our study makes three new contributions to the literature. First, our primary contribution is to provide original theoretical insights to the newly emerging literature at the intersection of international trade, finance, and multinational activities (Foley & Manova, 2015). We develop a systematic theoretical explanation for the relationship between finance and export behaviour of MNE foreign subsidiaries. Specifically, we focus on the impacts of intra-firm loans and bank loans on both intra-firm and arm's length export propensity and export intensity by foreign subsidiaries. We directly corroborate that foreign subsidiaries are less capital-constrained because they use internal capital markets to obtain intra-firm loans (Desai, Foley, & Hines, 2004) and raise external debt finance in host countries and other foreign capital markets (Manova et al., 2015; Nguyen & Rugman, 2015a). In this manner, we confirm the importance of international financial management in classic internalisation theory (Rugman, 1980, 1981); however, this particular aspect has not received the attention it deserves in the IB literature. This contribution is novel because research on MNEs has traditionally focused on the competitive advantages of common governance, economies of scale, propriety technology, research and development (R&D), trademarks, and managerial skills, among others, which MNEs develop and utilise within the boundaries of the firm, but not on the internal financial resources (for a comprehensive discussion, see Rugman, Verbeke and Nguyen (2011)). Thus, our study enriches the understanding of the role of finance in MNE foreign subsidiaries' foreign direct investment (FDI) and international trade activities.

Second, our conceptual model, which distinguishes between internal and external debt as sources of trade finance and dissects subsidiary-level exports into intra-firm and arm's length export propensity and intensity, is an original and new contribution. This phenomenon has not been examined in the extant literature (Foley & Manova, 2015). The study by Nguyen and Almodóvar (2018) explored the impact of intra-firm loans and bank loans only on the export intensity of foreign subsidiaries. We extend their work by demonstrating that these two sources of financial capital exert different impacts on two types of intra-firm and arm's length exports and two decisions of export propensity and export intensity. Specifically, we find that intra-firm loans are positively related to arm's length export propensity and export intensity; however, intra-firm loans have no significant relationship with subsidiary intra-firm export propensity and export intensity. There is also some evidence of a complex relationship between

bank loans and intra-firm exports and the positive impact of bank loans on subsidiaries becoming arm's length exporters. Bank loans negatively impact the likelihood of subsidiaries becoming intra-firm exporters; however, once subsidiaries have participated in intra-firm exports, bank loans are positively associated with intra-firm export intensity.

Third, our study complements the seminal works on horizontal, vertical, and export platform FDI, and the related intra-firm and arm's length exports in "classic" internalisation theory (Buckley & Casson, 1976). By examining how internal and external debt capital shape the behaviours of subsidiary-level intra-firm and arm's length export propensity and intensity, our study offers new insights that should be integrated into theorising this phenomenon. Furthermore, we provide new empirical evidence on the complex FDI, in which foreign subsidiaries become involved in both horizontal and vertical FDI and engage in both intra-firm and arm's length exports. This goes beyond the dichotomy of horizontal and vertical FDI, which have been well-established in the extant literature.

The paper is organised into several sections. The next section provides a literature review on subsidiaries' intra-firm and arm's length exports related to horizontal, vertical, and complex FDI from the perspective of internalisation theory and the effects of finance on exports. It also evaluates the extent to which these insights may carry over to MNE foreign subsidiaries while considering their specific nature, as well as the risks and opportunities associated with intra-firm and arm's length exports. Thereafter, Section 3 presents the theoretical development. Section 4 outlines the hypotheses. Section 5 describes the research method, including the research context and subsidiary-level primary data together with country-level secondary data. A description of variables follows in Section 6, while Section 7 explains the econometric models, and Section 8 reports the descriptive statistics and the results of multivariate tests and robustness checks. Finally, Section 9 discusses the implications of the findings for theory and practice, reflects on limitations, and offers suggestions for future research.

2. Literature synthesis

2.1. Subsidiaries' intra-firm and arm's length exports

In their seminal work on "classic" internalisation theory, Buckley and Casson (1976) explained horizontal and vertical FDI and the relationship between these types of FDI and intra-firm and arm's

length exports. Horizontal FDI facilitates subsidiaries' access to host markets and often leads to trade creation (Lipsey & Weiss, 1984; Rugman, 1990). The subsidiaries' products and services are not only sold in host-country markets but also exported to third-country markets (export-platform FDI), suggesting an involvement in arm's length trade. Horizontal FDI is also used as a mechanism for overcoming trade barriers. In a related manner, models of horizontal FDI following Markusen (1984) on the distribution side, where the trade-off is between establishing a subsidiary to produce abroad and serving the foreign market via exports, are typically trade replacing FDI.

Vertical FDI enables MNEs to optimise upstream and downstream value chain activities among the networks of subsidiaries abroad by exploiting the cost differences across countries and thus generates intra-firm trade, defined as trading activities with other affiliated units within MNEs. The main motive of intra-firm trade is the input side. The trade-off is between outsourcing by using foreign suppliers and in-house production involving a foreign subsidiary (Antràs & Helpman, 2004; Grossman & Helpman, 2005). According to Haller (2012), the ranking of firms that outsource abroad (giving rise to the arm's length imports of intermediates) and those that set up a production subsidiary abroad (giving rise to intra-firm imports) depends on the interplay of fixed and variable costs associated with the two alternatives and a firm's productivity. Using the data of French manufacturing firms, Corcos, Irac, Mion and Verdier (2013) indicated that more productive firms were more likely to vertically integrate. Ivarsson and Johnsson (2000) examined MNE strategies and variations in intra-firm trade using a dataset of 300 foreign manufacturing subsidiaries in Sweden in 1993. The results were that almost all intra-firm exports were finished products, and intra-firm imports consisted of material inputs and finished products for resale. The finding suggests that these subsidiaries were only marginally involved in vertically integrated production chains, especially in terms of exports.

In contrast, subsidiaries may become involved in the intra-firm exports of complementary finished products to sister affiliates. The subsidiary management literature documents that subsidiaries may be given a world product mandate (Etemad & Dulude, 1986; Pearce & Singh, 1992; Roth & Morrison, 1992; Young, Hood, & Dunlop, 1988). A mandate refers to any subsidiary's responsibility that extends beyond its markets and responds to the needs for subsidiary specialisation (Birkinshaw, 1996). A world product mandate provides the subsidiary with global responsibility for a single product line, including

development, manufacturing, and marketing (D'Cruz, 1986; Rugman & Bennett, 1982; Rugman & Douglas, 1986).

Complex FDI refers to a combination of both horizontal and vertical FDI (Helpman, 2006; UNCTAD, 1998; Yeaple, 2003). Foreign subsidiaries can supply inputs for their parent firms and sister affiliates (vertical FDI) and simultaneously produce the same finished goods and services as their parent firms (horizontal FDI). UNCTAD (1998) produced the first study that provided empirical evidence on complex FDI. Feinberg and Keane (2001) examined the subsidiaries of U.S. MNEs in Canada and found that only 12% of these subsidiaries were purely horizontal FDI and that only 19% were strictly vertical FDI. The rest (69%) of these subsidiaries represented complex FDI, having intra-firm trade flows from parent firms to subsidiaries, and vice versa. In addition, both parent firms and subsidiaries traded at arm's length and engaged in intra-firm trade. Lanz and Miroudot (2011) used firm-level data and found both vertical and horizontal FDI linkages between parent firms and their foreign subsidiaries. Bernard, Jensen and Schott (2009) utilised a comprehensive dataset of U.S. multinational parents that trade goods. Their key finding was that the most internationally engaged U.S. firms, or those that both exported to and imported from related parties (intra-firm trade), dominated U.S. trade flows and employment.

In a related manner, the literature has examined the heterogeneity between different groups of firms and international trade. Tomiura (2007) provided an analysis of productivity differences across a wide range of internationalisation options in a cross-section of Japanese manufacturing firms and showed that firms engaged in FDI abroad or in several internationalisation modes were more productive than firms that outsourced (imported) only and firms that exported only.

Haller (2012) used an Irish dataset to examine firm heterogeneity (size, wages, capital intensity, and productivity) between domestic and foreign-owned firms that engaged in intra-firm trade, firms that exported and imported, firms that imported only, and firms that exported only. Considering intra-firm trade in addition to exporting and importing yields new insights into the productivity advantage previously established for exporting firms. The results showed that this premium accrued only to exporters that also imported and to exporters that also engaged in intra-firm trade, but not to firms that exported only.

Morikawa (2019) examined firm heterogeneity and international trade in services in comparison with those of goods trade using a Japanese dataset. The finding was that the share of intra-firm exporters among total exporters was greater in services exports than in goods exports. Moreover, the productivity and wage level of services exporters were higher than those of non-exporters and goods exporters, although firms engaged in both goods and services exports were the most productive and pay the highest wages. The productivity and wages of firms that exported services beyond the boundary of their firm groups were higher than those of firms that exported services only to their affiliate firms.

2.2. Finance and exports

The “‘new’ new trade theory” in the IE literature, advanced by Melitz (2003), assumes that ex-ante differences across firms in terms of productivity determine participation in the export market. Financial frictions have a significant effect on exports. A body of research illustrates how firms’ heterogeneous productivity, financial frictions, and export activity explain micro-level and aggregate trade outcomes (Bernard, Eaton, Jensen, & Kortum, 2003; Melitz, 2003). Manova (2013) found that the interactions between financial frictions and firm heterogeneity disrupted trade by precluding potentially profitable firms from exporting and restricting exporters’ sales abroad.

Exporting induces upfront costs, such as market research to gain an understanding of the product preferences of foreign customers and market conditions; the set-up and management of distribution networks; product compliance with the quality, labelling, health and safety requirements, standards, and regulations of foreign markets; and the customisation of products (if required). Exporting also incurs variable costs, such as freights, which depend on shipping time and export volumes, along with insurance and duties. Cross-border trading takes 60 days longer than domestic trading, leading to longer accounts receivable and cash conversion cycles (Maes, Dewaelheyns, Fuss, & Van Hulle, 2019). Exporting also requires more capital to fund investments in machinery and equipment for export-oriented production (Foley & Manova, 2015; Manova, 2013). Additionally, exporters face uncertainties, such as trade barriers and changes in trade policies by foreign governments, exchange rate fluctuations, and risks of default payments from foreign customers.

Financing that provides the required working capital and liquidity is instrumental in facilitating international trade (Antràs & Foley, 2015; Foley & Manova, 2015; Schmidt-Eisenlohr, 2013). According to Vaubourg (2016), although the financing availability for sunk costs and fixed costs determines export propensity, the financing availability for variable costs affects export intensity.

3. Theoretical development

Before proceeding with our theoretical development that foreign subsidiaries use intra-firm loans and bank loans to finance their intra-firm and arm's length exports, we present some underlying assumptions about finance and exports in the parent firm–subsidiary relationships. First, foreign subsidiaries are part of the MNE network, whereby there is centralised coordination, management, and controlling of financial resources by parent firms. Specifically, when foreign subsidiaries engage in export activities, they can access internal capital markets and apply for intra-firm loans to finance their exports. Second, they are assumed to follow the headquarters' corporate policies in financial management, including export finance. Third, they must consider transfer pricing for intra-firm exports. Transfer pricing is defined as the price for payment for related party transactions. Transfer pricing must comply with the arm's length price standard (ALPS), defined as the price that exists or would exist for a sale of a given product or service between two unrelated companies (OECD, 2017). The assumption is that in business practice, foreign subsidiaries follow their parent firms' transfer pricing policy and that the profit margin of intra-firm exports is as reasonable as that of arm's length exports. Additionally, the interest rate of intra-firm loans that subsidiaries obtain from MNEs' internal capital markets must also comply with ALPS. It is often based on the London Interbank Offered Rate (LIBOR) plus basis point spread for risk premium (Nguyen & Almodóvar, 2018).

We build upon Rugman (1980, 1981) "classic" internalisation theory and corporate international finance for our theoretical development. First, foreign subsidiaries can secure intra-firm loans by tapping into MNEs' internal capital markets; thus, they have the necessary capital to finance exports. Rugman (1980) was among the first to introduce the concept of internal capital markets in the MNE context. He argued that MNEs can overcome segmented international capital markets by operating efficient internal markets within their organisational structures. The role of internal capital markets is

particularly important for foreign subsidiaries located in countries with underdeveloped capital markets. They encounter numerous challenges such as constrained access to host-country external capital markets, limited availability of external credit opportunities, and a high cost of borrowing (Nguyen & Rugman, 2015a; Stephens, 1998). Previous studies have showed that the development of external capital markets significantly differs around the world (Desai et al., 2004). To overcome such challenges in external capital markets, subsidiaries use MNEs' internal capital markets for obtaining intra-firm loans (Aggarwal & Kyaw, 2008; Aulakh & Mudambi, 2005; Desai et al., 2004; Dewaelheyns & Van Hulle, 2010; Gugler, Peev, & Segalla, 2013; Mudambi, 1999).

Desai et al. (2004) found that the foreign subsidiaries of U.S. MNEs used internal capital markets for overcoming liquidity constraints and reacting to profitable opportunities. Similarly, Antràs, Desai and Foley (2009) reported that the foreign subsidiaries of U.S. MNEs responded to credit market imperfections and relaxed constraints faced by input suppliers. Desai, Foley and Forbes (2008) also found that the foreign subsidiaries of U.S. MNEs expanded their sales and investment more than domestic companies when they confronted with sizeable real exchange rate devaluations. Furthermore, Manova et al. (2015) showed that foreign subsidiaries and joint ventures in China had better export performance than private domestic firms in sectors that are more financially vulnerable. The former was less constrained because they could access funding from internal capital markets.

Second, subsidiaries also manage to access external debt finance in host countries and third countries (Rugman & Verbeke, 2001). Building relationships with local financial institutions helps subsidiaries tap into external financial resources. However, access to local finance may be challenging in the context of Southeast Asia due to underdeveloped capital markets (only Singapore has a developed financial market). Thus, foreign subsidiaries must seek obtaining debt finance from banks in third countries (Nguyen & Rugman, 2015a; Rugman & Collinson, 2012).

In summary, we theorise that foreign subsidiaries utilise intra-firm loans from MNEs' internal capital markets and bank loans (if accessible and available) from external financial institutions to support their intra-firm and arm's length export propensity and intensity. In Section 4, we argue that foreign subsidiaries must arrange appropriate financing sources for their fixed and variable trade costs because different types of financing sources have different impacts on intra-firm and arm's length export

propensity and intensity. Our theoretical reasonings are based on the cost–benefit analysis and cost assumptions for each type of financing source. Figure 1 presents the conceptual model.

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4. Hypothesis development

4.1. Intra-firm loans and their impacts on intra-firm and arm's length export propensity and export intensity

4.1.1. Intra-firm loans

MNEs and their subsidiaries have advantages in accessing finance in multiple countries relative to indigenous firms with operations in a single country. They can source external funding from numerous capital markets and can use the funding elsewhere within the corporate network of subsidiaries. The financial flows are managed and coordinated within the internal capital markets of MNEs (Desai et al., 2004; Foley & Manova, 2015; Rugman, 1980). Desai et al. (2004) found that MNEs use their internal capital markets in response to cross-country differences in the access to, availability of, and cost of capital.

Intra-firm loans are arguably less costly than bank loans to finance exports due to lower information asymmetries, lower administration costs, and lower costs of contractual enforcement. First, information asymmetries between corporate treasuries as lenders and foreign subsidiaries as borrowers are minimal. Subsidiaries are internally embedded within the MNE networks, and they implement formal and systematic financial management, planning, variance analysis, controlling and reporting in compliance with the requirements of parent firms. The parent firms' evaluation of subsidiary performance is based on a systematic and rationalised approach using structured systems and formal processes (Rugman & Collinson, 2012). Parent firms and corporate treasuries have knowledge and information about the subsidiaries' strategy, business, operations, and performance, and they implement formal systems to control and monitor subsidiaries abroad. Intra-firm loans are not subject to a premium charge due to information asymmetries, compared to bank loans.

Second, administration costs for intra-firm loans are assumed to be lower than those of bank loans, since there is less documentation and fewer collateral requirements. Furthermore, there is little or no need to underwrite intra-firm loans due to less verification and less information asymmetries. Corporate

treasuries have all the necessary information on foreign subsidiaries' credit, capacity, assets, and financial resources when they consider granting intra-firm loans.

Third, the contractual enforcement costs of intra-firm loans are lower than those of bank loans because contract enforcement is more effective and lowers the risks of default. The internal linkages between corporate treasuries and foreign subsidiaries also reduce the concerns of adverse selection and moral hazard in credit evaluation (Stiglitz, 1990).

4.1.2. Export propensity

Direct empirical evidence on the relationship between intra-firm loans and export propensity in the extant literature is scarce (Foley & Manova, 2015), likely due to a lack of available data on the distinction between internal and external debt at the subsidiary level. Previous studies in the IE literature using firm-level trade data have shown a clear correlation between financial conditions and export propensity (Manova et al., 2015). According to Miravittles, Mora and Achcaoucaou (2018), financial constraints should be included to explain the differences in export propensity across firms. Incorporating firm liquidity into a model of international trade, Bellone, Musso, Nesta and Schiavo (2010) used a sample of French firms and found that firms in better financial health were more likely to export. Moreover, using a dataset of firms from nine developing and emerging economies, Berman and Héricourt (2010) highlighted the importance of firms' access to finance in their decisions to enter the export market. Forlani (2010) and Muûls (2008) reported the significant impacts of financial constraints on export probability using panel data from Italian and Belgian firms, respectively.

Prior research has also documented the internal financial and production linkages between foreign subsidiaries as exporters on the one hand and parent firms and sister affiliates as importers on the other hand (Alfaro & Chen, 2012). We argue that when subsidiaries engage in intra-firm exports, they expect to be granted intra-firm loans with favourable terms and conditions from the corporate treasury. In this way, subsidiaries will have the necessary financial resources to focus on providing goods and services to other subsidiaries and/or parent firms. Furthermore, the cost of intra-firm loans can be passed through the transfer price of intra-firm export goods and services following the corporate policy on transfer pricing which is controlled by the parent firms. Similarly, intra-firm loans are also important financing

sources to fund the sunk and fixed costs of exporting to external customers. Hence, we predict that intra-firm loans positively affect the probability of subsidiaries becoming intra-firm and arm's length exporters (export propensity) as follows:

Hypothesis 1a: The more intra-firm loans a subsidiary has, the more likely it is to become an intra-firm exporter.

Hypothesis 1b: The more intra-firm loans a subsidiary has, the more likely it is to become an arm's length exporter.

4.1.3. Export intensity

We argue that finance also influences the share of exports (export intensity) because exporting incurs significant variable costs and increases financial resource needs. According to Manova et al. (2015), exporting aggravates exporters' working capital needs, and if variable costs are also subject to financial constraints, exporters' scale of operations would also be restricted.

Foreign subsidiaries as exporters and parent firms and sister affiliates as importers have internal linkages in finance and production (Alfaro & Chen, 2012). The term of payment for intra-firm exports is likely to open accounts where goods are shipped, and services are delivered before payment is due. Similarly, the availability of intra-firm loans enables subsidiaries to offer attractive terms of payment to their well-established external customers. The term of payment is typically an open account for arm's length exports. This arrangement of trade finance helps to increase subsidiaries' competitive position in export markets (Antràs & Foley, 2015).

However, empirical studies that provide direct evidence of the relationship between intra-firm loans and subsidiaries' intra-firm and arm's length export intensity are scarce, probably due to a lack of data. Nguyen and Almodóvar (2018) examined the relationship between trade finance availability and the overall export intensity of MNE foreign subsidiaries (they did not separately investigate intra-firm and arm's length export intensity). They found that subsidiaries used intra-firm loans and, to some extent, bank loans to boost subsidiary export intensity. They used direct measurement and provided direct evidence of the critical role of intra-firm loans as a trade finance source to support subsidiary export intensity.

Manova et al. (2015) employed transaction-level customs data from China to explore the export patterns of domestic firms, the subsidiaries of foreign MNEs, and joint ventures. Their key finding was that the exports of the subsidiaries of foreign MNEs and joint ventures were respectively 62% and 50% higher than those of domestic firms, especially in sectors that relied comparatively heavily on expensive external finance. The indirect empirical evidence implicitly suggests that the subsidiaries of foreign MNEs used their MNEs' internal capital markets to acquire intra-firm loans and thus had the necessary financial resources to pay for fixed trade costs. In contrast, domestic firms do not have such advantages. Based on our theoretical development and empirical evidence from previous studies, we predict the following:

Hypothesis 2a: Intra-firm loans are positively related to a subsidiary's intra-firm export intensity.

Hypothesis 2b: Intra-firm loans are positively related to a subsidiary's arm's length export intensity.

4.2. Bank loans and their impacts on intra-firm and arm's length export propensity and export intensity

4.2.1. Bank loans

Subsidiaries borrow from banks by pledging physical and financial assets as collaterals (Claessens & Laeven, 2003; Rajan & Zingales, 1998). However, bank loans are typically more costly than intra-firm loans due to higher information asymmetries, higher administration costs, and higher costs of contractual enforcement.

First, financial institutions that have an arm's length relationship with subsidiaries as borrowers tend to have severe information asymmetries about borrowers. Subsidiary managers are assumed to have better knowledge regarding the true conditions of their business than financial institutions. The complex nature of foreign subsidiaries precludes external capital providers from making accurate appraisals of the value, resulting in a higher cost of capital for borrowers (Hall, 2002; Himmelberg & Petersen, 1994). Moreover, the concerns on moral hazard, agency problems, and contractual and governance responses make raising capital from external financial institutions more costly (Jensen & Meckling, 1976; Myers & Majluf, 1984); for comprehensive surveys, see Harris and Raviv (1991) and Shleifer and Vishny (1997).

Second, the costs of bank loans are assumed to be higher than those of intra-firm loans because of extensive documentation and collateral requirements and the need to underwrite bank loans. In the absence and/or deficiency of reliable information about borrowers' credit, capacity, and collaterals due to weak formal institutional environments in Southeast Asia (except Singapore), such as the weak disclosure requirements of accounting and financial reporting, banks require borrowers to pay a premium to compensate for the higher risks of default (Abor, Agbloyor, & Kuipo, 2014), resulting in higher costs for borrowers.

Third, the enforcement of financial contracts depends on the strength of financial institutions (Manova et al. (2015)). When borrowers honour financial contracts, they repay lenders; otherwise, they default on the repayment of loans, and creditors seize collaterals. Manova et al. (2015, p. 576) argue that "while all firms with productivity above a certain threshold become exporters, financial frictions raise this threshold above the first best. More efficient firms generate more revenues. They can offer lenders a higher return, and they are more likely to secure the necessary funds. Credit constraints thus preclude potentially profitable firms from exporting".

4.2.2. Export propensity

We develop our theoretical perspectives on bank loans' impacts on export propensity from the perspectives of supply and demand side. From the supply side of bank loans, foreign subsidiaries may have: (i) difficulties in accessing external finance due to capital market imperfections, given that financial markets in Southeast Asia are underdeveloped (except Singapore); (ii) adverse credit conditions and limited availability of credit (Singapore may be an exception with a more liquid capital market); and (iii) high costs of borrowing (Nguyen & Rugman, 2015a). Building upon Manova et al. (2015) in the earlier section, we argue that in the context of Southeast Asia, subsidiaries may be discouraged from becoming intra-firm exporters when they must rely on bank loans.

From the demand side of bank loans, when subsidiaries plan to borrow from financial institutions in host and other foreign countries, they must consider the capital structure norms of their parent firms that follow the standards of the home country (Rugman & Collinson, 2012). The level of debt in the capital structure of the subsidiaries must not cause the target capital structure of entire firms to deviate

from the acceptable standards in the home country where the shares of their parent firms are publicly listed and traded (Rugman & Collinson, 2012).

Foreign subsidiaries' bank loans are consolidated in the parent firms' balance sheets. According to Madura (2011), any increase in foreign subsidiaries' external debt financing may lead to a more debt-intensive capital structure of the parent firms, and this affects the overall exposure to exchange rate risks, the risk premium, and the cost of capital for the parent firms. Mishra and Tannous (2010) showed that more debt also increases liquidity risks. Consequently, subsidiaries' borrowing must be controlled to align with the parent firms' corporate financing policy. Nguyen and Rugman (2015a) found that foreign subsidiaries in Southeast Asia had a very low level of bank loans in their capital structure.

When foreign subsidiaries borrow from local banks, they will likely incur a higher cost of borrowing due to limited credit availability in Southeast Asia (Nguyen & Rugman, 2015a). However, charging all the actual high local borrowing costs, among other costs, in the transfer pricing of intra-firm export goods and services to internal customers may be challenging for foreign subsidiaries because the corporate policy on transfer pricing is controlled by their parent firms (five methods for establishing transfer pricing are outlined in the OECD Guidelines (OECD, 2017)). Thus, all these factors will negatively affect the likelihood of foreign subsidiaries becoming intra-firm exporters. Hence, we predict the following:

Hypothesis 3a: The more bank loans a subsidiary has, the less likely it is to become an intra-firm exporter.

Meanwhile, the IE literature has documented that arm's length export participation requires external finance ((Manova, 2013); Minetti and Zhu (2011); Caggese and Cuñat (2013)). Paravisini, Rappoport, Schnabl and Wolfenzon (2015) matched bank- and firm-level data to construct measures for credit rationing. Their studies confirmed the adverse impact of financial constraints on arm's length export propensity. Minetti and Zhu (2011) used a survey dataset of Italian firms conducted by the Italian banking group Capitalia in 2000. A firm was considered subject to rationing if it demanded more credit than it ultimately obtains. The rationed firms' probability of exporting was 39% lower than that of non-rationed firms, and rationing reduced exports by more than 38%.

Building upon previous studies, we argue that when foreign subsidiaries participate in arm's length exports and use bank loans as external debt financing sources, they can pass through high local borrowing costs in the market-based pricing of export goods and services to external third-party international customers in foreign markets, as long as the price is agreed upon by foreign subsidiaries and their customers. In this case, we assume that the selling price of export products and services to external third-party customers is determined by foreign subsidiaries. Another assumption is that these subsidiaries compete on value on the basis of firm-specific advantages (FSAs), such as innovation, global brand names, trademarks, high quality, customisation of products and services, excellent customer service, and customer relationship management (Rugman et al., 2011) rather than price per se. They focus on delivering benefits as promised. For example, they have the necessary financial resources to finance arm's length exports and employ trade finance as a strategy to gain and retain international customers, such as offering open accounts as a term of payment for well-established long-term customers. By focusing on value as a strategy, foreign subsidiaries make demand less sensitive to price when the cost of bank loans is passed through. Thus, we propose the following hypothesis:

Hypothesis 3b: The more bank loans a subsidiary has, the more likely it is to become an arm's length exporter.

4.2.3. Export intensity

We argue that bank loans may discourage subsidiaries from becoming intra-firm exporters; however, once subsidiaries have engaged in intra-firm exports, the access and availability of bank loans enable them to meet the medium- and short-term working capital and liquidity needs to finance intra-firm export intensity. Bank loans also help subsidiaries' arm's length export intensity.

Previous studies in the IE literature have demonstrated a significant relationship between finance and export intensity. Amiti and Weinstein (2011) indicated that exports were more sensitive to financial frictions than domestic sales because a larger proportion of exports was based on the term of payment of open accounts. The extant IE literature also confirms that export intensity declines more sharply in sectors with greater financial dependence (Feenstra, Li, & Yu, 2014; Manova et al., 2015).

Building upon our theoretical development and empirical evidence from previous studies, we expect that bank loans play a vital role in facilitating a subsidiary's intra-firm and arm's length export intensity. We propose the following hypotheses:

Hypothesis 4a: Bank loans are positively related to a subsidiary's intra-firm export intensity.

Hypothesis 4b: Bank loans are positively related to a subsidiary's arm's length export intensity.

5. Research method

5.1. Research context and subsidiary-level primary data

To test our hypotheses, we combined survey data on foreign subsidiaries of the largest British MNEs operating in Southeast Asian countries and country-level data from multiple public sources for three reasons. First, the research context of the Association of Southeast Asian Nations (ASEAN) is a relevant setting in the IB research. ASEAN member countries have implemented friendly FDI policies, trade liberalisation, and regional economic integration and cooperation that promote and enhance international competitiveness in the world economy. ASEAN has free trade agreements with large trading partners such as Japan, Korea, China, India, Australia, and New Zealand (ASEAN+6). The bloc is one of the most open economic regions in the world, with the total exports of goods valued at more than US\$1.4 trillion, accounting for 45% of the total ASEAN GDP (ASEAN, 2019). ASEAN also accounts for 7% of the world's global exports of goods (Statista, 2020). ASEAN hosts numerous foreign subsidiaries of MNEs, which are highly integrated into the world's global value chains. The international trade activities of foreign subsidiaries ultimately contribute to the balance of trade among host ASEAN countries.

Second, British MNEs are among the world's largest foreign direct investors in Southeast Asia. They have been conducting business in Asia since 1860 (Davenport-Hines & Jones, 2003) and have contributed to the economic and social development of host ASEAN countries (Nguyen, 2013).

Third, the Southeast Asia context enriches the empirical research setting on intra-firm and arm's length exports. Prior research used data collected by the Bureau of Economic Analysis on the foreign subsidiaries of U.S. MNEs (Ramondo, Rappoport, & Ruhl, 2016), data on affiliated establishments within the US (Atalay, Hortaçsu, & Syverson, 2014), foreign subsidiaries in Eastern Europe whose

parent firms are based in Austria and Germany (Marin, Rousova, & Verdier, 2013), and overseas subsidiaries in sub-Saharan Africa (Blanas, Seric, & Viegelaahn, 2017).

We used multiple data sources to manually construct a list of the ASEAN subsidiaries of British MNEs. First, we utilised the OneSource Global Business Browse database (acquired by Dun & Bradstreet in 2017) to identify the 500 largest British parent firms on the London Stock Exchange. These firms had minimum revenues of US\$180 million. From this list of parent firms, we used the database to search for subsidiaries in Southeast Asian countries. We also examined the exhibits of foreign subsidiaries in the parent firms' annual reports to crosscheck for assurance of data integrity. However, we found that only one-fifth of the 500 largest British firms had operations in Southeast Asia. We searched for financial information of the subsidiaries in the database; however, the database provided only basic information (i.e., subsidiary name; address; and a basic description of business activities, industry, and year of incorporation). Financial data were unavailable in the database. As all of these subsidiaries are private and fully owned by their parent firms, they are not required to disclose financial information to the public. Thus, we used the survey method to collect information.

Second, we consulted the British, American, and European Chamber of Commerce websites in Southeast Asian countries to build a complete list of the ASEAN subsidiaries of British MNEs. Finally, we compiled a list of 504 subsidiaries in Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. No subsidiaries were found in Cambodia and Laos, and few were identified in Brunei Darussalam. Thus, we directed our time and efforts towards contacting subsidiaries in the aforementioned six countries.

We designed our 40-question survey instrument specifically for the Southeast Asian research context, developing our questions based on theories in international business, finance, and international accounting standards (e.g., IFRS Conceptual Framework, IFRS8–*Operating Segments*, and IAS24–*Related Party Disclosures*). The aim of the questions was to collect information on the characteristics of subsidiaries, investment capital, financing sources, perceptions of subsidiary managers on subsidiary-level competitive advantages, business relationships, autonomy, host-country environments, subsidiary sales strategy (domestic sales and exports, including the geographic segments of exports and intra-firm

and arm's length exports), perceived concerns of foreign exchange (FX) risks and FX management techniques, and financial and non-financial performance evaluation (actual versus budget).

We conducted a pilot test with five experienced subsidiary managers. This procedure helped us verify the clarity and appropriateness of the questions. During this process, we found that managers would not be willing to provide their subsidiaries' most up-to-date information, because of the commercially sensitive and confidential nature of the information we planned to collect. Instead, they were willing to provide historical data for the period 2003–2007. We conducted our survey between 2010 and 2011.

We e-mailed managers of these 504 subsidiaries and spent eight months sending several rounds of invitations to subsidiary managers to encourage them to participate in the survey. We received 101 usable responses; the response rate of 20% was relatively high considering a previously reported low response rate for surveys in Southeast Asia (Harzing, 2000). The questionnaires were answered by the subsidiary-level top management team, who had an average of eight years of work experience in Southeast Asia at the time of their participation in the survey.

The profiles of the participating subsidiaries were diverse. Subsidiaries in Singapore accounted for 26% of the sample, Indonesia 18%, Vietnam 18%, Thailand 15%, Malaysia 13%, and the Philippines 10%. These subsidiaries were large, with an average invested capital of US\$78 million. At the time of the survey, the subsidiaries were in operation for 26 years on average. Subsidiaries from the manufacturing sector, including energy, petroleum, and refining, represented 44% of the sample, and those from the service sector constituted 56% of the sample. Market-seeking was found to be the primary FDI motive for these subsidiaries.

5.2. Country-level secondary data from public sources

We employed the Economic Freedom of the World Index by the Fraser Institute, Canada. The data used in the index are sourced from more than 70 international organisations around the world. The index measures the consistency of the nations' policies and institutions of economic freedom. It has been widely used in the literature (for a comprehensive literature review, see Hall and Lawson (2014)).

5.3. Sample size

According to Peduzzi, Concato, Feinstein and Holford (1995), there is a rule of thumb that establishes a minimum number of 10 observations per predictor. However, Vittinghoff and McCulloch (2007) explain that 10 observations constitute a conservative figure. Furthermore, they assert that statistical problems are quite common with two to four observations per variable, but uncommon with five to nine observations per variable, and the results remain similar with 10–16 observations per variable. They conclude that five to nine observations per variable delimit an appropriate sample size. Hair, Anderson, Babin and Black (2010) also support a ratio of observations to independent/control variables that do not fall below five. As we have 8.4 observations per variable,¹ we can rely on the statistically significant relationships presented by our results and consider that our sample size of 101 foreign subsidiaries is sufficient for our empirical tests.

We also hope that our data provide information on the export behaviours of the Southeast Asian subsidiaries of British MNEs for the time period of the study. This approach is consistent with previous studies on exports, using datasets for various periods of time. For example, Feinberg and Keane (2009) used a secondary dataset for intra-firm and arm's length US–Canada trade from 1984 to 1995. Additionally, Manova and Yu (2016) employed two proprietary datasets on the activities of Chinese firms in 2005. They offer useful insights into the phenomenon of tariff effects on MNE decisions to engage in intra-firm and arm's length trade and firms' export, especially processing versus ordinary trade, and financial frictions.

5.4. Non-response bias

We conducted two types of non-response bias tests. First, the results of a *t*-test showed no significant differences in sales, assets, and employees between the parent firms of the participating and non-participating subsidiaries at a 5% significance level. Second, the results of a *t*-test also confirmed that no significant differences were found in the characteristics of early and late respondents because the latter represented the former (Armstrong & Overton, 1977).

5.5. Common method variance

Our variables were collected from the same respondents; thus, we acknowledge that a common method bias (CMB) might occur (Chang, van Witteloostuijn, & Eden, 2010). In this case, data would show false correlations because respondents would present a systematic variance shared among the variables due to a tendency to deliver consistent responses to survey questions (Jakobsen & Jensen, 2015). To reduce the likelihood of this bias, we followed the procedures recommended by Chang et al. (2010); Podsakoff, MacKenzie, Lee and Podsakoff (2003); and Tehseen, Ramayah and Sajilan (2017), which previous studies have applied in collecting data from subsidiary managers using the survey method (Wei & Nguyen, 2019). In the ex-ante research design, we ensured the protection of the respondents' anonymity, and we provided explanations of ambiguous terminology. Furthermore, Podsakoff et al. (2003) suggest that surveys must include different scale endpoints and various formats to avoid respondents answers suffering from consistent bias. Following this recommendation, we required answers in percentages and on Likert five-point and seven-point scales. Furthermore, some of our variables, including *SoundMoney_index*, *Parent_size*, and *Sector_effects*, were collected from objective and secondary data sources.

In the ex-post research stage, we assessed whether CMB was a threat to our data. The relevant variables “subsidiary age” and “relatedness to parent firm activities” were in line with the “‘objective’ background and work history” variables described by Ng and Feldman (2012, p. 1039), where respondents were asked regarding specific and exact information about their subsidiaries. We compared this information with the data from the OneSource database; these data were not biased. Finally, we ran post-hoc statistical procedures to detect the presence of this bias. We applied Harman’s one-factor test and confirmatory factor analysis. Our analyses showed that no single factor arose or accounted for the majority of covariance (below 19% of the variance); hence, we could not observe any pervasive issue in our results. Accordingly, although we could not entirely dismiss CMB, there were no valid reasons to suspect that our results were affected by this bias.

6. Variables and measurements

We present a summary of our variables in a table in Appendix 1.

6.1. Dependent variables

To develop the questions for our survey and build our set of dependent variables about subsidiaries' intra-firm and arm's length exports, we applied international accounting standards such as *IAS24 Related Party Disclosures* (IAS24) and *IFRS8 Operating Segment*. We asked the managers of foreign subsidiaries to report the approximate percentages of the aggregate value of intra-firm exports and arm's length exports over the aggregate value of total sales of their subsidiaries from 2003 to 2007.² With these data, we generated four dependent variables.

6.1.1. Regarding export propensity

Intra-firm export propensity (*IntraFirm_Export_prop*) is captured by a binary variable equal to 1 for subsidiaries that report any level of intra-firm exports, and 0 otherwise. Similarly, arm's length export propensity (*ArmLength_Export_prop*) is a binary variable equal to 1 for subsidiaries that report any level of arm's length exports, and 0 otherwise. This measurement is aligned with previous studies in the literature on IB and IE (de Oliveira, Nguyen, Liesch, Verreyne, & Indulska, 2021).

6.1.2. Regarding export intensity

Intra-firm export intensity (*IntraFirm_Export_int*) and arm's length export intensity (*ArmLength_Export_int*) are calculated by dividing the percentage of exports reported by managers by 100 (therefore, it ranges from 0 to 1) to neutralise variance over time. This measurement is aligned with previous studies in the literature on IB and IE (Almodóvar & Rugman, 2014, 2015).

6.2. Independent variables

6.2.1. Intra-firm loans (IntraFirm_loans) and bank loans (Bank_loans) as sources of trade finance

We applied the IFRS conceptual framework and the international accounting standard *IAS24 Related Party Disclosures* to collect data on all the major financing sources of the subsidiaries' capital. This method was used in previous studies (Nguyen & Almodóvar, 2018; Nguyen & Rugman, 2015a). Specifically, we asked the managers of subsidiaries to report the percentages of intra-firm loans (*IntraFirm_loans*) and bank loans (*Bank_loans*) over total funding. They were also asked to report the percentages of other funding sources, including retained earnings and parent firms' investment capital

over total funding. To a certain extent, this approach of measurement is aligned with previous studies analysing firm-level data in the IE literature. In these studies, a wide range of indicators was used for assessing the degree of external financial dependence, relying on financial and accounting ratios to proxy for the degree of firms' financial vulnerability or financial health (Berman & Héricourt, 2010; Greenaway, Guariglia, & Kneller, 2007).

6.3. Control variables

6.3.1. Host-country business environment (SoundMoney_index)

The literature documents that host-country business environmental factors affect firm-level exports. We employed the average Economic Freedom of the World Index, specifically the “access to sound money” sub-index for the period from 2003 to 2007 (for a detailed explanation, see The_Fraser_Institute (2015)). Furthermore, this variable accounts for the heterogeneity of the host countries.

6.3.2. Subsidiary's perceived concerns about foreign exchange risks (FX_concerns)

Foreign exchange risk is a relevant concern for exporters. Thus, we asked subsidiary managers whether they were concerned about foreign exchange risks when they exported. We used a dummy variable.

6.3.3. Subsidiary's use of foreign exchange risk-management techniques (FX_management)

We asked subsidiary managers whether they implemented any measures to manage foreign exchange risks. We used a dummy variable.

6.3.4. Mode of ownership (Ownership_type)

According to a recent review of the past 50 years of research on FDI by MNEs, Paul and Feliciano-Cestero (2021) showed the relevance of analysing the ownership mode related to a foreign subsidiary (i.e., wholly-owned versus joint ventures). More specifically, when a foreign firm has a joint venture with a local company, it aims to access the local firm's complementary resources and knowledge of the local market and thus may focus more on domestic market sales (implied purely horizontal FDI). When the parent firm has established a wholly owned foreign subsidiary, the subsidiary can engage in

horizontal FDI, vertical FDI, and complex FDI depending on the subsidiary role(s) along the value chain. Therefore, we included a dummy variable (Lee, Xiao, & Choi, 2021) that takes the value of 0 when the subsidiary is a joint venture, and 1 when it is a wholly owned subsidiary.

6.3.5. Relatedness to parent firm's activities (Relatedness_parent)

Capturing the horizontal and vertical nature of the Southeast Asian subsidiaries of British MNEs is highly relevant because this type of FDI could affect the exporting activities of subsidiaries. On the one hand, horizontal FDI is the replication of parent-firm activities in multiple foreign locations; it can be captured by the variable of relatedness to the parent-firm activities (both upstream and downstream activities). On the other hand, vertical FDI is the parent firm's slicing value chain activities among the network of foreign subsidiaries to take advantage of the endowment factors of different countries and its organisation of global production networks. The relatedness to the parent-firm variable captures the upstream activities (innovation, sourcing, and production) rather than the downstream activities of sales. Thus, we controlled the relatedness between the main activity of the parent company and the main activity of the subsidiary. If the subsidiary were a horizontal or a vertical FDI, its main activity would be related to the parent firm's activity (Buigues & Lacoste, 2016; Markusen & Venables, 1998). In contrast, if the subsidiary were a part of the unrelated diversification strategy of the parent firm's FDI activities, the subsidiary would perform unrelated activities (Oba & Onuoha, 2013). We followed Slangen and Hennart (2008) to use a dummy variable, which had a value of 0 if the subsidiary performed related activities, and 1 otherwise. The information provided by subsidiary managers was double-checked with the information in the OneSource database.

6.3.6. Subsidiary autonomy (Subsidiary_autonomy)

Subsidiary autonomy is defined as the extent to which subsidiary managers can make decisions without the involvement of headquarters (Kawai & Strange, 2014) (for a review, see Cavanagh, Freeman, Kalfadellis and Herbert (2017); Young and Tavares (2004)). Previous studies have suggested that parent firms concede less autonomy to subsidiaries that focus on internal transactions within their internal network. In contrast, subsidiaries that are more focused on responding to the specific needs of the host

market are more autonomous, and this approach boosts their export activity outside the internal networks (Gammelgaard, McDonald, Stephan, Tüselmann, & Dörrenbächer, 2012). Therefore, we expect a positive impact of subsidiary autonomy on arm's length exports, but a negative impact on intra-firm exports. We followed the five-point Likert scale construct used in the studies of Birkinshaw and Hood (1998), Roth and Morrison (1992), and Slangen and Hennart (2008). Subsidiary managers were asked to self-assess their subsidiaries' degree of freedom to make decisions without the headquarters' interference.

6.3.7. Subsidiary age (Subsidiary_age)

Subsidiary age may affect subsidiary exports. The information provided by subsidiary managers was double-checked with the information in the OneSource database. This variable was measured by the number of years the subsidiary had, at the time of the survey, been in operation since its incorporation. It was coded on a seven-point scale and used for constructing intervals.

6.3.8. Subsidiary size (Subsidiary_size)

Subsidiary size may also impact subsidiary exports (Nguyen & Rugman, 2015a). The number of subsidiary employees was utilised to measure this variable, which was coded and used for constructing intervals using a seven-point categorical variable.

6.3.9. Parent firm size (Parent_size)

Parent-firm size implies the economies of scale and scope, and it may affect subsidiary-level intra-firm and arm's length exports. This variable was measured by the number of employees of the parent firm. Data were extracted from the OneSource database and coded as a seven-point categorical variable.

6.3.10. Sector (Sector_effects)

Different sectors tend to have different export dynamics. According to Makino, Isobe and Chan (2004) and Hansen and Gwozdz (2015), disentangling industry effects and country effects is challenging

because of the variation of the characteristics of sectors between countries. Thus, we used a dummy variable, where 1 = manufacturing sector and 0 = service sector.

7. Economic models

7.1. Empirical analysis

We analysed the intra-firm and arm's length export propensity and intensity of MNE foreign subsidiaries. The variable of exports usually presents many zeros, and this case was also true here. This might be an indication that export behaviour is better understood when analysing the complete sample of exporters and non-exporters because some non-exporters deliberately make the strategic decision not to export (Gkypali, Love, & Roper, 2021; Haddoud, Onjewu, Nowiński, & Jones, 2021). For such a censored dependent variable, we required a technique intended to statistically analyse two different considerations that we discuss in our hypotheses, namely (a) export propensity and (b) export intensity. To fit this particular type of mixture model that allows zeros and non-zeros to be produced by different densities, we used the extension of the Tobit model developed by Cragg (1971), namely the **two-part model**³ (TPM) (Egger & Kesina, 2013; Falk & Figueira de Lemos, 2019). The first part of our TPM analyses the discrete decision to serve any foreign market by exports with a **probit model** that is specified as $Prob(Exports_i = 1) = \Phi(x'_i\beta + \varepsilon_i)$, where $Exports_i$ is a dummy variable that takes the value of 1 if the subsidiary exports, and is 0 otherwise; x'_i denotes the explanatory variables (intra-firm loans, bank loans, and control variables); β is the vector of unknown parameters; Φ signifies the standard normal cumulative distribution function; and ε_i is the error term.

In addition to the probit model, the second part of the TPM is conditional on the positive values of $Exports_i$; hence, it only referred to subsidiaries with non-zero export shares, and the determinants of intra-firm exports and arm's length exports were estimated for a subset of the total sample. As the export share was bounded between values close to 0 and 1, the **generalised linear model** (GLM) link we used is $E((Exports_i/Y_i) : Exports > 0, X) = g^{-1}(X\gamma)$, where g^{-1} is the link function. The former model was applied in line with of Papke and Wooldridge (1996) by using a GLM with a binomial distribution

for our fractional outcomes. This approach has been applied to this topic in previous studies (Brache & Felzensztein, 2019; Falk & Figueira de Lemos, 2019; Lejárraga & Oberhofer, 2015).

TPMs are usually specified using the same set of independent and control variables in both parts (Belotti et al., 2015). The nature of our research prompted us to follow this approach. Additionally, a major strength of TPMs has recently been documented. According to the econometrics experts at Stata, these econometric models are robust to endogenous selection among the parts because estimators are consistent even when endogeneity exists (Drukker, 2017b, 2018), and this robustness also applies to our fractional outcomes (Drukker, 2017a).

The described statistical specification assumes that the subsidiaries' intra-firm and arm's length export decisions are separately made. Nevertheless, as our dependent variables depend on the same list of independent and control variables, we tested whether intra-firm and arm's length export decisions were closely linked.

Regarding the potential correlation of our export propensity variables, we modified the previous TPMs by replacing the two separated probit models by a bivariate probit regression. As the correlation coefficient between the residuals ("rho") presented a p -value = 0.0000, it was statistically significantly different from zero. Thus, we rejected that our dependent (propensity) variables were independent, requiring our two probit models to be simultaneously estimated.⁴ However, regarding the potential correlation of our export intensity variables, we ran a Breusch–Pagan test of independence (Breusch & Pagan, 1980). The correlation matrix of residuals presented a correlation of -0.07 between intra-firm export intensity and arm's length export intensity, and a Breusch–Pagan test of independence had a p -value of 0.4771. However, we could not reject that our dependent (export intensity) variables were independent; hence, we should separately maintain our GLM models. In the light of previous results, we introduced these modifications to our TPMs.

Furthermore, we acknowledge that the host country matters by analysing subsidiaries located in different Southeast Asian countries whose main characteristics differ from each other. Thus, subsidiaries in the same host country might share unobservable characteristics that would cause our disturbances to be correlated. As we could not ensure the independence of these observations (Bertrand, Duflo, & Mullainathan, 2004; Kezdi, 2004; Moulton, 1986, 1990), we modified our models to allow

subsidiaries to be independent across the clusters (countries). Thus, we addressed the potential issue derived from error terms correlated within groups or clusters. We also used robust standard errors that account for any possible heteroskedasticity and the lack of normality in the error terms (Greene, 2002). We evaluated whether our models suffered from functional form misspecification. To check the adequacy of the estimated models, we performed Ramsey RESET tests (Ramsey, 1969; Sapra, 2005) and link tests (Pregibon, 1980; Tukey, 1949). These tests used a predicted value squared as an extra predictor; if our model was correctly specified, then this squared predictor should not be statistically significant (Stata, 2015). After each part of our TPM (probit plus GLM models), we performed these tests, and they all satisfied the non-significance condition with p -values higher than 0.3. Thus, no evidence of any misspecification bias emerged, which indicates that we did not have to modify our specification with nonlinear terms, log-linear transformations, or interactions.

7.2. Endogeneity concerns

According to Hill, Johnson, Greco, O'Boyle and Walter (2021), simultaneous causality and omitted variables may cause endogeneity concerns. In this regard, from the theoretical perspective of the IE literature, the direction of causality is from finance (external and/or internal debt) to exports. However, there might be a counter-argument that export participation facilitates access to financial capital. Thus, our dependent and independent variables could be simultaneously determined and, if so, this procedure would introduce a simultaneous causality problem. Moreover, when building our econometric models, we followed previous studies to include a full set of relevant control variables to avoid any bias derived from the omitted variables. More specifically, we included 10 control variables. This number of control variables is well above the standard in micro-organisational research that uses 4.48 control variables on average (Atinc, Simmering, & Kroll, 2012, p. 67). However, we acknowledge the absence of a statistical test that identifies the specific number of control variables that should be introduced to avoid the omitted variable bias. Furthermore, because of our sample size, if we introduce more variables, we might suffer from an over-specification bias. To mitigate or eliminate the potential adverse effects of endogeneity that is mainly caused by simultaneous equation bias and omitted variable bias (Larcker & Rusticus, 2010; Semadeni, Withers, & Trevis Certo, 2014), we applied two different approaches. Regarding the

simultaneous equation bias, we tested whether our results were biased for endogeneity by adopting the most supported approach that upholds the use of instrumental variables (Bascle, 2008; Larcker & Rusticus, 2010; Reeb, Sakakibara, & Mahmood, 2012; Semadeni et al., 2014). With regard to the omitted variable bias, we applied a propensity score approach to mitigate any potential bias derived from the omitted variables (Reeb et al., 2012). If our models were correctly defined, then these modifications should not alter the results. Based on our examination of the results, all models remained robust.

7.2.1. Concerns about simultaneous equation bias: instrumental variables

We implemented an instrumental variable approach to detect whether our models suffered from endogeneity bias (Angrist & Krueger, 2001; Chenhall & Moers, 2007; Manole & Spatareanu, 2010). We used *CreditMarket_index* as an instrumental variable (IV) for *Bank_loans* (Kroszner, Laeven, & Klingebiel, 2007; Nguyen & Almodóvar, 2018; Rajan & Zingales, 1998). *CreditMarket_index* was sourced from the Economic Freedom of the World Index by the Fraser Institute, Canada (Gwartney, Lawson, Hall, Chauffour, & Stroup, 2011). According to the appendix of explanatory notes and data sources, the credit market regulation sub-index is a composite based on (a) ownership of banks, (b) interest rate controls and negative real interest rates, and (c) private sector credit.

The *CreditMarket_index* satisfies the conditions of relevance and exogeneity (Nguyen & Almodóvar, 2018; Reeb et al., 2012; Roberts & Whited, 2011; Wooldridge, 2009). In the IE literature, the ratio of country-level private credit to GDP is frequently used (Kroszner et al., 2007; Rajan & Zingales, 1998) because it measures the availability of credit finance. Furthermore, we found that *CreditMarket_index* was significantly and positively correlated with *Bank_loans* (p -value = 0.000), which indicated instrumental variable acceptability. Additionally, to double-check if *CreditMarket_index* was sufficiently correlated with *Bank_loans*, we had to develop a reduced form equation of *Bank_loans* with the rest of the variables. The estimated coefficient for *CreditMarket_index* would then be significant. When performing OLS, the impact of *CreditMarket_index* on *Bank_loans* was significant and positive (p -value = 0.005); moreover, when a Tobit model was performed to fit the regression better, the results were the same (p -value = 0.000).

We assumed that *CreditMarket_index* was an appropriate instrumental variable and performed several Wald tests of exogeneity, where the null hypothesis stated that all the explanatory variables were exogenous. As all the *p*-values were higher than 0.4, we did not find any evidence to reject the null; therefore, our regressors were exogenous and our estimations unbiased.⁵ These results were in line with a previous study on this topic (Nguyen & Almodóvar, 2018).

7.2.2. Concerns about omitted variable bias: propensity score approach

According to the instrumental variable approach, our results were not biased by endogeneity. To assure the accuracy of our analysis, we performed an additional test by using the propensity score approach to detect endogeneity. We acknowledge that a necessary condition for obtaining unbiased estimates is the inclusion of a complete set of relevant variables. Thus, we replicated all our models in a more demanding manner to mitigate any endogeneity issues attributed to the omitted variables.

To alleviate this concern, we adopted a propensity score approach in which propensity scores are defined as the conditional likelihood of assignment to a specific group (of firms) that receives treatment, or propensity towards exposure to treatment, given a vector of observed covariates (Rosenbaum & Rubin, 1983). Propensity scores can be used in four different ways: (a) matching, (b) stratification, (c) covariate adjustment, and (d) inverse probability of treatment weighting; for a detailed explanation, see Austin (2011). The first three alternatives require a larger sample; however, the fourth option, namely propensity score weighting, does not (Guo & Fraser, 2014). Moreover, Freedman and Berk (2008) assert that weighting regressions by propensity scores is intended to correct omitted variable bias. Consequently, we reformulated our TPM into a propensity score-weighted TPM.

In most of the literature, the propensity scores for outcomes are calculated with one binary treatment variable (Guadalupe, Kuzmina, & Thomas, 2012); however, we had two fractional treatment indicators (i.e., intra-firm loans and bank loans). Therefore, we had to implement a generalised propensity score approach with multiple treatments. Following Dai, Sun and Liu (2018), to apply multiple treatments, we had to reduce our fractional variable *IntraFirm_loans* to two values (a low⁶ level of *IntraFirm_loans* and a high level of *IntraFirm_loans*); we also had to reduce our second fractional treatment *Bank_loans* to two values (low levels of *Bank_loans* and high levels of *Bank_loans*). We then defined four mutually

exclusive states: (low, low), which represents low levels of *IntraFirm_loans* and low levels of *Bank_loans*; (low, high), which represents firms with a high level of *Bank_loans* only; (high, low), which represents firms with a high level of *IntraFirm_loans* only; and (high, high) which represents firms with high levels of *Bank_loans* and *IntraFirm_loans*. Table 1 is a cross-classified table of the number of subsidiaries by these four alternatives.

Insert_here_Table_1

According to Imbens (2000) and Guo and Fraser (2014), we had to follow three steps. First, we estimated the generalised propensity scores by predicting the probability of receiving a certain “dose” of treatment (i.e., the likelihood of belonging to each group). Here, a multinomial logit model had to be used. Second, we calculated the inverse of these generalised propensity scores and subsequently employed them as sample weights. Finally, we reweighed firms in the equations of the TPMs. As examined in Section 8, the results remain robust across the models. Therefore, we accepted the validity and accuracy of our results.

8. Results

8.1. Descriptive statistics

We found that arm’s length exports account for 17% of total sales, and intra-firm exports account for 9% of total sales. The finding suggests that subsidiary exports were directed towards third-party external customers rather than intra-firm internal customers because arm’s length exports constituted a larger share.

The types of exports (intra-firm and arm’s length exports) and implied types of FDI (horizontal, vertical, and complex FDI) are reported in Table 2. We found that out of 101 foreign subsidiaries in the sample, the number of subsidiaries engaging in intra-firm exports only (implied purely vertical FDI) accounted for 17%. Moreover, the number of subsidiaries involved in arm’s length exports only (implied purely horizontal FDI) accounted for 18%, while the number of subsidiaries engaging in both intra-firm and arm’s length (implied complex FDI) accounted for 24%. The rest of the non-exporting subsidiaries (implied horizontal FDI) accounted for 42%. Our finding is similar to that of Corcos et al. (2013),

reporting that intra-firm and arm's length trade coexist in almost all industries and combinations of firms, products, and destination countries.

Insert_here_Table_2

Table 3 presents detailed information about *IntraFirm_loans* and *Bank_loans*, which could be used as trade finance sources to support intra-firm and arm's length exports. *IntraFirm_loans* constituted 8% of the total financing sources. *Bank_loans* comprised 7%, of which borrowing from local banks in the host countries represented 4%, borrowing from venture capital in the host countries 1%, and borrowing from international banks in third countries 2%. *IntraFirm_loans* and *Bank_loans* comprise 15% of the total funding for these subsidiaries.

Our findings highlight the important role of MNE internal capital markets and the provision of intra-firm loans from parent firms and/or sister subsidiaries. This finding is consistent with empirical evidence in previous studies (Desai et al., 2004). We found that these subsidiaries obtained bank loans from multiple countries, suggesting that they may face troubles in accessing bank loans in host countries. The cost of external debt financing in host countries must be high, likely due to limited credit availability (Desai et al., 2004). Thus, subsidiaries raised capital in other third countries from the perspective of the supply side of bank loans.

The ratio of bank loans over the total funding of the subsidiaries in our sample is low by any standard of capital structure norms from the perspective of the demand side of bank loans. Our finding is consistent with Madura (2011), who argues that the level of external borrowing of subsidiaries affects the gearing, the overall exposure to exchange rate risks, and consequently influences the risk premium and the cost of capital of parent firms. Mishra and Tannous (2010) found that higher debt increases the liquidity risks of a firm. Thus, our findings suggest that these subsidiaries adopt a highly disciplined financial management approach (Nguyen & Rugman, 2015a).

Insert_here_Table_3

The means, standard deviations, and Pearson's correlations of independent and control variables are reported in Table 4. We used different tests to evaluate the multicollinearity to ensure that our study follows the assumption that independent, or control variables, are not perfectly multicollinear. First, Hair et al. (2010) suggest that the correlation among independent or control variables should be below

0.5. Pearson's pair-wise correlations were all lower than the threshold of 0.5, except for the correlation between *IntraFirm_loans* and *Bank_loans*. Second, we used the variance inflation factor, which is an index that measures how much variance of an estimated coefficient is increased because of multicollinearity. The individual values were all below 1.45, which is well under the different recommended cut-off points of below 20 (Greene, 2003; Griffiths, Judge, Hill, Lütkepohl, & Lee, 1985), below 10 (Wooldridge, 2014), below 5 (Rogerson, 2001), and even below 3 (Read & Read, 2004). These diagnostic tests indicated the lack of a serious threat of multicollinearity (Montgomery, Peck, & Vining, 2015; Neter, Wasserman, & Kutner, 1989). Furthermore, according to a recent editorial from the *Journal of International Business Studies*, the higher correlation between *IntraFirm_loans* and *Bank_loans* (-0.57) inflates standard errors, which would only make our results more conservative (Lindner, Puck, & Verbeke, 2019).

Insert_here_Table_4

8.2. Empirical analysis: hypothesis testing

The results from our models are presented in Table 5. Models I and II used robust TPM regressions with cluster effects by country, whereas Models III and IV applied propensity score-weighted TPM regressions (also robust and with cluster effects by country). Models I and III only introduced the control variables, whereas Models II and IV presented the results for the full models. We used Wald tests to check the goodness of fit. The *p*-values of our models were all lower than 0.001; therefore, we can assume that at least one regressor is statistically different from zero. We subsequently tested whether Models I and III were nested on Models II and IV, respectively. Our *p*-values were all lower than 0.001, indicating that considering the full models significantly increased the fit of the models. Finally, we observed that signs and significance levels remained stable across the models, and this robustness assured the validity of our analysis. We focused on Models II and IV to discuss our results and hypotheses.

Insert_here_Table_5

First, Table 5 lists TPM and propensity score-weighted TPM regressions, where the dependent variables were intra-firm export propensity and intensity. Thus, *IntraFirm_loans* had no significant relationship with intra-firm export propensity or with export intensity, because they offered large *p*-values (Model

II: p -values = 0.717 and 0.068; Model IV: p -values = 0.453 and 0.088,⁷ respectively). The findings did not support for Hypothesis 1a and Hypothesis 2a. However, *Bank_loans* presented a different picture. The first part of our TPMs used bivariate probit models to study how our variables affected the predicted probability of becoming an intra-firm exporter (value 1) over remaining a non-intra-firm exporter (value 0). *Bank_loans* were negative and significant (Model II: $\beta = -0.146$; p -value = 0.000; Model IV: $\beta = -0.169$; p -value = 0.001). This robust result indicated that, ceteris paribus, an increase in the level of external debt decreased the predicted probability of becoming an intra-firm exporter. The actual magnitude of this effect cannot be directly interpreted from the coefficient β . Thus, we enriched this information with the average marginal effect. The marginal effects for continuous or fractional variables measured the instantaneous rate of change in the probability of observing a value of “one” (dependent variable = 1); therefore, it provided an approximation of the change in probability when *Bank_loans* increased by a small amount (all the other predictors were adjusted to use their population-averaged predicted values) (Royston, 2013; Williams, 2012, 2018a, 2018b). The approximation of the expected change in the probability of being an intra-firm exporter was, according to Probit II (Bivariate), -0.055 (p -value = 0.000) and, according to Probit IV (Bivariate), -0.061 (p -value = 0.001). Both magnitudes and significance levels are almost equal; this fact reinforces the robustness of our results. Therefore, we found support for Hypothesis 3a.

The second part of the TPM tested the impact on intra-firm export intensity; hence, we performed a truncated GLM for subsidiaries that were intra-firm exporters. *Bank_loans* were also significant and positive (Model II: $\beta = 0.104$; p -value = 0.015 and Model IV: $\beta = 0.164$; p -value = 0.017), and the average marginal effects of *Bank_loans* were, according to GLM II, 2.635 (p -value = 0.005), and according to GLM IV, 6.113 (p -value = 0.012). This behaviour fully supported Hypothesis 4a.

Taken together, the results indicated that *Bank_loans* had a negative impact on a subsidiary becoming an intra-firm exporter; however, once a firm engaged in intra-firm exports, the more external financing they received, the higher the level of intra-firm exports they achieved (Hypotheses 3a and 4a). In summary, Hypotheses 1a and 2a were not supported by any model. Nonetheless, *Bank_loans* behaved according to our theoretical development. Thus, obtaining more loans from external financial institutions discouraged subsidiaries from becoming intra-firm exporters. However, once subsidiaries

embarked on intra-firm export activities, obtaining more external financial resources positively affected their export intensity, providing empirical evidence to support Hypotheses 3a and 4a.

Among the control variables, we observed a significant and negative impact of *FX_concerns* on intra-firm exports, although mostly when analysing the impact of subsidiaries' concerns with foreign exchange risk on the likelihood of becoming an intra-firm exporter. *FX_management* and *SoundMoney_index* behaviours were robust along with models, and they exerted a positive and significant impact. Furthermore, in an attempt to alleviate any concerns about the FDI motivations, we must focus on (a) ownership type, (b) relatedness to the parent firm activities, and (c) subsidiary autonomy. *Ownership_type* was not significant in any model, but the other two control variables behaved as expected and “complemented” each other. Regarding *Relatedness_parent*, we observed a negative impact, suggesting that subsidiaries with unrelated activities from those of the parent company experienced a decrease in their intra-firm exports. This inference makes sense because the main objective of such subsidiaries would be to diversify risks by supplying foreign markets rather than expanding the commitment to the parent's main business. This is in line with the negative impact of *Subsidiary_autonomy* on intra-firm exports because subsidiaries with higher levels of autonomy were less oriented towards becoming intra-firm exporters. This result is aligned with Gammelgaard et al. (2012), who did not find any support for a positive impact of subsidiary autonomy on intra-organizational network relationships, along with Harzing (1999), who found that MNEs conceded less autonomy to output-dependent subsidiaries. Furthermore, *Sector_effects* were significant, suggesting that manufacturing subsidiaries (versus service subsidiaries) tend to have a significant positive relationship with intra-firm exports. The rest of the control variables had no significant impact on the dependent variable.

Table 6 replicates the same structure as before, but the dependent variables are *ArmLength_Export_prop* and *ArmLength_Export_int*. We acknowledge that our models exhibited a better fit than an empty model because our Wald tests were all significant (p -values < 0.000). Models I and III were once again nested on Models II and IV, respectively. Therefore, we focused on Models II and IV to examine our results and hypotheses.

Insert_here_Table_6

Regarding arm's length export propensity as the dependent variable, our TPMs displayed bivariate probit models, which supported a positive and significant impact of *IntraFirm_loans* on a subsidiary becoming an arm's length exporter (Model II: $\beta = 0.211$; p -value = 0.000 and Model IV: $\beta = 0.169$; p -value = 0.000). Related average marginal effects also supported this positive and significant behaviour (Model II: $dy/dx = 0.084$; p -value = 0.000; Model IV: $dy/dx = 0.063$; p -value = 0.000). This robust behaviour fully supported Hypothesis 1b. With regard to the truncated model, *IntraFirm_loans* were also significant and positive (Model II: $\beta = 0.094$; p -value = 0.006 and Model IV: $\beta = 0.100$; p -value = 0.010) with positive and significant average marginal effects (Model II: $dy/dx = 3.69$; p -value = 0.008 and Model IV: $dy/dx = 3.48$; p -value = 0.006). Coefficients, p -values, and marginal effects depicted the same sign and similar magnitudes; these robust results supported Hypothesis 2b. In summary, *IntraFirm_loans* depicted a robust behaviour because they were positive and significant under every model specification. Thus, we confirmed that the subsidiary-level ratio of *IntraFirm_loans* positively impacted the likelihood of a subsidiary becoming an arm's length exporter and increased arm's length export intensity. This empirical result fully supported Hypotheses 1b and 2b.

The behaviour of *Bank_loans* required closer attention. Under the TPM specifications, *Bank_loans* only had a positive and significant value when the bivariate probit models were run (Model II: $\beta = 0.076$; p -value = 0.000; $dy/dx = 0.030$; p -value = 0.000 and Model IV: $\beta = 0.079$; p -value = 0.048; $dy/dx = 0.029$; p -value = 0.046). These results were highly robust and seemed to support Hypothesis 3b. However, the truncated GLM had no impact on arm's length export intensity (Model II: $\beta = 0.010$; p -value = 0.811 and Model IV: $\beta = 0.015$; p -value = 0.719). Therefore, an increase in the level of *Bank_loans* only positively affected the predicted probability of becoming an arm's length exporter. These results did not support Hypothesis 4b. In this aspect, our results are consistent with those of Berman and Héricourt (2010) in the IE literature. Bank loans exert a positive influence on the probability of subsidiaries becoming arm's length exporters. Once they become arm's length exporters, bank loans do not help them remain on the foreign markets. Bank loans thus have a negligible impact on the share of exports. In summary, the behaviour of *IntraFirm_loans* was robust and stable because this variable remained positive and significant under every statistical model. Therefore, we found support for Hypotheses 1b and 2b. *Bank_loans*' behaviour was again more complicated. Accessing external sources of financing

only triggered the subsidiary to become an arm's length exporter. However, the greater or lesser intensity level of arm's length exports was not affected by this variable. These results only provided full support for Hypothesis 3b, but we could not sustain Hypothesis 4b.

Among the control variables, we first analyse the variables that are intended to control by the FDI motives of the parent company (a) *Ownership_type*, (b) *Relatedness_parent*, and (c) *Subsidiary_autonomy*. As was the case in the previous table, and supporting the logic and robustness of our research, *Ownership_type* was not significant in any model, whereas the other two control variables behaved as expected. Thus, *Relatedness_parent* was significant and positive; when subsidiaries performed unrelated activities to the parent firms –that is, they were mostly driven by financial motivations (Subhanij & Annonjarn, 2016) – the subsidiaries become arm's length exporters. Regarding *Subsidiary_autonomy*, these results were in line with Gammelgaard et al. (2012), who confirmed that subsidiary autonomy has a positive impact on the inter-organizational network relationships of the subsidiary. This result could be explained because subsidiary autonomy enhances the subsidiary's local responsiveness (Geleilate, Andrews, & Fainshmidt, 2020; Luo, 2001) and facilitates, for example, the host country's exporting efforts (Edwards, Ahmad, & Moss, 2002). Hence, subsidiary autonomy had a positive impact on arm's length exports.

SoundMoney_index also had a positive impact on arm's length exports, while *FX_concerns* had an adverse effect on a subsidiary becoming an arm's length exporter, and *FX_management* and *Subsidiary_autonomy* remained primarily significant and positive when we analysed *ArmLength_Export_int*. Moreover, *Subsidiary_age* and *Subsidiary_size* were negative and significant in related models. Finally, *Ownership_type*, *Sector_effects*, and *Parent_size* were not significantly related to a subsidiary's arm's length exports.

8.3. Extra robustness tests

Aside from the robustness tests on which we commented in our endnotes (i.e., we replicated all our models with different combinations on the number of control variables, and we replicated all our TPMs with independent [univariate] probit models in place of bivariate probit models), our results remained the same. We performed additional robustness tests.

First, we addressed the potential counterargument that exporting allows subsidiaries to access international financial markets, provides them with more opportunities to secure internal and external sources of financing, or improves their financial conditions. We ran several models using *IntraFirm_loans* and *Bank_loans* as dependent variables and performed tests to deal with endogeneity concerns. However, none of the models displayed any significant impact of intra-firm and arm's length export propensity and intensity on intra-firm loans or on bank loans. The results are unreported in this paper due to space constraints. Our findings are consistent with Forlani (2010), who found no effect of a subsidiary being an exporter on ex-post cash flow or debt-equity ratio. Similarly, Bellone et al. (2010) reported that exporting did not affect the ex-post liquidity or the ex-post composite financial health index. Therefore, the results confirm the absence of the reverse effect of exports on finance. In other words, finance determines exports as outlined in our theoretical development from the IE and IB perspectives.

Second, we tested several other models to exclude alternative explanations. These included testing an interaction term between *IntraFirm_loans* and *Bank_loans*, using subsidiary-level retained earnings over total funding as an alternative trade finance source, moderating *Subsidiary_autonomy* on the relationship between *IntraFirm_loans* and *Bank_loans*, and moderating host-country sound money index on the relationship between bank loans and intra-firm and arm's length export propensity and intensity. Furthermore, we tested for nonlinearities in the impact of the intra-firm and bank loans on intra-firm and arm's length export propensity and intensity. However, the unreported results of these models were nonsignificant. The findings suggest that retained earnings cannot be used for financing subsidiary exports and thus confirm the proposition by Foley and Manova (2015). The results also indicate the lack of a synergistic impact of the mixture of intra-firm loans and bank loans on subsidiary exports. Each type of financing source has a direct impact instead. As we reported our Ramsey RESET and Link tests, our models were correctly specified, and nonlinearities were unsuitable.

9. Discussion and conclusions

9.1. Implications for theory

First, in this study, we developed a theoretical explanation of the impacts of intra-firm loans and bank loans on intra-firm and arm's length export propensity and export intensity. We thus provided new empirical evidence using survey data of the Southeast Asian subsidiaries of British MNEs and country-level data from public sources. We found no significant impact of intra-firm loans on intra-firm export propensity and export intensity. However, intra-firm loans are positively related to the subsidiary arm's length export propensity and export intensity. Bank loans reduce the likelihood of subsidiaries becoming intra-firm exporters; however, once they are involved in intra-firm exports, bank loans positively affect intra-firm export intensity. Furthermore, bank loans have a positive effect on the subsidiary arm's length export propensity, but not on arm's length export intensity. With these results, our study makes a novel contribution to the literature at the intersection of international trade, finance, and MNE activities (Foley & Manova, 2015), which has been largely under-researched in the extant IB literature.

Our findings confirm the important role of MNEs' internal capital markets in facilitating subsidiaries access to intra-firm borrowing, which helps them overcome financial frictions in external capital markets. This internal debt financing source is particularly important for arm's length exports that take a much longer time to complete than domestic sales transactions because they undergo considerably longer cash conversion cycles (Maes et al., 2019). In line with the maturity matching principle (i.e., the maturity of the uses of funds should match the maturity of the sources of funds), subsidiaries resolve their need for higher working capital financing by using intra-firm loans other than bank loans.

We also reaffirm the centrality of international financial management in "classic" internalisation theory (Rugman, 1980, 1981); however, this aspect has not received the attention it deserves in the IB literature. Our study is among the first to provide direct evidence of the role of intra-firm loans in subsidiary-level intra-firm and arm's length export propensity and intensity.

Our findings suggest that these subsidiaries use intra-firm loans to mainly finance arm's length exports rather than intra-firm exports. They thereby focus on value creation and efficiency creation in arm's length sales in domestic and international markets rather than on value appropriation based on tax avoidance and profit shifting through transfer pricing in intra-firm exports and intra-firm loans (Penrose,

1959). This explains the nonsignificant relationship between intra-firm loans and intra-firm export propensity and intensity.

Intra-firm loans are often considered as one of the potential mechanisms for profit shifting for MNEs by arbitraging tax differentials across countries for tax planning purposes. They can charge high-interest rates on intra-firm loans with the use of transfer pricing on interest rates because interest expenses are tax-deductible and thus reduce tax liabilities in relatively high-tax host countries and move funds to desired locations by shifting profits from high-tax to low-tax jurisdictions. During the data collection process by the survey method, we also obtained insights from subsidiary managers, who maintained that host-country governments have become more advanced in developing regulations to tackle any aggressive tax avoidance schemes of MNE foreign subsidiaries.

Our findings also confirm the importance of bank loans in supporting subsidiaries to become arm's length exporters. Bank loans are positively associated with intra-firm export intensity. Our new empirical evidence is consistent with previous studies in the IE literature on the instrumental role of external finance in facilitating international trade (Manova, 2013; Manova et al., 2015).

Second, our research is among the first studies to add new theoretical and empirical insights by examining the impacts of two types of internal and external debt finance sources (intra-firm loans and bank loans) on two types of decisions (i.e., export propensity and export intensity) regarding two types of subsidiary-level exports (intra-firm and arm's length exports). This work is an original contribution. Most prior studies have focused on examining firms' overall financial needs to support exports; however, they have not analysed the forms of financial capital that can be used for financing exports by foreign subsidiaries (Foley & Manova, 2015). We clearly distinguish the types of debt finance, the types of exports, and the types of exporting decisions. We show how foreign subsidiaries' export behaviour is affected by sources of finance and their ability to utilise internal capital markets. Subsidiaries must fund the fixed and variable costs of exports, which often tie up capital for a longer period of time than domestic sales and often involve distinct risks (Foley & Manova, 2015). Internal and external debt finance plays a role in determining the exporting activities of foreign subsidiaries. Through internal capital markets, subsidiaries access intra-firm loans and bank loans from different countries, which

provide them with a competitive advantage over purely domestic firms. We find that subsidiaries use intra-firm loans and bank loans to mainly support their arm's length exports, not intra-firm exports.

Third, our study complements Buckley and Casson (1976) "classic" internalisation theory on horizontal, vertical, and export platform FDI. Our work enriches the literature with new empirical evidence on the complex FDI, in which foreign subsidiaries become involved in both horizontal and vertical FDI and engage in both intra-firm and arm's length exports. We also offer a new theoretical perspective to explain the intra-firm and arm's length export behaviour of subsidiaries by examining the role of internal and external debt as trade finance.

9.2. Implications for practice

Our study provides relevant practical implications for subsidiary managers and policymakers. First, our findings indicate that subsidiaries use intra-firm loans and bank loans (if accessible and available) to finance their arm's length exports. These critical financial resources help subsidiaries to pay for the fixed and variable costs and finance the working capital and liquidity requirements of exports.

Second, policies that increase the accessibility of trade finance from banks to both local firms and the subsidiaries of foreign MNEs would be particularly helpful because they enable subsidiaries to become arm's length exporters. Exports ultimately contribute to the balance of trade, the balance of payments, and the international competitiveness of host countries.

9.3. Limitations and suggestions for future research

Our study has several limitations. First, it employed a dataset collected using the survey method with the subsidiaries of the largest British MNEs in six Southeast Asian countries. The findings reported in our study might only represent the behaviours of subsidiaries of large MNEs in this context. We hence suggest future research to examine the subsidiaries of MNEs headquartered in North America, Europe, and the Asia-Pacific region. A comparison of our findings with those of such future investigations will be interesting.

Second, we used both primary and secondary data sources. We examined the phenomenon from a subsidiary's perspective; thus, our analysis focused on subsidiary-level explanatory variables and

controlled for the potential effects of country-level variables. Future research may follow the traditional IE approach of using a gravity model with country-level explanatory variables. Our dataset was also limited because we applied a dummy variable to distinguish between the manufacturing and service sectors in our empirical testing models. Exports may considerably vary across manufacturing and service sectors. Thus, we suggest further exploration of this issue in future research.

Third, the nature of our dataset limited our ability to examine the relationship between finance and exports of MNEs' foreign subsidiaries in times of global financial crises and thus limited the generalisability of our findings. As previously noted, data collection through a survey was a challenging and time-consuming process. Our data were related to the period from 2003 to 2007, while the global financial crisis occurred in 2008. It is commonly believed that the crisis' effect on Asian markets was delayed. Our literature review showed that MNE foreign subsidiaries navigate financial crises more effectively than domestic counterparts, especially in international trade, which has been reported in previous studies using firm-level datasets from the US and South Korea (Alfaro & Chen, 2012; Antràs et al., 2009; Desai et al., 2008; Kim, 2019). Future research may explore the impacts of financial constraints on exports by comparing multinationals and domestic firms.

Finally, as listed in Table 2, our dependent variables on intra-firm exports and arm's length exports captured the FDI types of horizontal, vertical, and complex FDI; hence, the direct analysis of their impacts on these two export decisions was impossible. Meanwhile, a subsidiary's access to MNE internal capital markets may be affected by its bargaining power vis-à-vis other subsidiaries and the headquarters. A subsidiary's position in the network of subsidiaries and in the global value chain of its parent companies is, therefore, a theme to consider in future studies. Additional research on a subsidiary's types of export products and services (e.g., finished goods or intermediate goods), the geographic orientation of exports (e.g., exports within the home region where the subsidiary is located versus exports to the rest of the world), and export financing would be useful.

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¹ We replicated all our models with a lower number of control variables (we tried different numbers and combinations of control variables), and the results remain the same. However, research on the subsidiary, as a unit of analysis, requires multi-level information (Meyer, Li, & Schotter, 2020) because the subsidiary is influenced by the parent firm (the subsidiary often receives knowledge and resources from the parent firm), the host-country environment, and the nature of its business operations (e.g., exports, foreign exchange risks, and the requirement of foreign exchange risk management). Hence, we prefer to include our full set of control variables in our models.

² Concerns may arise regarding a potential bias with self-reported data. However, previous studies have shown that subjective self-reported data are aligned with actual data. In a study measuring organisational performance in the absence of objective measures, Dess and Robinson Jr (1984) found that the correlation between the top management team's perception of how well their firms had performed, which was measured in a subjective and relative sense, was consistent with how well the firm actually performed vis-à-vis return on investment and growth in sales.

³ We used the TPM in place of the Heckman selection model because (a) the TPM does not make any assumption about the correlation between the errors of the two parts; (b) zeros in the TPM are true zeros versus the "censored value" consideration of the selection model; and (c) under certain circumstances, the TPM usually offers better estimates of the conditional mean and marginal effects (Belotti, Deb, Manning, & Norton, 2015).

⁴ We also replicated all our models considering our TPMs with independent (univariate) probit models, and the results remain the same.

⁵ We also ran these Wald tests of exogeneity on the variable of intra-firm loans (*IntraFirm_loans*). All the *p*-values were larger than 0.6; hence, we did not detect any endogeneity bias.

⁶ We acknowledge that it would be more desirable to establish the “no, yes” dichotomisation, referring to subsidiaries with “no” loans versus subsidiaries with any level of loans in place of the “low, high” dichotomisation. It would then be easier to understand the “no, no” group, which would refer to subsidiaries with no “treatment” at all (i.e., no intra-firm loans; no bank loans). However, we do not have any subsidiaries with no indebtedness. To identify the least arbitrary threshold to differentiate between low levels and high levels of loans, we used the average of the loans. On the one hand, the subsidiary is treated as “low” below the average; on the other hand, the subsidiary is treated as “high” at or above the average.

⁷ We would like to note that, as explained above, we conducted a large number of robustness tests. Among them, we replicated all the models without control variables and with different combinations of control variables. The results were stable in all the replications. Regarding the *p*-values of the “intra-firm loans” variable, a *p*-value lower than 0.05 was never presented (*p*-values slightly higher than 0.1 were normally presented). Since this was the only variable with *p*-values of less than 0.1, but greater than 0.05, we deemed any results that did not satisfy the condition of *p*-values < 0.05 as insignificant.

Figure 1: Conceptual model

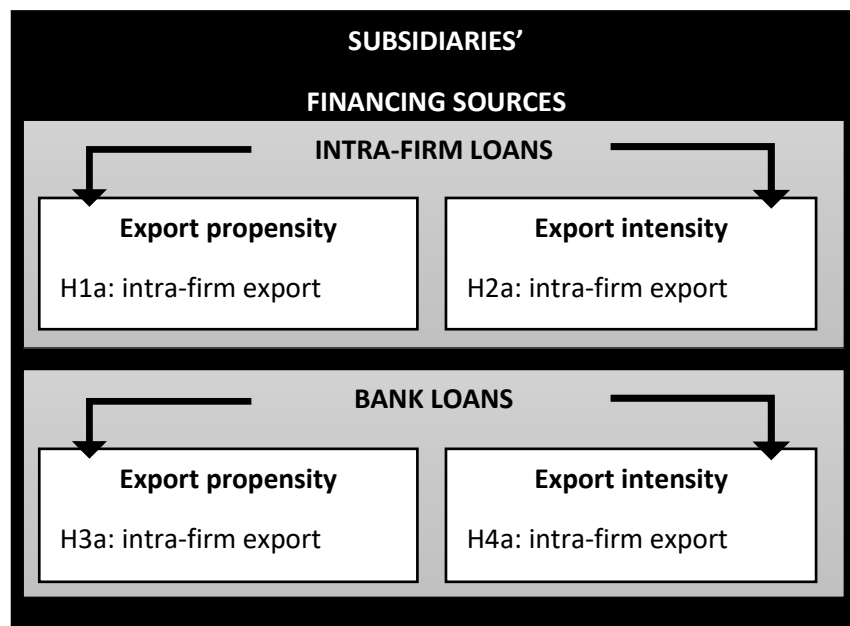


Table 1. Number of MNE foreign subsidiaries in the ASEAN bloc, cross-classified by indebtedness levels

		Intra-firm loans		<i>Total</i>
		Low-level	High-level	
Bank loans	Low-level	11	46	57
	High-level	18	26	44
<i>Total</i>		29	72	101

Table 2. Types of exports and types of FDI

Types of exports	(Implied) types of FDI	Number of subsidiaries	Percentage (%)
Non-exports (domestic sales only)	Horizontal FDI	42	41.6
Intra-firm exports only	Vertical FDI	17	16.8
Arm's length exports only	Horizontal FDI	18	17.8
Intra-firm and arm's length exports	Complex FDI	24	23.8
Total		101	100

Note: n = 101. Data was collected from the survey method.

Table 3. Intra-firm loans and bank loans as trade finance sources of MNE foreign subsidiaries in the ASEAN bloc

Intra-firm loans and bank loans	Percent	Percent
Intra-firm loans, i.e., borrowing from sister affiliates and/or parent firms	8	
Intra-firm loans from MNE internal capital markets		8
Loans from banks in the host countries (1)	4	
Loans from venture capitalists in the host countries (2)	1	
Loans from international banks outside the host countries (3)	2	
Loans from external financial institutions (1) + (2) + (3)		7

Note: n = 101. Data was collected from the survey method.

Table 4. Descriptive statistics and correlation matrix

	Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1	Intra-firm loans	7.77	2.92	1											
2	Bank loans	6.42	2.90	-0.57	1										
3	FX Concerns	0.18	0.38	-0.04	-0.06	1									
4	FX Management	0.50	0.50	-0.04	-0.02	0.46	1								
5	Subsidiary autonomy	3.37	0.80	0.14	0.02	0.01	-0.14	1							
6	Parent firm size	3.30	2.57	-0.09	-0.04	-0.03	-0.07	-0.01	1						
7	SoundMoney Index	7.72	1.22	0.21	-0.10	-0.08	-0.02	-0.06	-0.30	1					
8	Subsidiary size	1.62	1.15	-0.08	-0.02	0.06	-0.10	0.08	0.38	-0.20	1				
9	Subsidiary age	2.62	1.26	0.24	-0.19	-0.11	-0.11	0.01	0.34	0.11	0.26	1			
10	Relatedness to parent	0.03	0.17	0.03	-0.03	-0.08	-0.06	-0.08	-0.02	0.14	-0.04	-0.04	1		
11	Ownership type	0.79	0.41	0.04	-0.06	0.11	-0.07	-0.01	0.00	0.21	0.02	0.14	0.09	1	
12	Sectors	0.45	0.50	-0.05	0.02	-0.16	-0.11	0.01	0.12	-0.10	0.09	0.08	-0.04	-0.23	1

Note: n=101.

Table 5. Two-Part Models (with cluster effects by country) for intra-firm exports as the dependent variable

	TWO-PART MODELS				(PROPENSITY SCORE-BASED) WEIGHTED TWO-PART MODELS			
	Model I		Model II		Model III		Model IV	
	Probit I (Bivariate)	GLM I	Probit II (Bivariate)	GLM II	Probit III (Bivariate)	GLM III	Probit IV (Bivariate)	GLM IV
Intra-firm loans			-0.008 (0.023) <i>0.717</i>	0.102 (0.056) <i>0.068</i>			-0.031 (0.041) <i>0.453</i>	0.128 (0.075) <i>0.088</i>
Bank loans			-0.146 *** (0.018) <i>0.000</i>	0.104 * (0.043) <i>0.015</i>			-0.169 *** (0.049) <i>0.001</i>	0.164 * (0.069) <i>0.017</i>
FX Concerns	-1.053 ** (0.378) <i>0.005</i>	0.088 (0.570) <i>0.877</i>	-1.286 ** (0.388) <i>0.001</i>	0.013 (0.541) <i>0.980</i>	-0.673 * (0.323) <i>0.037</i>	0.035 (0.283) <i>0.901</i>	-0.842 * (0.327) <i>0.010</i>	0.004 (0.293) <i>0.989</i>
FX Management	0.058 (0.194) <i>0.764</i>	1.033 ** (0.301) <i>0.001</i>	0.117 (0.222) <i>0.600</i>	1.182 *** (0.293) <i>0.000</i>	0.293 (0.228) <i>0.198</i>	1.358 *** (0.179) <i>0.000</i>	0.369 (0.267) <i>0.167</i>	1.383 *** (0.188) <i>0.000</i>
SoundMoney Index	0.100 (0.112) <i>0.371</i>	0.242 ** (0.086) <i>0.005</i>	0.125 * (0.049) <i>0.012</i>	0.208 *** (0.042) <i>0.000</i>	0.215 (0.136) <i>0.113</i>	0.272 ** (0.096) <i>0.005</i>	0.183 *** (0.050) <i>0.000</i>	0.252 *** (0.068) <i>0.000</i>
Parent firm size	0.008 (0.056) <i>0.885</i>	-0.053 (0.080) <i>0.514</i>	0.017 (0.050) <i>0.730</i>	-0.071 (0.081) <i>0.382</i>	-0.005 (0.053) <i>0.920</i>	-0.071 (0.082) <i>0.383</i>	-0.014 (0.046) <i>0.753</i>	-0.071 (0.078) <i>0.362</i>
Ownership type	0.023 (0.320) <i>0.943</i>	0.102 (0.258) <i>0.693</i>	0.042 (0.342) <i>0.902</i>	0.438 (0.331) <i>0.186</i>	-0.101 (0.531) <i>0.849</i>	0.303 (0.367) <i>0.409</i>	-0.123 (0.549) <i>0.823</i>	0.704 (0.454) <i>0.121</i>
Relatedness to parent	-0.419 (0.754) <i>0.579</i>	-1.326 *** (0.210) <i>0.000</i>	-0.521 (0.890) <i>0.558</i>	-1.764 *** (0.330) <i>0.000</i>	-0.056 (0.890) <i>0.949</i>	-1.685 *** (0.242) <i>0.000</i>	-0.148 (1.019) <i>0.884</i>	-2.244 *** (0.393) <i>0.000</i>
Subsidiary autonomy	-0.153 (0.173) <i>0.374</i>	-0.120 (0.123) <i>0.332</i>	-0.170 (0.226) <i>0.453</i>	-0.106 (0.155) <i>0.494</i>	-0.348 ** (0.120) <i>0.004</i>	-0.026 (0.110) <i>0.814</i>	-0.364 * (0.164) <i>0.027</i>	-0.031 (0.159) <i>0.844</i>
Subsidiary size	-0.052 (0.103) <i>0.614</i>	0.048 (0.108) <i>0.658</i>	-0.023 (0.096) <i>0.812</i>	0.172 (0.127) <i>0.176</i>	-0.095 (0.068) <i>0.164</i>	0.273 (0.221) <i>0.217</i>	-0.024 (0.085) <i>0.778</i>	0.286 (0.182) <i>0.116</i>
Subsidiary age	0.007 (0.104) <i>0.950</i>	-0.073 (0.083) <i>0.379</i>	-0.064 (0.067) <i>0.346</i>	-0.174 (0.125) <i>0.163</i>	-0.093 (0.086) <i>0.281</i>	-0.028 (0.105) <i>0.792</i>	-0.128 * (0.059) <i>0.030</i>	-0.159 (0.161) <i>0.322</i>
Sectors	0.388 * (0.185) <i>0.036</i>	-0.333 (0.331) <i>0.314</i>	0.505 * (0.255) <i>0.048</i>	-0.278 (0.398) <i>0.486</i>	0.628 ** (0.226) <i>0.005</i>	-0.454 * (0.222) <i>0.041</i>	0.701 ** (0.257) <i>0.006</i>	-0.432 (0.265) <i>0.103</i>
Constant	-0.546 (1.097) <i>0.619</i>	1.433 * (0.644) <i>0.026</i>	0.333 (0.624) <i>0.593</i>	0.003 (1.021) <i>0.998</i>	-0.622 (1.260) <i>0.622</i>	0.353 (0.855) <i>0.680</i>	1.024 (0.900) <i>0.255</i>	-1.492 (1.349) <i>0.269</i>
Wald-tests	15950.21	*** <i>0.000</i>	6122.92	*** <i>0.000</i>	5310.06	*** <i>0.000</i>	10206.95	*** <i>0.000</i>

* Bivariate probit considered the intra-firm export propensity and arm-length export propensity decisions as joint (these results are related to those presented in Table 6).

Robust standard error appears in parentheses ()

p-values appear in *italics* on the right side of the cell. In order to facilitate the reading, we also include: *p-value< 0.05; ** p-value< 0.01; *** p-value< 0.001

Table 6. Two-Part Models (with cluster effects by country) for arm-length exports as the dependent variable

	TWO-PART MODELS				(PROPENSITY SCORE-BASED) WEIGHTED TWO-PART MODELS			
	Model I		Model II		Model III		Model IV	
	Probit I (Bivariate)	GLM I	Probit II (Bivariate)	GLM II	Probit III (Bivariate)	GLM III	Probit IV (Bivariate)	GLM IV
Intra-firm loans			0.211 *** (0.026) 0.000	0.094 ** (0.034) 0.006			0.169 *** (0.038) 0.000	0.100 * (0.039) 0.010
Bank loans			0.076 *** (0.013) 0.000	0.010 (0.042) 0.811			0.079 * (0.040) 0.048	0.015 (0.041) 0.719
FX Concerns	-1.285 *** (0.309) 0.000	-0.318 (0.321) 0.322	-1.399 *** (0.368) 0.000	-0.468 (0.321) 0.145	-1.647 *** (0.460) 0.000	-0.205 (0.358) 0.566	-1.649 *** (0.437) 0.000	-0.405 (0.335) 0.227
FX Management	0.353 (0.297) 0.235	0.290 ** (0.110) 0.008	0.408 (0.296) 0.168	0.436 *** (0.117) 0.000	0.596 (0.328) 0.070	0.234 (0.156) 0.133	0.628 * (0.314) 0.046	0.408 *** (0.086) 0.000
SoundMoney Index	0.374 ** (0.139) 0.007	0.363 ** (0.108) 0.001	0.385 *** (0.034) 0.000	0.405 *** (0.096) 0.000	0.300 * (0.120) 0.012	0.317 ** (0.095) 0.001	0.261 *** (0.062) 0.000	0.327 *** (0.086) 0.000
Parent firm size	-0.092 (0.066) 0.168	0.012 (0.064) 0.852	-0.065 (0.071) 0.357	-0.004 (0.069) 0.956	-0.159 (0.089) 0.075	-0.017 (0.079) 0.829	-0.151 (0.090) 0.092	-0.031 (0.075) 0.683
Ownership type	-0.483 (0.333) 0.148	0.002 (0.359) 0.996	-0.504 (0.386) 0.192	0.065 (0.376) 0.863	-0.495 (0.400) 0.216	-0.073 (0.337) 0.828	-0.522 (0.459) 0.256	0.006 (0.317) 0.985
Relatedness to parent	7.206 *** (0.529) 0.000	0.555 * (0.216) 0.010	7.313 *** (0.660) 0.000	0.677 ** (0.232) 0.004	7.055 *** (0.715) 0.000	0.532 (0.436) 0.222	7.464 *** (0.797) 0.000	0.600 (0.373) 0.107
Subsidiary autonomy	0.073 (0.181) 0.687	0.301 * (0.141) 0.033	-0.046 (0.217) 0.830	0.234 * (0.100) 0.019	-0.031 (0.230) 0.893	0.382 ** (0.133) 0.004	-0.130 (0.225) 0.564	0.289 ** (0.109) 0.008
Subsidiary size	-0.091 (0.174) 0.600	-0.357 * (0.151) 0.018	0.022 (0.134) 0.870	-0.231 (0.141) 0.101	-0.126 (0.231) 0.586	-0.338 * (0.168) 0.044	-0.089 (0.242) 0.712	-0.236 (0.153) 0.123
Subsidiary age	-0.111 (0.141) 0.430	-0.044 (0.098) 0.653	-0.296 ** (0.105) 0.005	-0.117 (0.141) 0.408	-0.260 (0.137) 0.058	-0.063 (0.063) 0.316	-0.367 ** (0.121) 0.002	-0.152 (0.091) 0.094
Sectors	0.159 (0.378) 0.674	0.378 (0.286) 0.186	0.198 (0.354) 0.576	0.499 (0.320) 0.119	0.442 (0.384) 0.250	0.288 (0.283) 0.307	0.413 (0.366) 0.260	0.451 (0.326) 0.166
Constant	-2.216 (1.514) 0.143	-0.268 (1.197) 0.823	-3.867 *** (0.532) 0.000	-1.430 (1.232) 0.246	-1.022 (1.281) 0.425	-0.078 (1.003) 0.938	-1.963 ** (0.726) 0.007	-0.908 (0.976) 0.352
Wald-tests	15950.38	*** 0.000	6144.55	*** 0.000	5231.21	*** 0.000	10200.7	*** 0.000

* Bivariate probit considered the arm-length export propensity and intra-firm export propensity decisions as joint (these results are related to those presented in Table 5).

Robust standard error appears in parentheses ()

p-values appear in *italics* on the right side of the cell. In order to facilitate the reading, we also include: *p-value< 0.05; ** p-value< 0.01; *** p-value< 0.

Appendix 1: Summary of variables

Variables	Variable Code	Description	Data sources
Dependent variables			
Intra-firm export propensity	IntraFirm_Export_prop	Binary variable taking the value of 1 if the subsidiary participates in intra-firm exports, and 0 otherwise.	Survey
Arm's length export propensity	ArmLength_Export_prop	Binary variable taking the value of 1 if the subsidiary participates in arm's length exports, and 0 otherwise.	Survey
Intra-firm export intensity	IntraFirm_Export_int	Intra-firm export sales as a percentage of total sales of the subsidiary.	Survey
Arm's length export intensity	ArmLength_Export_int	Arm's length export sales as a percentage of total sales of the subsidiary.	Survey
Independent variables			
Intra-firm loans	IntraFirm_loans	Intra-firm loans as a percentage of the total funding of the subsidiary.	Survey
Bank loans	Bank_loans	Bank loans as a percentage of the total funding of the subsidiary.	Survey
Control variables			
A subsidiary's perceived concerns with FX risks	FX_concerns	A dummy variable taking the value of 1 if the subsidiary is concerned with FX risks and 0 otherwise.	Survey
A subsidiary's use of FX risk management	FX_management	A dummy variable taking the value of 1 if the subsidiary uses FX risk management techniques and 0 otherwise.	Survey
Host country business environment	SoundMoney_index	Sound money sub-index (a composite of multiple components: money growth; the standard deviation of inflation; inflation of most recent year; and freedom to own foreign currency bank accounts).	The Fraser Institute
Parent firm size	Parent_size	Number of employees of the parent firm (coded using seven-point categorical variables where 1=10,000 employees or less; 2=20,000 employees or less; 3=30,000 employees or less; 4=40,000 employees or less; 5=50,000 employees or less; 6=60,000 employees or less; and 7=70,000 employees or more).	OneSource database
Mode of ownership	Ownership_type	A dummy variable taking the value of 1 if the subsidiary is a wholly owned subsidiary and 0 in case of joint venture.	Survey
Related to parent firms' activities	Relatedness_parent	A dummy variable taking the value of 0 if the subsidiary performs related activities and 1 if the subsidiary performs unrelated activities (we follow the approach in Slangen and Hennart, 2008).	Survey and OneSource database
Subsidiary autonomy	Subsidiary_autonomy	Five-point scale with the following values: 1=decisions exclusively made by the headquarters; 2=decisions primarily made by the headquarters; 3=shared decisions; 4=decisions made mainly by subsidiary; and 5=decisions made solely by the subsidiary.	Survey
Subsidiary size	Subsidiary_size	Number of subsidiary employees (coded seven-point categorical variables: 1 if the subsidiary had fewer than 500 employees; 2=500 up to less than 800; 3=800 to less than 1000; 4=1000 to less than 1,300; 5=1,300 to less than 1,600; 6=1,600 to less than 2,000; and a value of 7 if it had more than 2,000 employees).	Survey
Subsidiary age	Subsidiary_age	Number of years that the subsidiary has been in operation at the time of the survey since its incorporation (seven-point categorical variables where 1=established in the 2000s (between 2000 and 2011); 2=established in the 1990s (between 1990-1999); 3=established in the 1980s (between 1980 and 1989); 4=established in the 1970s (between 1970 and 1979); 5=established in the 1960s (between 1960 and 1969); 6=established in the 1950s to 1900s; and a value of 7 when it was established between 1880-1889).	Survey and OneSource database
Sectors	Sector_effects	A dummy variable taking the value of 1 for manufacturing and 0 for service.	OneSource database
Instrumental variable			

Credit market regulation	CreditMarket_index	Sub-index that collects conditions in the domestic credit market. It is a composite of (a) to what extent the banking industry is privately owned; (b) to what extent credit is supplied to the private sector; and (c) to what extent regulations on interest rates affect the credit market.	The Fraser Institute
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