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The Effect of Bank Credit and the Trade Patterns of Colombian Exporters*

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Abstract: In this paper we use manufacturing data on Colombian exports and bank financing to estimate the credit elasticity of exports. The data allows us to construct a supply side instrumental variable for the credit of manufacturers that we use to address a possible reverse causality problem. We find that access to credit produces a significant increase in the revenue of exporters, explained by the positive effect of credit on the trade margins. Likewise, we find that across manufacturers, the impact of credit on the margins varies by firm size. Medium-sized manufacturers use credit to increase their market reach, market penetration and product mix. The largest manufacturers use credit to increase their market reach, while the smallest manufacturers use it to expand their product mix.
Keywords: International Trade, Export Margins and Bank Financing
JEL Classification: F14 y G21

Resumen: Este documento usa datos de exportaciones manufactureras y financiamiento bancario de Colombia para estimar la elasticidad al crédito de las exportaciones. Siguiendo el método de variables instrumentales para corregir un posible problema de doble causalidad, se encuentra que el crédito bancario tiene un efecto positivo sobre los márgenes del comercio. Adicionalmente, se enfatiza que el impacto del crédito varía de acuerdo al tamaño de la empresa exportadora. En efecto, las empresas medianas se benefician en todos los márgenes del acceso al crédito (i.e. penetración de mercado, variedad de productos y cantidad de mercados), en tanto que las empresas grandes emplean el crédito para aumentar el número de mercados destino, y las empresas pequeñas lo usan para aumentar el número de productos exportados.
Palabras Clave: Comercio Internacional, Márgenes de Exportación y Financiamiento Bancario

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1. Introduction

Manufacturers need working capital to pay for upfront costs that are due before production and sales are realized. When pockets are deep, upfront costs are paid with a manufacturer's internal resources, but when the available working capital is limited, an active manufacturer is left with two options: 1) downsize the scale of production until the upfront costs are fully paid with internal resources, or 2) use an external financing source (investor) to meet its capital needs. In the latter case, access to external financing not only enables a manufacturer to avoid the under-investment problem of producing at a lower scale, but also to be active even when upfront costs are higher than available internal resources. In addition, access to external finance shapes export decisions. For instance, consider a firm that offers a range of products each with different profit margins. This firm would chose to export the most profitable goods subject to its credit constraints. In contrast, a less financially constrained firm would increase its product intensity, operate at a lower product scale, and sell less profitable goods in the margin.

Since exporting manufacturers incur additional upfront costs to service foreign market destinations, access to external sources of financing plays a key role in determining a manufacturer's export decisions. In line with the recent empirical evidence that links the use of external financing with a firm's export performance. We use an instrumental variable approach to estimate the credit elasticity of exports for manufacturing firms, and focus on the impact on trade margins across firms.

Data from Colombian manufacturers are used[1] to construct a sample that matches detailed manufacturer level information regarding exports, with detailed balance sheet information and matched firm-bank data. A manufacturer's balance sheet information enables us to know the magnitude of the

[1] Recent evidence on the real effect of bank financing on export entry is also available for other Latin-American countries. For example, Alvarez and Lopez (2012) use plant level data for Chile, and they find that financial development increases the probability of export participation of a plant, while Castagnino, D'Amato, and Sangiacomo (2013) use firm level from Argentina to show that manufacturers with more access to bank credit are more likely to start exporting. Nevertheless, none of these studies are able to make a causal interpretation of the result.

external financing provided by banking institutions, while the matched firm-bank data is used to identify the banking institutions that provided the external financing to the manufacturer. These data also allow us to know the total lending disbursement of each financial institution. Together, these data allow us to estimate the bank financing elasticity of exports while controlling for firm-specific and aggregate-specific factors that are also related to a manufacturer's export decisions.

Our results contribute to a growing body of empirical literature that shed light on the cost structure of international trade and exports decisions. In particular, our findings suggest that bank financing has a significant, positive and differentiated effect on the extensive (number of products or trade partners) and intensive (average trade per product or trade partner) margins of trade. We find that external financing increases manufacturer´s market reach denoted by the number of export destinations. However, bank financing does not seem to have the same impact on the export outcomes of all manufacturers. Our results suggest that the positive effect of bank financing on a manufacturer's exports varies across firm size. Bank financing seems to have a greater effect on medium-sized manufacturers, operating through all export margins. Medium-sized exporters use bank financing to increase their market reach, market penetration and product mix. Small-sized exporters use credit to increase their product mix.

Empirically, our strategy uses the firm-year variation of the credit provided by banking institutions to estimate the bank financing elasticity of exports, while controlling for a manufacturer's prior leverage ratio, and a set of manufacturer and sector-year fixed effects. The use of manufacturer fixed effects sweeps out all the manufacturer specific non-observable factors that do not vary over time, but are related to a manufacturer's export performance and access to bank financing. The sector-year fixed effects control for macro and sector specific factors which in turn are known to affect a manufacturer's export performance and bank financing.

The challenge resides in acknowledging that the estimation of the credit elasticity of exports is subject to a reverse causality bias. While banking credit may lead a manufacturer to export, export

participation may lead a manufacturer to accrue debt with banking institutions.[2] To address this problem, all of our estimates instrument a manufacturer's total demand of banking credit with a supply side instrument that is manufacturer specific. We instrument a manufacturer's banking credit demand with the total loan disbursements of the banks that have a lending relationship with a manufacturing firm. Provided that our matched firm-bank dataset enables us to identify the financial institutions that have a lending relationship with a manufacturer, we use the banks' balance sheet information on total loan disbursements jointly with a manufacturer's information on its financial lending ties to construct a supply side instrument for a manufacturer's demand of banking credit. Our identification strategy uses the supply side determinants of a bank's credit disbursements to isolate a manufacturer's demand of banking credit from the factors determining a manufacturer's export performance. This empirical strategy allows us to estimate the effect of banking credit on a manufacturer's export performance.

In line with the recent and growing trade literature studying the real effects of external finance on a manufacturer's exports, our findings support the concept that external financing to the firm in the form of banking credit not only plays a central role in determining a manufacturer's entry decision into exporting (Chaney, 2005; Greenaway, Guariglia, and Kneller, 2007; Bellone, Musso, Nesta, and Schiavo, 2009 and Berman and Héricourt, 2010), but they also support the concept that manufacturers also use external financing to finance their operational variable cost.

First, countries export those goods in which they have comparative advantage and countries with more developed financial systems have a comparative advantage in sectors highly dependent on external sources of financing. Rajan and Zingales (1998), Petersen and Rajan (1997) and Fisman and Love (2003) find that access to external financing has a positive and significant effect on the sectoral growth rates of

[2] Results on the direction of the causality are mixed. For example, Greenaway, Guariglia, and Kneller (2007) use a panel dataset of 9292 UK manufacturing firms, over the period 1993 − 2003, and they find evidence suggesting that participation in export markets improves firms' financial health. On the contrary Bellone, Musso, Nesta, and Schiavo (2010) use French data of 25,000 manufacturing enterprises, over the period 1993 − 2005, and they find that firms staring to export display a significant ex-ante financial advantage compared to their non-exporting counterparts.

financially dependent sectors.[3] Recent evidence in Manova (2013) suggests that the sectoral growth rate of exports is higher for financially dependent sectors when located in financially developed countries. And, during economic downturns, Braun and Larrain (2005), Kroszner, Laeven, and Klingebiel (2007) and Dell'Ariccia, Detragiache, and Rajan (2008) show that the short supply of credit has a greater real effect on the growth rates of financially dependent sectors.[4]

Second, if banks finance exporters' credit shocks affect variable cost, and therefore intensive margins. Paravisini, Rappoport, Schnabl, and Wolfenzon (2011) argue that adverse credit conditions reduce the equilibrium size and profitability of exports. Similarly, Arkolakis and Muendler, 2009; Bernard, Redding and Schott, 2009; Manova and Zhang, 2009; Manova, 2013) argue that external finance could generate a positive or negative relationship between the extensive and intensive margins. Chaney (2005), Muûls (2008), Berman and Héricourt (2010) Manova (2013) and Feenstra, Li, and Yu (2014) supports the idea that access to external financing has a real and positive effect on a manufacturer's export performance.[5]

The novelty of this paper resides on using disaggregated financial information at the firm level to determine whether a manufacturer uses external resources to finance its own operational cycle,[6] rather than relying on standard proxies that the literature uses to infer whether manufacturers rely on external financing or if manufacturers are credit constrained.[7] Our empirical setup relates a manufacturer's export

[3] While Rajan and Zingales (1998) find that the growth rate of sectors relying more on external financing is higher when located in financially developed economies, Fisman and Love (2003) and Petersen and Rajan (1997) show that in non-developed economies sectoral growth rates are higher for sectors that are more intense in the use of supplier trade debt; an alternative source of external financing to the firm.

[4] A common problem within this literature is that estimates do not address the endogeneity problem between crises and growth. Lower growth rates may deter the ability of agents to repay back loans, so crises may arise as a consequence of low growth rates.

[5] While Manova (2013) provides cross country sectoral evidence on the effect of credit constraints in financially developed economies on sectoral export patterns, Muûls (2008), Berman and Héricourt (2010) and Feenstra, Li, and Yu (2014) use firm level data to provide evidence on the negative effect of credit constraints on a manufacturer's export performance.

[6] Unfortunately, when a manufacturer does not use external financing, we cannot differentiate if this was a choice or it was a result of being credit constrained by all the existing banking institutions.

[7] For example, Manova (2013) uses the standard Rajan and Zingales (1998) sectoral financing need to infer if a sector relies intensively on external sources of financing. Muûls (2008) focuses her analysis using a firm level credit score, while Berman and Héricourt (2010) and Feenstra, Li, and Yu (2014) use financial leverage ratios to

revenue with a manufacturer's size of external financing (Guiso, Sapienza, and Zingales, 2004; Muûls, 2008; Minetti and Zhu, 2011; Manova, 2013; and, Feenstra, Li, and Yu, 2014).[8]

Similar to Amiti and Weinstein (2011) and Paravisini, Rappoport, Schnabl, and Wolfenzon (2011), we take advantage of our matched firm-bank data and construct a manufacturer-specific supply side instrument for credit demand. But, rather than using supply side variations of bank lending in times economic distress, which is more associated with changes on access to credit, our empirical estimation uses the variations in the supply side of bank credit to the firm.[9] In addition, and in contrast with Paravisini, Rappoport, Schnabl, and Wolfenzon (2011), our firm level data allows us to corroborate the dependence of firms to external finance through the incorporation of the value of outlays.

This paper contributes to the current literature of trade and external financing by finding that the positive and significant effect of bank financing on exports varies across manufacturers' size. In particular, we find that the effect of bank financing on a manufacturer's market penetration is significantly higher for small- and medium-sized firms, while the effect of bank financing on a manufacturer's export market reach is significantly higher for medium- and large-sized firms. The mixed results suggest that firms of different sizes have distinct bank financing strategies. Small- and medium-sized manufacturers use bank financing to increase their product mix, while medium- and large-sized manufacturers prefer to use bank financing to increase their export market reach. We reconcile this

infer if a manufacturer is credit constrained.

[8] While in Chaney (2005), Muûls (2008) and Manova (2013) a manufacturer's level of debt is taken as given, Feenstra, Li, and Yu (2014) develop a contract theory model of financing where manufacturers endogenously choose their level of external financing and their optimal level of interest rates which enables the creditor to acknowledge a manufacturer's credit type. In a general equilibrium setup, Formai (2013) develops a model where firms finance the costs for product innovation and domestic and foreign market entry with external capital. In this setup credit frictions cause misallocations of resources with significant effect over the export performance of manufacturing firms.

[9] In particular Amiti and Weinstein (2011) and Paravisini, Rappoport, Schnabl, and Wolfenzon (2011) use the change of a bank's financial health in periods of economic distress as an instrument for the change of a manufacturer's demand for credit. Paravisini, Rappoport, Schnabl, and Wolfenzon (2011) find that the credit shortage, measure through outstanding loan reduced exports by raising the cost of working capital for general production. This finding is against the idea of exports being that trade credit intensive compared to domestic activity. Similar, Del Prete and Federico (2013) find that the contribution of finance to trade is not limited to the specific financing of export activities, but reflects a more general provision of credit to the exporting firm.

finding with the prior evidence of Beck and Demirgüç-Kunt (2006) and Beck, Demirgüç-Kunt, Laeven, and Maksimovic (2006) suggesting not only that access to finance is different by firm size, but also that these differences translate into exporting outcome. For instance, Manova (2003) suggests that small-manufacturer exporters are more likely to survive in financially development countries.

This paper is structured as follows: Section 2 summarizes why external financing to firms is more important for exporting firms, and also describes the theoretical results embodied by previous models of international trade and firm credit constraints. Section 3 provides a description of our dataset and formulates our empirical estimation strategy. Section 4 discusses our results; and finally, Section 5 concludes.

2. External Financing and Related Literature

2.1. Relevance of External Financing

Production is a capital intensive activity that requires the payment of upfront costs which are financed using a manufacturer's internal and external resources. When internal resources are limited, external resources become an additional financing source that manufacturers use to cover the entire upfront costs of production. In this case, access to external financing becomes an important instrument that enables a manufacturer to overcome cash flow needs without affecting its decisions about the scale of production. In this sense, domestic and exporting firms are not very different from each other; both require working capital to cover fixed expenses, as expenditures on R&D and product development, marketing research, advertising, and investment in fixed capital requirement. They also need to finance variable expenditures related to intermediate input purchases, advanced payments to salaried workers, and land or equipment rental fees.

In addition to the above mentioned costs, exporters accrue additional upfront costs. Some of these costs are related to the fixed costs of exporting, which affect entry into export market destinations, while others are related to an increase of a manufacturer's variable cost. The latter may be explained by a variety of reasons: a) the rise of per unit charges due to additional transport fees when shipping cargo to

a foreign destination, b) the per unit costs increase as manufacturers decide to upgrade a product's characteristics to match consumer preferences in more demanding foreign markets, or c) a manufacturer engages in per unit marketing costs following a sales strategy to position its product in the foreign market.[10] Either way, an increase in a manufacturer's variable cost structure, and its ability to finance these costs, affect its optimal pricing rule which in turn affects its total demand, total export revenue and total export profit.

Exporters also face additional financing needs due to the mismatch between the time when costs are accrued and the time when revenue from foreign market destinations is realized. Since the timing of payment of these inputs is rarely set to be equal to the timing when export revenue is realized, manufacturers are required to pay for production costs prior to the realization of revenue. With production, transportation, customs' processing and local distribution in the final market requires additional time; exporters need to finance operational costs for at least two additional months beyond the time required by manufacturers producing only for the local market.[11]

Understanding how exporters use external financing allows us to determine how financing affects a manufacturer's export market decisions. Depending on the financing need, external financing to the firm may only affect a manufacturer's decision to enter into foreign export markets (as in Chaney, 2005). However if debt is also used to finance a manufacturer's variable cost, one should expect that financing costs will also impact the level of firm exports (see Muûls, 2008; Manova, 2013; Feenstra, Li, and Yu, 2014). In the following subsection, we will provide a brief overview of the results obtained when heterogeneous productive manufacturing firms are internally financially constrained; hence, they use external financing to fund their fixed and variable costs.

[10] In Arkolakis (2010), marketing costs gives rise to a new margin of adjustment of a country's volume of exports.

[11] According to Djankov, Freund, and Pham (2010), on average it takes 31 days for firms to transport a 20 foot container from its factory doors into a shipping vessel, and another 25 days for firms in the destination country to receive the good at the purchaser's location.

2.2. Theoretical Framework

Recent literature on international trade accounts for the effects of credit constraints on export market outcomes. In this Section, we use Paravisini, Rappoport, Schnabl, and Wolfenzon (2011) and Manova's (2013) baseline model to highlight the effects of external financing on a firm's decision to export and on a firm's export revenue. These findings are used to guide our empirical estimation in Section 4.

In Manova's (2013) model, heterogeneous productive exporters finance their total cost structure using internal and external sources of financing. In absence of enough internal resources, exporters finance their costs with resources from banks or other financial institutions, or from their business partners. Particularly, every firm offers a contract to the potential investor, and this contract specifies the amount the firm needs to borrow, the repayment in case of enforcement, and the collateral in case of default.[12] Under a given demand for external financing and an exogenous probability of repayment, financially dependent exporter's decisions is determined by a liquidity constraint and the return paid to the external investor (i.e. the interest rate). Given the liquidity of the manufacturer depends on the productivity level, Manova provides four endogenous productivity thresholds. Two determine entry for non-financially and financially dependent local manufacturers, while the other two determine entry for non-financially and financially dependent foreign manufacturers.

Highly financially dependent manufacturers are less likely to self-select into production, as the cost and the magnitude of the external financing makes entry optimal only for highly productive manufacturing firms. The entry threshold for financially dependent manufacturers, whether domestic or foreign, lies to the right of the entry threshold for non-financially dependent firms. Furthermore, financially dependent manufacturers' productivity cut-off increases with their level of dependence on external financing. Consequently, a highly financially dependent manufacturer is less likely to produce or export. In this setup external financial dependence is only offset when a manufacturer draws a high

[12] All these financial arrangements are back with tangible asset as collateral (Braun, 2003).

productivity, and then can offer the investor a higher return in case of repayment.[13] Manova's model shows external financing enables a manufacturer to meet the cash flow requirements that they otherwise would not be able to meet, avoiding shutting down operations due to liquidity constraints.

Credit dependence also affects the extensive and intensive margins. When the producer does not reach the productivity cut-off, the firm prefers to produce/export less quantities and produce/export smaller quantities per product, and then it reduces the amount of external capital needed. This allows the firm meets investor requirements at expenses of pricing the products at higher level, and obtain revenues closer to the first-best. This trade off enables financially dependent exporters to export at a scale that, although smaller, is closer in magnitude to the scale achieved if they were not financially dependent.

In terms of destination markets, financially dependent firms choose which destinations to service, ranking them from most profitable to least profitable. Conditional on the external financing obtained by the firm, the number of destination markets it serves is directly related to how credit dependent the firm is. Highly financially dependent manufacturers are able to export to fewer destinations. And, manufacturers facing external financing constraints will export only the most profitable products, and will ship fewer products to their foreign market destinations.

3. Data and Empirical Strategy

3.1. Data

To relate a manufacturer's current export outcomes to its current external financing sources, we constructed an unbalanced panel dataset using detailed information on exports, financial statements and bank-firm linked data for 2,930 Colombian exporters, classified within the industrial sectors of

[13] Unfortunately, this type of setup does not take into account that higher returns imply an endogenous adjustment of the repayment probabilities. Since repayment probabilities are taken as given, the model does not capture the decrease in the probability of repayment caused by rise of a manufacturer's credit dependence, or when exporters accept higher interest rates in return of securing a loan disbursement.

Agriculture (sectors 1-5) and Manufacturing (sectors 15-39) as defined by the international standard industry classification, ISIC revision 1.1, for the period 1998 − 2006.

Manufacturing export data was extracted from the Transactional Export Dataset (TED) processed by "Direccion de Impuestos y Aduanas Nacionales" (DIAN). TED contains the universe of transactions realized by Colombian exporters at the product level per destination country.[14] From this dataset we extracted annual information on the total value of exports, the market reach - number of export destinations -, product mix[15]- number of exported products - and the export market penetration – average exports per product or per trade destination - for the universe of Colombian exporters.

A manufacturer's financial information was extracted from the Financial Statement Database processed by the "Superintendencia de Sociedades" (SS). Although this dataset does not allow us to obtain financial information for the universe of manufacturing firms, it allows us to gather detailed financial information on the type, the term and the currency composition of the external financing of a sub-set of manufacturing firms. Colombian regulations established that there are two reasons why a commercial manufacturer could be included in this data set: First, the firm must meet a threshold at the end of the fiscal year[16]. This threshold is defined as the ratio between sales and total assets, and it has been modified three times since 1993. The Decree 1258 of 1993 initially established that firms with only a value of assets over the equivalent of 20,000 times the minimum monthly wage were oblige to report their financial statement to SS.[17] Decree 3100 of 1997 modified the baseline financial account upon which the threshold was set. From this point onwards, the threshold was set to be compared with a manufacturer's total assets or total sales. Decree 4350 of 2006 increased the minimum monthly wage multiple up to 30,000 times the total level of assets or sales of the firm. Meaning that in year 2006, a

[14] Eaton, Eslava, Kugler, and Tybout (2007, 2008) use these data to provide firm level evidence on the patterns of market reach of Colombian exporters.
[15] For robustness purposes, we performed this calculation defining a product line at the 10, 8 and 6 digit level of the harmonized system code product classification.
[16] Decree 2649 of 1993 sets December 31st as the end of the fiscal year in Colombia.
[17] From 1993 − 1996, commercial manufacturers where only obliged to report their financial statements to SS by only comparing their level of total assets to the level set by the given reporting threshold.

manufacturer was oblige to report its financial statements to SS if at the end of the fiscal year its level of sales or total assets was above USD5.2 million.[18] As a consequence of the modifications on the threshold, there are years in which some manufacturers are not obligated to report their balance sheets.

Second, for regulation purposes the superintendent in charge might decide to include manufacturers in the survey even though they fail to meet the minimum reporting threshold upon which they are obliged to report their financial statements to SS. Several non-observed reasons may explain the inclusion of these firms within the data set. For example, a direct petition of the stakeholders or a judicial requirement may require the superintendent to oblige a manufacturer to report its financial statements to SS.[19]

The two rule selection criterion of inclusion into the SS data set not only implies that our data set is mainly composed by medium- and large-sized firms, but it also introduces a bias on a manufacturer's entry decision into producing/exporting. That is, the year when a firm reports financial information to the SS does not correspond to the year when the firm decides to be active. Across time, when a firm fails to be included within the SS database, it does not imply that the corresponding manufacturer has decided to exit the market; it only means that a manufacturer's sales/assets size does not meet the selection reporting criteria. For our empirical exercise, we cannot use the data to study the self-selection process into producing/exporting, but we can use the data to investigate the relation between a manufacturer's external financing choices and a manufacturer's export outcomes. In this context, our empirical strategy requires accounting for the selection bias to include a manufacturer in the database.

A manufacturer's information on sources of financing was used to construct a bank-firm linked dataset[20] that we built using Superfinanciera's financial format 341 and the banks' balance sheet information. We used Superfinanciera's format 341 to obtain yearly information of the financial

[18] In Column 5 of Table 1, we report by year the thresholds that are used to determine if a manufacturer is obliged to report its financial statements to SS.
[19] We would like to thank Marcela Eslava for sharing detailed information on the entry selection criteria into the SS's database.
[20] Due to the confidentiality restrictions of the data the matching procedure is not public.

institutions that are effectively providing credit to manufacturing firms. We matched this dataset with a bank's information on yearly total loan disbursements, and we obtained a manufacturer specific variable that we use as a supply side instrument for credit demand.[21]

Export Outcomes and External Financing

Table 2 reports summary statistics for our firm-year unbalanced panel data set that we construct using firm-level export outcome data, firm-level balance sheet information, and bank-firm linked information. The available information within the SS's database enable us to construct an unbalanced database containing 38.4% of the universe of Colombian exporters, which in turn represents on average 72.1% of Colombia's total export volume (per year results are reported in Table 3).[22] This percentage corresponds to almost the country's total export share achieved by manufacturers classified in the economic sectors that are not related to the extraction of petroleum, gas and coal; which in the case of Colombia represents on average 28% of the country's yearly exports.

On average, a Colombian manufacturer exports a total volume of USD312,000, with a reported export market penetration of USD82,500, an average export market reach of six countries and an average product mix equal to 8 products.[23] A manufacturer's average size is around USD5.7 million, with an asset tangibility equivalent to 20% of a manufacturer's average size and an average leverage ratio equal to 49% of a manufacturer's total assets. While a manufacturer's active financing is on average provided by three different financing institutions, our evidence suggests that a manufacturer's access to finance might be concentrated, as 25% of the sample of manufacturers obtains external financing from only one financing institution.[24]

[21] Sub Section 3.2 provides detailed explanation on the construction and use of the financing supply side instrument.

[22] Although the database only matches at most 44% of the country's number of exporters (year 1998), the match on the total value of exports is high, and it is in line with recent evidence by Freund and Pierola (2012) where regardless of the country, custom level data around the world reflects a concentration of a country's level of exports. As reported by the authors, the top 1% of Colombian exporters concentrate nearly 51% of the country's total volume of exports.

[23] Measured at the 6, 8 and 10 digit level of the harmonized system code. For details, refer to Table 2.

[24] Corresponding to the number of financing institutions evaluated at the 25th percentile; see Table 2.

Although a manufacturer can obtain external financing from different sources, (e.g. standard debt loans, supplier trade debt, equity and other financing types), the empirical evidence for Colombian exporters reveals a concentration on the financing type. Almost 61% of a manufacturer's total liability is financed using bank credit and supplier trade debt. Bank financing accounts to 33% of a manufacturer's total liabilities, while supplier trade debt accounts up to 28% of a manufacturer's total liabilities.[25] The other 39% corresponds to other financing resources not related to the ones reflected in the balance sheet. The term structure of a manufacturer's external financing supports the idea that manufacturers use external financing to finance their cash flow requirements for production, as 52% of a manufacturer's total liabilities are short term. While 50% of this short-term financing is provided by domestic financing institutions, 37% is provided by domestic suppliers.

Across manufacturers, the characterization of the sources and term structure of external financing reveals differences in the type of financing used to meet a manufacturer's cash flow requirements. As reported in panel B in Table 2, we classified manufacturers by size using Colombia's asset classification criteria as given by Law 590 of year 2000.[26] Although Colombia's current manufacturer size classification is determined by law 905 of 2004, the sample period of our database implies that 70% of the firm-year observations were subject to the size classification given by Law 590 of year 2000. Hence, we use the total asset thresholds as determined by Law 590 of year 2000 to classify a manufacturer within one of the following three size categories: 1) Small: when a manufacturer's level of total assets is lower than USD 2.5 million. 2) Medium: when a manufacturer's level of total assets is between USD 2.5 million and USD 5.1 million, and 3) Large: when a manufacturer's level of total assets is greater than USD 5.1 million.[27]

[25] The other 49% is composed by liabilities not related to production; two examples are differed debt to workers and other liabilities.

[26] Since late 1980's, the size classification criteria has been modified in three opportunities: 1) Law 78 of 1988. 2) Law 590 of 2000 and 3) Law 905 of 2004.

[27] Originally, Law 590 of year 2000 determines that the thresholds used to determine a manufacturer's size classification are based on a cutoff level given in multiples of the country's yearly minimum wage (ymw). Large manufacturers are those whose level of total assets is greater than 30,000 ymw. Medium manufacturers are those

We not only find that export performance increases with size (see Figure 1(a)), but we also find that there are also significant differences in the type and the terms upon which manufacturer's use external financing. Small manufacturers have a higher percentage of tangible assets; they exhibit a higher lever-age ratio despite having a lower level of bank debt, and having a lower number of financing ties. This seems to be explained by their higher use of supplier trade debt. In contrast, large manufacturers tend to rely more on bank financing, as their total debt ratio is 8 percentage points higher than that observed for small manufacturers. A manufacturer's different financing choice may be partially explained by the relative cost of bank debt. As reported in Figure 1(c), credit interest rates are higher for small manufacturing firms than they are for large manufacturing firms. We now turn to test whether these financing patterns are related to a manufacturer's export performance.

3.2. Empirical Strategy

Our objective is to test whether a manufacturer's current external bank financing $bloan_{i,s,t}$ has a positive and significant effect on a manufacturer's current export outcomes $y_{i,s,t}$. Our baseline specification is

$$\ln y_{i,s,t} = \beta_0 + \beta_1 \ln bloan_{i,s,t} + \beta_2 levrat_{i,s,t-1} + \Lambda_i \gamma' + \Gamma_{s,t} \delta' + \varepsilon_{i,s,t} \qquad (1)$$

where sub-indexes *i, s, t* refer to a manufacturer *i*, classified within the industrial sector *s* at time *t*. $y_{i.s.t}$ corresponds to a manufacturer's total value of exports, but provided that its total export revenue may be decomposed into its export margins, we extend our baseline specification to test whether current bank financing also affects a manufacturer's export margins. In this case, $y_{i.s.t}$ also represents a manufacturer's market reach, product mix[28] and market penetration.

whose level of total assets is within the bracket of 15,001 − 30 000 ymw. Small manufacturers are those whose level of total assets is within the bracket of 5,001 − 15,000 ymw and Micro-manufacturers are those whose level of total assets is below 5,000 ymw. The calculations included in the text are obtained using the implied ymw in US dollars of year 2006 as reported in column 4 of Table 2. Since the country's ymw. Changes by year, in our estimates a manufacturer's size classification varies through time not only because the implied threshold level changes with each year's minimum wage level, but also because a manufacturer's total asset value also varies through time.

[28] These are measured at the 6, 8 and 10 digit level of the harmonized system code.

A manufacturer's current external financing can come from a variety of sources: bank financing, equity finance, supplier trade debt or loans from non-financial institutions or other individual investors.[29] However, in all of our specifications $bloan_{i.s.t}$ corresponds to the value of the loan disbursements given by banking institutions at time t; $bloan_{i,s,t} = \sum_{b \in B} bloan_{b,s,t}$, where b identifies the bank providing the external financing to the manufacturer i and B is the set of banks in the database. The focus on current bank financing is based on evidence that Colombian manufacturers use bank financing as their main external financing source; the use of other financing sources represents less than 4% of a manufacturer's total liabilities[30].

All of our estimates control for a manufacturer's ex-ante leverage ratio $levrat_{i,s,t-1}$ which we use to control for manufacturer specific credit constraints that might limit current export performance and current bank credit access. We also include a set of firm fixed effects Λ_i and a set of year fixed effects Γ_t. The use of manufacturer fixed effects enables us to sweep all the manufacturer specific non-observable factors that do not vary through time and are related to a manufacturer's export performance and to a manufacturer's access to current bank financing[31]. Year fixed effects control for non-observable macro factors that are known to affect a manufacturer's export performance and a manufacturer's demand for bank financing. As an alternative, one would like to control for non-observable macro factors that are sector-year specific which in turn affect a manufacturer's export performance and credit demand. Hence, our results also include estimates that instead of including year fixed effects include sector-year fixed effects. In addition, all of our estimates cluster standard errors using a manufacturer's industry classification - 4 digit level, ISIC revision 1.1-.

[29] To our acknowledge, there is no public dataset in Colombia that can provide a detailed decomposition of trade finance, or financing provided by suppliers or clients.
[30] See debt ratios of equity and other financing sources reported in Table 2
[31] Ideally, we would control firm size for firm's employment or productivity but these are variables that are only available in the Encuesta Anual Manufacturera. Then, we include leverage and firm fixed effects. Leverage is a firm statistic that is positively correlated to firm size, and firm fixed effects is a proxy of the time it takes to change firm size.

Recall, Manova's set up when exporters finance both fixed and variable costs with external resources, they allow trade participation with revenues close to the first-best. This occurs because the scale of production is higher than the level obtained when production is limited by a manufacturer's internal financing. In other words, those exporters that reach a minimum productivity can offer greater investment return to creditors but they also need more external capital since to serve foreign markets it requires operating at a large scale level[32]. If the savings due to the scale effect of production are higher than the return required by the investor, one should expect that $\hat{\beta}_1 > 0$. Nevertheless, as it was mentioned in Section 2.2., credit might have a differentiated magnitude impact on the intensive and extensive margins.

As Manova (2008) points out, few different opposing forces could generate a negative or positive impact on extensive and intensive margins. Assume that all products potentially available to the firm are identical in terms of costs structure and profitability. When scale economies are more important than scope economies, then manufacturers are able to produce/export more products and produce/export more quantities per product. If the firm experiences diminishing scope economies that dominate increasing returns to scale, the impact of external capital would be greater on the intensive margin than on the extensive margin.

3.2.1 Estimation Problems

Empirically, there are several factors affecting the correct estimate of coefficient $\hat{\beta}_1$. First, the estimated magnitude of $\hat{\beta}_1$ is subject to a reverse causality bias. While banking credit may lead a manufacturer to export, current export participation may lead a manufacturer to accrue current debt with banking institutions. Second, the correct estimation of parameter $\hat{\beta}_1$ should account for the selection criteria to include a manufacturer into SS's data set produces a sampling of manufacturers that is non-

[32] Van Biesebroeck (2014) shows that productivity increases after firms enter the export market, and this effect is more pronounced for producers that faced increasing returns to scale.

random (see Wooldridge, 2002; chapter 17). [33]This implies that when estimating (1) one not only should take into account the reverse causality problem, but one should also consider that there is an incidental truncation problem that, if significant, may make the estimates of parameter $\hat{\beta}_1$ inconsistent.

We address these problems by re-setting the estimation of (1) as:

$$\ln y_{i,s,t} = \beta_0 + \beta_1 \ln bloan_{i,s,t} + \beta_2 \ln levrat_{i,s,t-1} + \Lambda_i \gamma' + \Gamma_{s,t}\delta' + \varepsilon_{i,s,t}, \quad (2a)$$

$$\ln bloan_{i,s,t} = \eta_0 + \eta_1 \ln sloan_{i,s,t} + \eta_2 \ln levrat_{i,s,t-1} + \Lambda_i \theta' + \Gamma_{s,t}\mu' + \xi_{i,s,t} \quad (2b)$$

$$y_{1,i,j,s,t} = \mathbb{I}\{z_{i,j,s,t}\lambda' + \Lambda_i \alpha' + \Gamma_{s,t}\rho' + \upsilon_{i,,s,t} > 0\} \quad (2c)$$

Equation (2a) is our equation of interest. Equation (2b) is the linear projection that we use to address the reverse causality problem of bank lending and equation (2c) is the selection equation that we use to correct for the non-random sampling of SS's dataset. The variables $\ln sloan_{i,s,t}$ and $z_{i,s,t}$ are the instruments that we use to address the reverse causality problem and the incidental truncation problem. While Λ_i and $\Gamma_{s,t}$ are a manufacturer and year/sector-year fixed effects, and $\varepsilon_{i,s,t}$, $\xi_{i,s,t}$ and $\upsilon_{i,s,t}$ are the corresponding error terms with $\upsilon_{i,s,t} \sim$ N(0, 1).[34]

As proposed by (2b), in all of our specifications we instrument a manufacturer's current bank lending with a manufacturer specific supply side instrument of bank credit that we construct using the bank-firm matched data set. Provided that this data set contains information on the financial institutions that have a lending relationship with a manufacturer, and given that from a bank's balance sheet information we extract a bank's total loan disbursements, we construct four supply side instruments of bank credit. The first instrument takes into account all the credit relations that manufacturer *i* has with all banks *b*, then, the first instrument is equal to the sum of the loan disbursements executed by all banking institutions that have a commercial banking relationship with the manufacturing firm (i.e.

[33] Other source of bias selection might arise from the fact that format 341 collects loans data of observable borrowers. This restriction is especially relevant to study the impact of credit constraints on exporters' participation but not to study how credit shapes exporters' decisions. Nevertheless, the sample selection could represent a measurement error bias for which our estimations represent an upper bound.

[34] Additional assumptions require that $\varepsilon_{i,s,t}$ and $\upsilon_{i,,s,t}$ are independent of $z_{i,s,t}$ and that $E(sloan'\xi) = 0$.

$sloan_{i,s,t} = \sum_{b \in B} sloan_{b,s,t}$). In the second instrument, we consider exclusively the loans disbursed by private banks[35] (i.e. $sloan_{i,s,t} = \sum_{b \in B_{private}} sloan_{b,s,t}$). The third instrument is the historical average of the outlays of all banking institutions and the fourth instrument is the historical average for private banks. Since one may think that the credit demand of the specific manufacturer may affect a bank's overall supply of credit, for each manufacturer of each supply side instrument is net of a manufacturer's own credit demand obtained from these banks. In other words, bank's supply of credit to a specific firm is independent of that firm's demand for credit. Thus, bank total credit supply is correlated with firm credit but not correlated with firm export revenues (i.e. the portion of the credit that increases export revenues is the portion that is not obtained from higher revenues).

To sum up, our identification strategy uses a bank's supply side determinants of credit disbursements to isolate a manufacturer's demand of banking credit from the factors determining a manufacturer's export performance. We expect that the first stage results of $\hat{\eta}_1$ should be significantly greater than zero.

We use (2c) to address the non-random sampling problem that affects the selection of manufacturers into SS's database according to the two selections rules described in Section 3.1. In this context $y_{1,i,s,t}$ is an indicator variable that takes the value of one when $z_{i,s,t}\lambda' + \Lambda_i\alpha' + \Gamma_{s,t}\rho' + \upsilon_{i,s,t} > 0$, where $z_{i,s,t}$ are manufacturer-year specific exogenous variables that determine whether in a given year a manufacturer is included in the data set. The first variable is the change of sales over time[36], and the next four are a dummy variables indicating the SS's superintendent. With the change of sales we capture the likelihood of meeting the threshold participation each year, and with the dummy variables we detect the changes on regulatory policy. Provided that the SS's superintendent has discretionary power to oblige a manufacturer to report its financial statements even though it might not meet the

[35] Differences between funding from private and public banks have been largely documented. For instance, public banks execute a more imprecise screening process that is reflected in higher interest rates (Song and Thakor, 2013; Eslava and Freixas, 2016).

[36] Recall that each manufacturer must meet a threshold (i.e. sales/total sales) to be part of SS sample.

exogenous threshold condition to report, and given that within a ten-year period the SS's superintendent has changed on average every two years, we use a superintendent's term in office as indicators for a manufacturer's inclusion into SS's data set. Hence, $z_{i,s,t}$ in (2c) is a matrix with four dummy variables. Each variable takes the value of one during the term when a given superintendent was in office. Since superintendents are in office for more than a year[37], and given that their term in office does not correspond to a calendar year, one does not expect that the set of year fixed effects will absorb the significance of the coefficients linked to the term in office instruments.

While $y_{1,i,s,t}$ and $z_{i,s,t}$ are always observed, $\ln y_{i,s,t}$ and $\ln bloan_{i,s,t}$ are only observed when $y_{1,i,s,t} = 1$. Our estimation procedure is applied as follows: First, we estimate parameters $\hat{\lambda}'$, $\hat{\alpha}'$ and $\hat{\rho}'$ in (2c) with a probit of $y_{1,i,s,t}$ on $z_{i,s,t}$ using all the observations. Second, after the estimation of the selection model, we proceed to estimate the inverse mills ratio $\hat{\lambda}^{M}_{i,s,t} = \frac{\phi(z_{i,s,t}\lambda' + \Lambda_i\alpha' + \Gamma_{s,t}\rho')}{1-\Phi(z_{i,s,t}\lambda' + \Lambda_i\alpha' + \Gamma_{s,t}\rho')}$. Third, we proceed to estimate (2a) using an standard 2SLS estimation procedure on the observations where $y_{1,i,s,t} = 1$, while including the inverse mills ratio which is set to control for the sample selection bias. In other words we proceed to estimate:

$$\ln y_{i,s,t} = \beta_0 + \beta_1 \ln bloan_{i,s,t} + \beta_2 \ln levrat_{i,s,t-1} + \beta_3 \hat{\lambda}^{M}_{i,s,t} + \Lambda_i\gamma' + \Gamma_{s,t}\delta' + \varsigma_{i,s,t} \qquad (3)$$

using a standard IV estimation approach that deals with the reverse causality problem between $\ln y_{i,s,t}$ and $\ln bloan_{i,s,t}$. At this stage we need to test if our supply side instrument is significantly different from zero ($\hat{\eta}_1 \neq 0$), and if the estimate of $\hat{\beta}_3$ is statistically different from zero. If we fail to reject that $\hat{\beta}_3 \neq 0$, we find that the sample selection bias in the SS dataset is not significant, and estimates of (1) can be carried out by implementing a standard 2SLS without requiring to control for the sample bias.[38]

[37] See Table 4 for SS's superintendents between 1997 and 2007.

[38] We are aware that there could be an identification problem because of an omitted variable bias but we consider that this bias is reduced by the use of the firm fixed effects. For instance, including a covariate under the assumption that the corresponding additional external financing variable is not correlated with other independent variable is not an option as the firm actively choosing the financing options. Hence, both variables are

We also test whether the estimate magnitude of $\hat{\beta}_1$ in equation (3) differs across manufacturers' size. Prior evidence by Carpenter and Petersen (2002), Beck and Demirguc-Kunt (2006), and Beck, Demirgüç-Kunt, Laeven, and Maksimovic (2006) supports the view that access to credit is more difficult for small and medium sized firms. Hence, one should expect that the estimated credit elasticity of export outcomes should vary by manufacturer size.

4. Results

4.1. Overall Evidence

Tables 5 through 11 report the results for our benchmark specification as proposed in equations (2a)–(2c)[39]. We estimate the credit elasticity of export outcomes, where export outcomes are measured by an exporter 1) total export volume (Table 5), 2) market reach (Table 6), 3) market penetration (Table 7), 4) product mix (Table 8), product mix per trade destination (Tables 9 and 10) and trade per industry (Table 11) . From Tables 5 to 8, column (1) corresponds to the results obtained using equation (1). Columns (2) and (3) address the reverse causality problem using a standard IV approach with year and sector-year fixed effects. Column (4) reports the results obtained when we also control for sample selection bias. In columns (2) − (4), we include the first stage results on the coefficient of credit supply and we include the corresponding F-statistic that we use to determine whether our instrument in the first stage is weak. Since column (4) is the only specification that controls for the entry selection problem, we also include a joint significance test for the variables we use to estimate the probit specification.

Given the differences between the results with year and sector-year fixed effects are minimal in Table 9, we exclude the year fixed effects and include industry-country-year fixed effects. Then column (1) presents the benchmark results and column (2) addresses the reverse causality problem. Additionally,

correlated. Furthermore this approach implies that we should to do the claim that the endogenous problem is not an issue with the extra variables, but for our main variable it is. As this would be a type of cherry picking to where we decide how to instrument, we choose not to include the other additional covariates.

[39] From the four instruments mentioned in Sub Section 3.2.1, we find that disbursements executed by all banking institutions, is the most consistent instrument across all estimations. Therefore, results report the estimations with this instrument. All other results are available upon request.

in Table 10 we do some robustness check of those results by indicating that observations are clustered into industries (column 1), country destination (column 2), industry-country destination dyad (column 3) and, industry and country destination (column 4).

To analyze the impact of credit at industry level we follow two strategies: a) split the estimations by two digits of disaggregation and b) split the estimations according to Rauch classification[40]. Unfortunately, the first strategy does not provide consistent results. We claim this is the outcome of a sample overrepresented in some industries. Considering the over- or sub-representation of industries in the sample we present the most consistent results, which are by grouping the sample according to Rauch classification. In Table 11, we present the estimations of homogenous goods (column 1), referenced prices and differentiated products (column 2), differentiated goods (column 3) and reference priced (column 4).

Results in Table 5 are in line with the theoretical findings that current access to bank financing enables a manufacturer to increase its current export revenue. The estimated coefficient for current bank financing is positive and significant at 5% in all specifications, and our results suggest that disregarding the reverse causality problem between exports and bank credit produces a downward bias in the estimated coefficient that must be corrected once we use our manufacturer specific supply side instrument as reported in column (2). The first stage results on the significance of our instrument suggest that our supply side instrument is relevant, and the reported magnitude of the estimated F-statistic suggests that our estimation strategy does not suffer from a weak instrument problem as the estimated value of the F-statistic is in all cases greater than 10 (Stock, Wright, and Yogo, 2002). Results in column (4) show that the sample selection bias of the SS's data set is not statistically different from zero as the significance of the inverse mills ratio fails to be different from zero. One may wonder if this is because the variables in the selection equation are not significant. We conduct a joint test on the significance of

[40] Rauch (1999) classifies industries according to three possible types: differentiated products, reference priced, or homogeneous goods.

the variables used in the probit specification and find that the coefficients are jointly significantly different from zero. Thus the lack of significance of the inverse mills ratio in column (4) implies that estimating (1) following the standard IV estimation will produce consistent estimates for $\hat{\beta}_1$. Hence, our estimates in column (3) suggest that an increase in a manufacturer's bank financing debt level from the sample average to the level obtained at the 75th percentile implies an increase of manufacturer's export revenue of 61.1%.[41]

Our detailed export data enables us to test through what channel bank financing affects a manufacturer's export revenue. Our TED data allows us to calculate a manufacturer's market reach, market penetration and product mix at three different levels of aggregation of the harmonized system code. Tables 6 and 7 report the results obtained when testing for the effect of current bank financing on a manufacturer's market reach and on a manufacturer's export market penetration. Table 8 reports the results obtained when testing for the effect of bank financing on a manufacturer's product mix, given three alternative definitions of the head count of products.

Results in Table 6 support the idea that current bank financing has a significant effect on a manufacturer's decision to export to more foreign destinations. The reported first stage results in columns (2) − (4), not only validate the significance of our instrument, but also suggests that our estimation strategy does not suffer from an estimation bias due to the use of a weak instrument. Column (4) confirms that the sample selection bias does not affect the overall estimates of bank-credit coefficient. The estimated coefficient in column (3) suggests that increasing a manufacturer's bank financing debt level from the sample average to the level obtained at the 75th percentile increases a

[41] The estimated percentage increase of a manufacturer's exports is obtained using the percentage increase of bank financing when moving from the sample average up to the level observed at the 75th percentile joint with the estimated coefficient of *Total Bank Financed Debt* reported in column (3)-Table 5. Thus, a manufacturer's export revenue increase of 61.1% = $\hat{\beta}_1 * \%\Delta bloan_{75-50}$. Provided that $\hat{\beta}_1$= .059 and $\%\Delta bloan_{75-50} = \left[\frac{bloan_{75}}{bloan_{50}} - 1\right] * 100$, where $bloan_{75}$ and $bloan_{50}$ correspond to the level of bank financing at the 75th and the 50th percentile reported in log scale in Table 2.

manufacturer's number of export destinations by 24.6%, the equivalent to 2 additional destinations.[42] In Table 7, we present our estimations of the impact of credit on market penetration (Table 7). Despite the benchmark estimation shows a positive and significant effect of credit on the average number of products per destination, the result is not significant when we correct the double causality problem.

Results in Table 8 show a positive and significant effect of credit on the product mix. Nevertheless, the significance levels change depending on the fixed effect introduced. In order to analyze if it the demand or the industry the drivers of the differences on product mix, we follow two estimation strategies: 1) by trade destination (Tables 9 and 10), and 2) by industry according to Rauch classification (Table 11).[43] Given we have not found evidence that omitting the sample selection correction parameter produce a bias on the $\hat{\beta}_1$, the estimations of this section lay out in equations (2a) and (2b).

Results of Tables 9 show that current access to bank financing enables a manufacturer to increase its current export revenue through the product mix. The estimated coefficient for current bank financing is positive and significant at 5%, and consistent with previous estimation results, our results suggest that disregarding the reverse causality problem between exports and bank credit produces a downward bias in the estimated coefficient that is corrected once we use our manufacturer specific supply side instrument as reported in column (2). In Table 10 we do robustness check by indicating that observations are clustered into industries (column 1), country destination (column 2), industry-country destination dyad (column 3) and, industry and country destination (column 4).

[42] The estimated percentage increase of a manufacturer's exports is obtained using the percentage increase of bank financing when moving from the sample average up to the level observed at the 75th percentile joint with the estimated coefficient of *Total Bank Financed Debt* reported in column (3)-Table 6. Thus, a manufacturer's export revenue increase of 28.9% = $\hat{\beta}_1 * \%\Delta bloan_{75-50}$. Provided that $\hat{\beta}_1$= .027 and $\%\Delta bloan_{75-50} = \left[\frac{bloan_{75}}{bloan_{50}} - 1\right] * 100$, where $bloan_{75}$ and $bloan_{50}$ correspond to the level of bank financing at the 75th and the 50th percentile reported in log scale in Table 2.

[43] Rauch (1999) classifies industries according to three possible types: differentiated products, reference priced, or homogeneous goods. Unfortunately, the first strategy does not provide consistent results.

Regarding the estimations by industry in Table 11, we present the results of homogenous goods (column 1), referenced prices and differentiated products (column 2), differentiated goods (column 3) and reference priced (column 4). We find that banking finance has positive and significant effect at 5% level on differentiated products. Our results indirectly evaluate the role of information cost and, align with literature that considers these costs primary operate with respect differentiated products.

4.2. Evidence of Extensive and Intensive Margins by Manufacturing Size

While all manufacturers in a particular industry share similar financial needs and pledgeable assets, the differences in productivity can be different in the same industry. These differences have implications in exporting decisions and credit access. Indeed, there are firms who are productive enough to export in absence of credit constraints, but are not productive enough to raise outside finance since they cannot offer high returns in case of repayment (Manova, 2013).

Considering the impact of differences in productivity on access to credit, in this section we estimate equations (2a)-(2c) by manufacturing size to evaluate the impact on total value of exports (Table 12), market reach (Table 13), market penetration (Table 14) and product mix (Table 15). Although we know that estimating equation (1) under the standard IV procedure provides consistent estimates of the bank financing parameter, we continue to report the results obtained even when we control for the sample selection bias. Our results are in line with large body of recent literature that predicts that larger, productive firms are less credit constraint.[44]

In all Tables, columns (1)−(3) correspond to the effect of bank financing when we only address the reverse causality problem while columns (4)−(6) correspond to the results when we correct for sample selection bias. In all Tables we confirm the lack of sample selection bias. Hence, we focus our analysis on the results reported in columns (1)−(3).

[44] See Beck (2005) and Forbes (2007).

As reported in tables 12 - 15, bank financing has a different effect on the export revenue of medium-sized manufacturers. For instance, the estimates in column (2) of Table 12 suggest that increasing bank financing from the sample average up to the level observed at the 75th percentile produces an export increase of 63%. The differential export increase of medium-sized manufactures is not only explained by an increase in market reach, but it is also explained by an increase on market penetration and product mix. Reported results in column (2) in Tables 12 through 15 show that an increasing bank financing from the sample average up to the level observed at the 75th percentile produces a market reach increase equivalent to 1.5 destinations; produces an increase of market penetration equivalent to 37.6%, and produces an increase on its product mix equivalent to 2 new products. Our results find that bank credit has a significant effect on the market reach of large manufacturing firms.

We assess the impact of banking finance at the firm level considering our new level of disaggregated data, product-country destination and, differentiated by size percentile. Figure 2, shows the results of the percentile regression by 10 digits of disaggregation[45]. We find that external finance has a positive and significant impact for small- and medium-sized firms. In particular, we find a non-linear relationship that suggest banking has greater impact on smallest firms.

5. Conclusions

Recent theoretical and empirical research on international trade provides evidence of the importance of external financing for exporters. As explained by Chaney (2005), Muûls (2008), Paravisini, Rappoport, Schnabl, and Wolfenzon (2011), Manova (2013) and Feenstra, Li, and Yu (2014), financing fixed costs of exporting with external financing sources only affects the entry decision into exporting, while the pricing, and export revenue are not affected. However, when variable costs are

[45] Direction of results do not change at 6 digits of disaggregation.

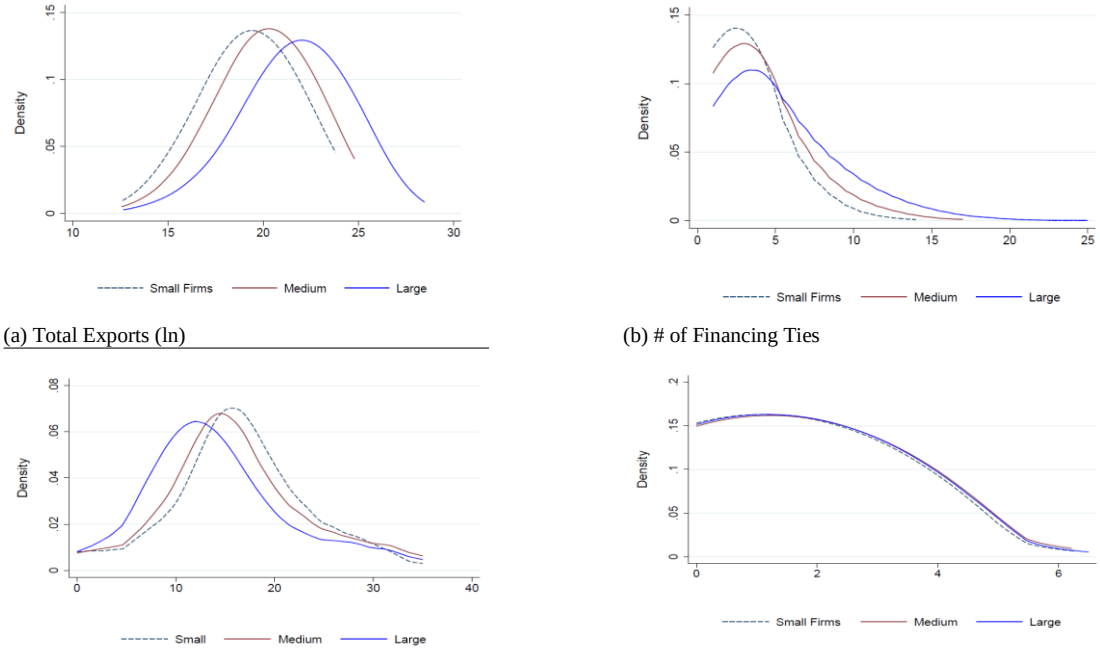
financed with external sources of credit, one may find that the external financing has a significant effect on an exporter's export revenue, and on an exporter's export margins.

Inspired by this literature, in this paper we use detailed manufacturer and bank-firm linked data from Colombia to construct a database that allows us to test whether current access to bank financing has a significant effect on the current export revenue of manufacturing firms. We also test whether this external financing has a significant effect on export margins as measured by market reach, market penetration and product mix. Finally, we test whether the effect of current bank financing on a manufacturer's current export outcomes may vary by manufacturer size.

Our empirical results suggest: 1) access to current bank financing has a positive and significant effect on a manufacturer's current export outcomes, 2) the effect of credit is channeled by productivity differences (i.e. that we observed through firm size) and 3) trade patterns are influenced by banking finance. Particularly, we observe that banking finance has a positive impact on the product mix of small manufacturers and on the market reach of large firms. Medium-sized firms benefit extensive and intensive margins with credit. The intuition behind this result may lie on the dominance of firm economies of scale on product economies of scale in large firms and the opposite for small firms. Our results suggest that small firms are more sensitive to credit factors, and large firms to non-credit factors. Any further policy on credit provision, must consider not only the alleviation of barriers to credit but also the use of credit.

Figures

Figure 1. Financing Terms by Manufacturing Size



(a) Total Exports (ln)

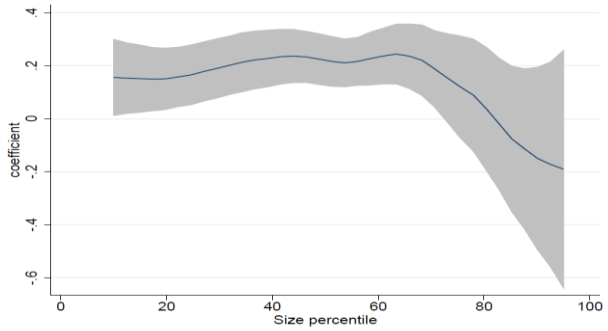
(b) # of Financing Ties

c) Interest Rate

d) Collateral as % of Debt

Source: Own authors' calculations. Note: Data on a manufacturer's export volume was extracted from TED. Data on a manufacturer's number of financing ties, loan interest rates and collateral size by financing need were extracted from SS's format 341. A manufacturer's size classification corresponds to the asset size criteria determined by Law 590 of 2000.

Figure 2. Percentile regression by 10 digits HS



Source: Own authors' Calculations. Note: Data on a manufacturer's export volume was extracted from TED. Data on a manufacturer's number of financing ties, loan interest rates and collateral size by financing need were extracted from SS's format 341. A manufacturer's size classification corresponds to the asset size criteria determined by Law 590 of 200

Tables

Table 1. Yearly Minimum Wage in Colombia and Yearly Entry Threshold Criteria into SS Database

Year	Decrete[a]	Monthly Minimum Wage[b] (Col. Pesos)	Monthly Minimum Wage[b] (US. Dollars)	Reporting Entry Threshold SS[c] (US - Dollars)
1998	3106, December 1997	203.826	14,293	2,858,634.75
1999	2560, December 1998	236.460	13,464	2,692,812.25
2000	2647, December 1999	260.100	12,457	2,491,494.00
2001	2579, December 2000	286.000	12,437	2,487,353.25
2002	2910, December 2001	309.000	12,339	2,467,813.25
2003	3232, December 2002	332.000	11,537	2,307,436.25
2004	3770, December 2003	358.000	13,619	2,723,870.00
2005	4360, December 2004	381.500	16,438	3,287,611.00
2006	4686, December 2005	408.000	17,280	5,183,938.00

a As reported by the Central Bank of Colombia in http://obiee.banrep.gov.co/analytics/saw.dll?Go&Path=/shared/Consulta%20Series%20Estadisticas%20desde%20Excel/1.%20Salarios/1.1%20Salario%20minimo%20legal%20en%20Colombia/1.1.1%20Serie%20historica&Options=rdf&NQUser=salarios&NQPassword=salarios&lang=es. *b* For calculation purposes we use the yearly average level of the exchange rate (col-pesos/us-dollar) as reported in the IMF's International Financial Statistics Database (IFS). *c* Until 2005, the threshold was set at 20,000 times of the corresponding yearly monthly minimum wage. Since 2006, the threshold was modified to 30, 000 times of the corresponding yearly monthly minimum wage. The Reporting threshold is equal to the product of the minimum wage in Colombia in US dollars and the threshold expansion factor as previously defined.

Table 2. Summary Statistics

Panel A: Summary Statistics All Manufacturers

Variable	Obs.	Avg.	Std. Dev.	Min.	Max.	Perc. 25	Perc. 75
Tot Value of Exports (ln)	11,191	12.651	2.613	4.605	20.703	10.874	14.550
Export Market Penetration (ln)[a]	11,191	11.320	2.010	1.912	19.150	10.026	12.640
Export Market Reach[b]	11,191	6.070	6.187	1.000	57.000	2.000	9.000
Product Mix (hs 6 digit level)[c]	11,191	8.215	11.710	1.000	208.000	1.000	9.000
Product Mix (hs 8 digit level)[c]	11,191	8.784	14.690	1.000	217.000	2.000	9.000
Product Mix (hs 10 digit level)[c]	11,191	8.902	14.750	1.000	217.000	2.000	10.000
Total Assets (ln)	11,191	15.563	1.555	10.164	22.422	14.474	16.540
Total Bank Financed Debt (ln)	11,191	12.892	4.455	0.000	20.657	12.398	15.356
Asset Tangibility Ratio[d]	11,190	0.201	0.157	0.000	0.931	0.081	0.283
Leverage Ratio[e]	11,191	0.494	0.258	0.006	4.499	0.327	0.634
# of Active Financing Relations	11,191	2.786	2.595	0.000	19.000	1.000	4.000
# of Historical Financing Relations	11,191	1.980	1.173	1.000	25.000	2.000	5.000
Ratio Total Debt with Banks[f]	11,191	0.324	0.235	0.000	0.988	0.113	0.511
Ratio Total Debt with Domestic Banks[f]	11,191	0.305	0.229	0.000	0.988	0.097	0.486
Ratio Total Debt with Foreign Banks[f]	11,191	0.019	0.081	0.000	0.940	0.000	0.000
Ratio Total Debt with Suppliers[f]	11,191	0.281	0.197	0.000	0.997	0.132	0.393
Ratio Total Debt with Domestic Suppliers[f]	11,191	0.181	0.163	0.000	0.975	0.058	0.259
Ratio Total Debt with Foreign Suppliers[f]	11,191	0.100	0.165	0.000	0.997	0.000	0.130
Ratio Other Debt[f]	11,191	0.032	0.086	0.000	0.928	0.000	0.014
Ratio Equity Debt[e]	11,191	0.003	0.029	0.000	0.532	0.000	0.000
Ratio Short Term Debt[e]	11,191	0.522	0.244	0.000	1.000	0.334	0.721
Ratio Long Term Debt[e]	11,191	0.119	0.174	0.000	1.000	0.000	0.194
Ratio Short Term Bank Financing[e]	11,191	0.225	0.205	0.000	0.945	0.039	0.369

Panel B: Summary Statistics External Financing by Manufacturing Size[g]

Variable	Obs.	Avg.	Std. Dev.	Min.	Max.	Perc. 25	Perc. 75
Asset Tangibility Ratio - Large Size[d]	5,982	0.200	0.152	0.000	0.931	0.086	0.274
Asset Tangibility Ratio - Medium Size[d]	2,191	0.189	0.148	0.000	0.865	0.070	0.277
Asset Tangibility Ratio - Small Size[d]	3,017	0.213	0.171	0.000	0.916	0.077	0.306
Leverage Ratio - Large Size[e]	5,982	0.459	0.226	0.006	1.867	0.299	0.596
Leverage Ratio - Medium Size[e]	2,191	0.518	0.291	0.033	4.499	0.337	0.660
Leverage Ratio - Small Size[e]	3,018	0.547	0.283	0.015	1.878	0.380	0.672
Total Bank Financed Debt (ln) - Large Size	5,982	11.911	4.619	0.000	20.657	11.802	16.285
Total Bank Financed Debt (ln) - Medium Size	2,191	12.325	1.971	0.000	15.940	12.527	14.329
Total Bank Financed Debt (ln) - Small Size	3,018	11.283	1.873	0.000	15.503	11.323	11.341
# of Historical Financing Relations - Large Size	5,982	4.622	1.518	1.000	25.000	2.000	6.000
# of Historical Financing Relations - Medium Size	2,191	1.759	2.885	1.000	17.000	2.000	5.000
# of Historical Financing Relations - Small Size	3,018	2.868	2.165	1.000	15.000	1.000	4.000
Ratio Total Debt with Suppliers - Large Size[f]	5,982	0.270	0.195	0.000	0.984	0.120	0.377
Ratio Total Debt with Suppliers - Medium Size[f]	2,191	0.291	0.190	0.000	0.965	0.148	0.398
Ratio Total Debt with Suppliers - Small Size[f]	3,018	0.297	0.203	0.000	0.997	0.144	0.420
Ratio Total Debt with Banks - Large Size[f]	5,982	0.356	0.246	0.000	0.971	0.129	0.558
Ratio Total Debt with Banks - Medium Size[f]	2,191	0.303	0.221	0.000	0.988	0.105	0.480
Ratio Total Debt with Banks - Small Size[f]	3,018	0.276	0.210	0.000	0.929	0.094	0.425

Sample: 1998 − 2006. Annual Data. *a* Measured as average exports per product or per trade destination. *b* Measured as number of exported products. *c* Measured as number of export destinations. *d* Measured as a ratio of the share of Net Property, Plant, and Equipment to Total Assets. *e* Measured as a ratio of Total Debt to Total Assets. *f* Measured as a ratio to Total Liabilities. *g*.A manufacturer's size is determined by the entry thresholds given by Law 590 of 2000. Small manufacturers are those who have a total level of assets lower than 15,000 times Colombia's yearly minimum wage (ymw). Medium sized manufacturers are those who have a total level of assets between 15,001 and 30,000 times Colombia's ymw. Large sized manufacturers are those who have a total l**e**vel of assets higher than 30,001 times Colombia's ymw. See Table 2 for a by year reference of the implied ymw in US dollars.

Table 3. Per Year Export Sample Representation

Year	Number of Exporters in Sample	Value of Total Exports in Sample
1998	3,716	6,392
1999	4,396	6,415
2000	4,161	6,681
2001	3,950	7,313
2002	3,937	7,330
2003	3,829	7,448
2004	3,511	7,506
2005	3,558	7,970
2006	3,463	7,909
Sample Avg.	3,836	7,218

Sample: 1998 − 2006. Note: Own authors' calculations made with the match of exporters and the yearly universe of exporting manufacturers reported in TED.

Table 4. Superintendent's Time in Office at "Superintendencia de Sociedades" 1998 – 2006

Term in Office	Super-Intendent Name
1997 - 1998	Cesar Ucros Barros
1998 - 2003	Jorge Gabino Pinzon Sanchez
2003 - 2006	Rodolfo Danies Lacouture
2006 - 2007	Francisco Nogera Rocha

Sample: 1998 − 2006. Source: "Superintendencia de Sociedades". For additional information on the terms in office of each Superintendent refer to: http://www.supersociedades.gov.co/superintendencia/Historia/Documents/revista-supersociedades-73anios.pdf.

Table 5. Credit Elasticity of Total Value of Exports

Dependent Variable:	**(1)**	**(2)**	**(3)**	**(4)**
Total Value of Exports in t (ln)	**No IV**	**IV**	**IV**	**IV**
Total Bank Financed Debt in t (ln)	.008	.051	.059	.049
	(.003)**	(.023)**	(.026)**	(.023)**
Leverage Ratio in t-1	-0.241	-0.286	-0.319	-0.278
	(0.199)	(0.202)	(0.227)	(0.198)
Inverse Mills Ratio				0.583
				(0.611)
Observations	11191	11191	11191	11191
R^2	0.887	0.882	0.91	0.883
First Stage: Credit Supply in t		0.743	0.682	0.743
First Stage: F-statistic		46.294	30.415	47.136
Test Instruments Selection Equation				800.798
P-value				0.000
Manufacturer Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	No	Yes
Sector-Year Fixed Effects	No	No	Yes	No

Sample: 1998−2006. Number of exporters: 2,930. We only include manufacturers within economic sectors of Agriculture (1−5) and Manufacturing (15 − 39) as defined by the international standard industry classification, ISIC revision 1.1 at the 4 digit level. Source: Authors' own calculations. Notes: Total Bank Financed Debt in *t* (ln) corresponds to the logarithm of the loan obtained in *t*. Columns (2), (3) and (4) instrument a manufacturer's demand for bank credit with the total bank supply of banking credit net of a manufacturer's own credit supply. Column (4) includes a control for the sample selection bias of SS's database. Instruments for entry into the SS's database are obtained from the terms in office reported in Table 4. All specifications cluster standard errors by industry classification *, ** and *** means significant at 1%, 5% and 10% respectively.

Table 6. Credit Elasticity of Market Reach

Dependent Variable:	**(1)**	**(2)**	**(3)**	**(4)**
Total Market Reach in t (ln)[a]	**No IV**	**IV**	**IV**	**IV**
Total Bank Financed Debt in t (ln)	0.002	0.024	0.027	0.023
	(.001)	(.007)***	(.008)***	(.007)***
Leverage Ratio in t-1	-0.066	-0.09	-0.102	-0.085
	(.081)	(.082)	(.095)	(.082)
Inverse Mills Ratio				0.369
				(.294)
Observations.	11191	11191	11191	11191
R^2	0.871	0.862	0.89	0.863
First Stage: Credit Supply in t		0.743	0.682	0.743
First Stage: F-statistic		46.294	30.415	47.136
Test Instruments Selection Equation				800.798
P-value				0.000
Manufacturer Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	No	Yes
Sector-Year Fixed Effects	No	No	Yes	No

a Market Reach is the measured as the ln of the head count of export market destinations. Sample: 1998 − 2006. Number of exporters: 2, 930. We only include manufacturers within economic sectors of Agriculture (1 − 5) and Manufacturing (15 − 39) as defined by the international standard industry classification, ISIC revision 1.1 at the 4 digit level. Source: Authors own calculations. Notes: Total Bank Financed Debt in *t* (ln) corresponds to the logarithm of the loan obtained in *t*. Columns (2), (3) and (4) instrument a manufacturer's demand for bank credit with the total bank supply of banking credit net of a manufacturer's own credit supply. Column (4) includes a control for the sample selection bias of SS's database. Instruments for entry into the SS's database are obtained from the terms in office reported in Table 4. All specifications cluster standard errors by industry classification *, ** and *** means significant at 1%, 5% and 10% respectively.

Table 7. Credit Elasticity of Market Penetration

Dependent Variable:	**(1)**	**(2)**	**(3)**	**(4)**
Market Penetration in t (ln)[a]	**No IV**	**IV**	**IV**	**IV**
Total Bank Financed Debt in t (ln)	0.006	0.027	0.032	0.026
	(.003)**	(.020)	(.024)	(.020)
Leverage Ratio in t-1	-0.174	-0.196	-0.217	-0.193
	(.164)	(.166)	(.186)	(.164)
Inverse Mills Ratio				0.214
				(0.509)
Observations	11191	11191	11191	11191
R^2	0.85	0.848	0.884	0.848
First Stage: Credit Supply in t		0.743	0.682	0.743
First Stage: F-statistic		46.294	30.415	47.136
Test Instruments Selection Equation				800.798
P-value				0.000
Manufacturer Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effects	**Yes**	**Yes**	**No**	**Yes**
Sector-Year Fixed Effects	**No**	**No**	**Yes**	**No**

a Market Penetration is measured as the ln of a manufacturer's average exports per destination. Sample: 1998−2006. Number of exporters: 2,930. We only include manufacturers within economic sectors of Agriculture (1−5) and Manufacturing (15−39) as defined by the international standard industry classification, ISIC revision 1.1 at the 4 digit level. Source: Authors' own calculations. Notes: Total Bank Financed Debt in *t* (ln) corresponds to the logarithm of the loan obtained in *t*. Columns (2), (3) and (4) instrument a manufacturer's demand for bank credit with the total bank supply of banking credit net of a manufacturer's own credit supply. Column (4) includes a control for the sample selection bias of SS's database. Instruments for entry into the SS's database are obtained from the terms in office reported in Table 4. All specifications cluster standard errors by industry classification. *,** and *** means significant at 1%, 5% and 10% respectively.

Table 8. Credit Elasticity of Product Mix

Panel A: Product Mix at 6 digits HS

Dependent Variable:	**(1)**	**(2)**	**(3)**	**(4)**
Product Mix in t (ln)[a]				
Total Bank Financed Debt in t (ln)	.004	.018	.016	.018
	(.002)**	(.010)*	(.010)	(.010)*
Leverage Ratio in t-1	-.090	-.105	-.107	-.104
	(.081)	(.085)	(.092)	(.085)
Inverse Mills Ratio				.080
				(.284)
Observations	11,191	11,191	11,191	11,191
R^2	.838	.835	.874	.835
First Stage: Credit Supply in t		.743	.682	.743
First Stage: F-statistic		46.294	30.415	47.136
Test Instruments Selection Equation				800.798
P-value				0.000

Panel B: Product Mix at 8 digits HS

Dependent Variable:	**(1)**	**(2)**	**(3)**	**(4)**
Product Mix in t (ln)[a]				
Total Bank Financed Debt in t (ln)	.005	.019	.016	.019
	(.002)**	(.010)*	(.010)	(.010)*
Leverage Ratio in t-1	-.066	-.082	-.089	-.081
	(.088)	(.092)	(.098)	(.091)
Inverse Mills Ratio				.052
				(.284)
Observations	11,191	11,191	11,191	11,191
R^2	.83	.827	.868	.827
First Stage: Credit Supply in t		.743	.682	.743
First Stage: F-statistic		46.294	30.415	47.136
Test Instruments Selection Equation				800.798
P-value				0.000

Panel C: Product Mix at 10 digits HS

Dependent Variable:	**(1)**	**(2)**	**(3)**	**(4)**
Product Mix in t (ln)[a]				
Total Bank Financed Debt in t (ln)	.005	.020	.015	.020
	(.002)**	(.010)**	(.010)	(.010)**
Leverage Ratio in t-1	-.059	-.075	-.083	-.074
	(.091)	(.095)	(.100)	(.094)
Inverse Mills Ratio				.126
				(.280)
Observations	11,191	11,191	11,191	11,191
R^2	.828	.825	.867	.825
First Stage: Credit Supply in t		.743	.682	.743
First Stage: F-statistic		46.294	30.415	47.136
Test Instruments Selection Equation				800.798
P-value				0.000
Manufacturer Fixed Effect	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	No	Yes
Sector-Year Fixed Effect	No	No	Yes	No

a Product Mix is measured as the ln of the head count of products exported, given the corresponding harmonized system category. Sample: 1998 − 2006. Source: Authors' own calculations. Notes: All specifications cluster standard errors by industry classification. *, ** and *** means significant at 1%, 5% and 10% respectively.

Table 9. Credit Elasticity of Product Mix per Trade Destination

Panel A. Product Mix - 6 digits HS		
Dependent Variable:	**(1)**	**(2)**
Product Mix in t (ln)[a]	**No IV**	**IV**
Total Bank Financed Debt in t (ln)	0.002	0.363
	(0.014)	(0.123)***
Leverage Ratio in t-1	-0.097	-0.628
	(0.230)	(0.239)***
Observations	189,118	189,118
R^2	0.894	0.891
First Stage: Credit Supply in t		0.118
F-stat First Stage		52.03
APF First Stage		52.03
APF-CHI^2 First Stage		53.00
Panel B. Product Mix - 10 digits HS		
Dependent Variable:	**(1)**	**(2)**
Product Mix in t (ln)[a]	**No IV**	**IV**
Total Bank Financed Debt in t (ln)	0.001	0.286
	(0.014)	(0.120)**
Leverage Ratio in t-1	-0.152	-0.565
	(0.233)	(0.238)**
Observations	202,092	202,092
R^2	0.894	0.892
First Stage: Credit Supply in t	0.124	0.105
F-stat First Stage	91.35	36.86
APF First Stage	91.35	36.86
APF-CHI^2 First Stage	93.17	37.51
Firm Fixed Effect	Yes	Yes
Municipality-Sector-Country-Year	Yes	Yes

a Product Mix is measured as the ln of the head count of products exported, given the corresponding harmonized system category. Sample: 1998 − 2006. Source: Authors' own calculations. Notes: All specifications cluster standard errors by industry classification. *,** and *** means significant at 1%, 5% and 10% respectively.

Table 10. Credit Elasticity of Product Mix per Trade Destination (Robustness Check)

Panel A. Product Mix - 6 digits HS				
Dependent Variable: Product Mix in t (ln)[a]	**(1)**	**(2)**	**(3)**	**(4)**
Total Bank Financed Debt in t (ln)	0.363	0.363	0.363	0.363
	(0.088)***	(0.121)***	(0.086)***	(0.123)***
Leverage Ratio in t-1	-0.628	-0.628	-0.628	-0.628
	(0.202)***	(0.225)***	(0.185)***	(0.239)***
Observations	189,118	189,118	189,118	189,118
R^2	0.891	0.891	0.891	0.891
First Stage: Credit Supply in t	0.118	0.118	0.118	0.118
F-stat First Stage	99.01	83.67	348.8	52.03
APF First Stage	99.01	83.67	348.8	52.03
APF-CHI^2 First Stage	100.4	85.22	353.5	53.00
Panel B. Product Mix - 10 digits HS				
Dependent Variable: Product Mix in t (ln)[a]	**(1)**	**(2)**	**(3)**	**(4)**
Total Bank Financed Debt in t (ln)	0.286	0.286	0.286	0.286
	(0.099)***	(0.117)**	(0.096)***	(0.120)**
Leverage Ratio in t-1	-0.565	-0.565	-0.565	-0.565
	(0.210)***	(0.223)**	(0.194)***	(0.238)**
Observations	202,092	202,092	202,092	202,092
R^2	0.892	0.892	0.892	0.892
First Stage: Credit Supply in t	0.105	0.105	0.105	0.105
F-stat First Stage	65.75	64.87	281.6	36.86
APF First Stage	65.75	64.87	281.6	36.86
APF-CHI^2 First Stage	66.59	66.01	285.2	37.51
Firm Fixed Effect	Yes	Yes	Yes	Yes
Municipality-Sector-Country-Year	Yes	Yes	Yes	Yes

a Product Mix is measured as the ln of the head count of products exported, given the corresponding harmonized system category. Sample: 1998 − 2006. Source: Authors' own calculations. Notes: All specifications cluster standard errors by industry classification. *,** and *** means significant at 1%, 5% and 10% respectively.

Table 11. Credit Elasticity of Product Mix per Industry[a] (Rauch classification)

Panel A. Product Mix - 6 digits HS				
Dependent Variable: Product Mix in t (ln)[a]	**(1)**	**(2)**	**(3)**	**(4)**
Total Bank Financed Debt in t (ln)	0.394	0.353	0.377	-0.209
	(0.345)	(0.127)***	(0.133)***	(0.595)
Leverage Ratio in t-1	-1.653	-0.540	-0.479	0.007
	(2.361)	(0.257)**	(0.269)*	(1.567)
Observations	7,501	180,968	152,505	28,463
R^2	0.952	0.887	0.875	0.962
First Stage: Credit Supply in t	0.188	0.115	0.122	0.0263
F-stat First Stage	6.205	53.35	64.07	0.941
APF First Stage	6.205	53.35	64.07	0.941
APF-CHI^2 First Stage	6.766	54.35	65.39	0.982
Panel B. Product Mix - 10 digits HS				
Dependent Variable: Product Mix in t (ln)[a]	**(1)**	**(2)**	**(3)**	**(4)**
Total Bank Financed Debt in t (ln)	0.257	0.277	0.313	-11.044
	(0.239)	(0.123)**	(0.133)**	(76.138)
Leverage Ratio in t-1	-1.524	-0.448	-0.366	32.615
	(1.596)	(0.248)*	(0.264)	(234.151)
Observations	8,626	192,813	163,045	29,768
R^2	0.955	0.888	0.875	0.102
First Stage: Credit Supply in t	0.211	0.103	0.110	0.00334
F-stat First Stage	6.540	36.73	43.14	0.0197
APF First Stage	6.540	36.73	43.14	0.0197
APF-CHI^2 First Stage	7.056	37.39	43.98	0.0205
Firm Fixed Effect	Yes	Yes	Yes	Yes
Municipality-Sector-Country-Year	Yes	Yes	Yes	Yes

a Product Mix is measured as the ln of the head count of products exported, given the corresponding harmonized system category. Sample: 1998 − 2006. Source: Authors' own calculations. Notes: All specifications cluster standard errors by industry classification. *,** and *** means significant at 1%, 5% and 10% respectively.

Table 12. Credit Elasticity of Total Value of Exports by Size[a]

Dependent Variable:	**Manufacturer Size**			**Manufacturer Size**		
Total Value of Exports in t (ln)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Small	**Medium**	**Large**	**Small**	**Medium**	**Large**
Total Bank Financed Debt in t (ln)	.080	.100	.024	.084	.098	.024
	(.042)*	(.029)***	(.033)	(.043)*	(.029)***	(.033)
Leverage Ratio in t-1	-.727	-.467	.122	-.768	-.420	.128
	(.439)*	(.324)	(.251)	(.428)*	(.320)	(.255)
Inverse Mills Ratio				-.518	3.241	1.526
				(.067)	(2.729)	(2.110)
Observations.	3,018	2,191	5,982	3,018	2,191	5,982
R^2	.872	.836	.868	.87	.837	.868
First Stage: Credit Supply in t	.693	.885	.665	.677	.884	.665
First Stage: F-statistic	14.285	23.276	25.421	13.452	23.024	25.235
Test Instruments Selection Equation				1195.897	38.01	13.334
P-value				0.000	0.000	.01
Manufacturer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

a A manufacturer's size is determined by the entry thresholds given by Law 590 of 2000 described in detailed in Table 2. Number of exporters: 2,930 distributed as follows: 5,982 Large, 2,191 Medium and 3,018 Small. The database only includes manufacturers classified within economic sectors of Agriculture (1 − 5) and Manufacturing (15 − 39) as defined by the international standard industry classification, ISIC revision 1.1. Source: Authors' own calculations. Notes: Total Bank Financed Debt in *t* (ln) corresponds to the logarithm of the loan obtained in *t*. Columns (2), (3) and (4) instrument a manufacturer's demand for bank credit with the total bank supply of banking credit net of a manufacturer's own credit supply. Column (4) includes a control for the sample selection bias of SS's database. Instruments for entry into the SS's database are obtained from the terms in office reported in Table 4. All specifications cluster standard errors by industry classification. ***, ** and * means significant at 1%, 5% and 10% respectively.

Table 13. Credit Elasticity of Market Reach by Size[a]

Dependent Variable:	Manufacturer Size			Manufacturer Size		
Market Reach in t (ln)	(1)	(2)	(3)	(4)	(5)	(6)
	Small	Medium	Large	Small	Medium	Large
Total Bank Financed Debt in t (ln)	.001	.041	.030	.002	.040	.030
	(.017)	(.016)**	(.011)***	(.018)	(.016)**	(.011)***
Leverage Ratio in t-1	-.181	-.080	-.058	-.192	-.058	-.052
	(.148)	(.175)	(.117)	(.151)	(.177)	(.121)
Inverse Mills Ratio				-.194	1.776	1.736
				(.268)	(1.658)	(1.488)
Observations	3,018	2,191	5,982	3,018	2,191	5,982
R^2	.848	.811	.853	.848	.812	.853
First Stage: Credit Supply in t	.693	.885	.665	.677	.884	.665
First Stage: F-statistic	14.285	23.276	25.421	13.452	23.024	25.235
Test Instruments Selection Equation				1195.897	38.01	13.334
P-value				0.000	0.000	.01
Manufacturer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

a A manufacturer's size is determined by the entry thresholds given by Law 590 of 2000 described in detailed in Table 2. Number of exporters: 2,930 distributed as follows: 5,982 Large, 2,191 Medium and 3,018 Small. The database only includes manufacturers classified within economic sectors of Agriculture (1 − 5) and Manufacturing (15 − 39) as defined by the international standard industry classification, ISIC revision 1.1. Source: Authors' own calculations. Notes: Total Bank Financed Debt in *t* (ln) corresponds to the logarithm of the loan obtained in *t*. Columns (2), (3) and (4) instrument a manufacturer's demand for bank credit with the total bank supply of banking credit net of a manufacturer's own credit supply. Column (4) includes a control for the sample selection bias of SS's database. Instruments for entry into the SS's database are obtained from the terms in office reported in Table 4. All specifications cluster standard errors by industry classification. ***, ** and * means significant at 1%, 5% and 10% respectively.

Table 14. Credit Elasticity of Market Penetration by Size[a]

Dependent Variable:	Manufacturer Size			Manufacturer Size		
Market Penetration in t (ln)	(1)	(2)	(3)	(4)	(5)	(6)
	Small	Medium	Large	Small	Medium	Large
Total Bank Financed Debt in t (ln)	0.079	0.059	-0.006	0.082	0.058	-0.006
	(.035)**	(.027)**	(0.026)	(.037)**	(.026)**	(.026)
Leverage Ratio in t-1	-0.547	-0.387	0.18	-0.576	-0.362	0.18
	(.335)	(.200)*	(.191)	(.321)*	(.201)*	(.192)
Inverse Mills Ratio				-0.515	2.005	0.062
				(.577)	(3.194)	(3.582)
Observations	3018	2191	5982	3018	2191	5982
R^2	0.846	0.798	0.825	0.844	0.799	0.825
First Stage: Credit Supply in t	0.693	0.885	0.665	0.677	0.884	0.665
First Stage: F-statistic	14.285	23276	25421	13452	23024	25235
Test Instruments Selection Equation				1195.897	38.01	13.334
P-value				0.000	0.000	0.01
Manufacturer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

a Market Penetration is measured as the ln of a manufacturer's average exports per destination. A manufacturer's size is determined by the entry thresholds given by Law 590 of 2000 described in detailed in Table 2. Number of exporters: 2,930 distributed as follows: 5,982 Large, 2,191 Medium and 3,018 Small. The database only includes manufacturers classified within economic sectors of Agriculture (1 − 5) and Manufacturing (15 − 39) as defined by the international standard industry classification, ISIC revision 1.1. Source: Authors' own calculations. Notes: Total Bank Financed Debt in *t* (ln) corresponds to the logarithm of the loan obtained in *t*. Columns (2), (3) and (4) instrument a manufacturer's demand for bank credit with the total bank supply of banking credit net of a manufacturer's own credit supply. Column (4) includes a control for the sample selection bias of SS's database. Instruments for entry into the SS's database are obtained from the terms in office reported in Table 4. All specifications cluster standard errors by industry classification. ***, ** and * means significant at 1%, 5% and 10% respectively

Table 15. Credit Elasticity of Product Mix by Size[a]

Panel A. Product Mix - 6 digits HS						
Dependent Variable:	**Manufacturer Size**			**Manufacturer Size**		
Product Mix in t (ln)	**(1) Small**	**(2) Medium**	**(3) Large**	**(4) Small**	**(5) Medium**	**(6) Large**
Total Bank Financed Debt in t (ln)	0.035	0.036	0.011	0.037	0.036	0.011
	(.023)	(.014)**	(.014)	(.024)	(.015)**	-0.014
Leverage Ratio in t-1	-0.141	-0.138	-0.02	-0.157	-0.137	-0.014
	(.124)	(.104)	(.175)	(.127)	(.106)	(.179)
Inverse Mills Ratio				-0.289	0.109	1.522
				(.339)	(2.171)	(1.992)
Observations	3018	2191	5982	3018	2191	5982
R^2	0.842	0.778	0.821	0.84	0.778	0.821
First Stage: Credit Supply in t	0.693	0.885	0.665	0.677	0.884	0.665
First Stage: F-statistic	14.285	23.276	25.421	13.452	23.024	25.235
Test Instruments Selection Equation				1195.9	38.01	13.334
P-value				0.000	0.000	0.01
Panel B. Product Mix - 8 digits HS						
Dependent Variable:	**Manufacturer Size**			**Manufacturer Size**		
Product Mix in t (ln)	**(1) Small**	**(2) Medium**	**(3) Large**	**(4) Small**	**(5) Medium**	**(6) Large**
Total Bank Financed Debt in t (ln)	0.038	0.037	0.011	0.039	0.037	0.011
	(.022)*	(.015)**	(.014)	(.024)*	(.015)**	(.014)
Leverage Ratio in t-1	-0.118	-0.085	-0.012	-0.132	-0.08	-0.007
	(.129)	(.127)	(.177)	(.130)	(.126)	(.180)
Inverse Mills Ratio				-0.25	0.398	1.464
				(.345)	(2.182)	(2.059)
Observations	3018	2191	5982	3018	2191	5982
R^2	0.831	0.759	0.817	0.829	0.759	0.817
First Stage: Credit Supply in t	0.693	0.885	0.665	0.677	0.884	0.665
First Stage: F-statistic	14.285	23.276	25.421	13.452	23.024	25.235
Test Instruments Selection Equation				1195.9	38.01	13.334
P-value				0.000	0.000	0.01
Panel C. Product Mix - 10 digits HS						
Dependent Variable:	**Manufacturer Size**			**Manufacturer Size**		
Product Mix in t (ln)	**(1) Small**	**(2) Medium**	**(3) Large**	**(4) Small**	**(5) Medium**	**(6) Large**
Total Bank Financed Debt in t (ln)	0.039	0.037	0.012	0.04	0.037	0.012
	(.023)*	(.015)**	(.015)	(.024)*	(.015)**	(.014)
Leverage Ratio in t-1	-0.082	-0.074	-0.021	-0.089	-0.067	-0.016
	(.151)	(.134)	(.175)	(.153)	(.134)	(.178)
Inverse Mills Ratio				-0.119	0.534	1.331
				(.340)	(2.216)	(2.026)
Observations	3018	2191	5982	3018	2191	5982
R^2	0.828	0.757	0.816	0.828	0.757	0.816
First Stage: Credit Supply in t	0.693	0.885	0.665	0.677	0.884	0.665
First Stage: F-statistic	14.285	23.276	25.421	13.452	23.024	25.235
Test Instruments Selection Equation				1195.9	38.01	13.334
P-value				0.000	0.000	0.01
Manufacturer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

a Product Mix is measured as the ln of the head count of products exported, given the corresponding harmonized system category. Sample: 1998 − 2006. Source: Authors own calculations. Notes: All specifications cluster standard errors by industry classification. ***, ** and * means significant at 1%, 5% and 10% respectively.

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