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FINANCIAL DEVELOPMENT, EXPORTING AND FIRM HETEROGENEITY IN CHILE*

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Abstract

Using plant-level data from Chile's manufacturing sector for the period 1990-2000, this paper examines the effect of financial development on the probability of exporting at the plant level, with a special focus on the heterogeneous responses of plants with different characteristics. The main results are that an improvement in financial development increases the probability of exporting of more productive plants and those with foreign ownership operating in manufacturing sectors that are more dependent on external finance. Our estimates also indicate that financial development does not appear to improve the probability of exporting for relatively smaller and younger plants. This result suggests that, at least for the case of exporting in Chile, smaller and younger plants are not necessarily more likely to benefit from improvements in access to credit than larger and older ones.

Resumen

Utilizando datos de plantas manufactureras en Chile durante el período 1990-2000, este trabajo analiza el efecto del desarrollo financiero sobre la probabilidad de exportar con énfasis en la respuesta heterogénea de las plantas. Los resultados muestran que el mayor desarrollo financiero de la economía chilena ha aumentado la probabilidad de exportar de las plantas más productivas y de aquellas de propiedad extranjera en sectores industriales que son más dependientes del financiamiento externo. En general, nuestros resultados no muestran que las plantas más nuevas y más pequeñas sean particularmente beneficiadas de una profundización del mercado financiero en Chile.

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1. INTRODUCTION

The recent financial crisis that affected many economies of the world during the latter part of the 2000s, demonstrated the importance of financial systems for economic growth and international trade. While empirical studies at the macro level have shown that financial development is an important determinant of economic growth (King and Levine, 1993; Levine, 1997; Levine, et al., 2000), and trade volumes and trade patterns (Beck, 2002, 2003), still surprisingly little is known about the heterogeneous responses of firms at the micro level. A series of empirical studies has shown that international trade is characterized by a high degree of heterogeneity. Firms that are involved in exporting or importing activities are, on average, more productive, larger, more capital and skill intensive, and pay higher wages than firms that participate in domestic markets only (Bernard and Jensen, 1999; Alvarez and López, 2005; Kasahara and Rodrigue, 2008; López and Yadav, 2010).[1] The purpose of this paper is to link the macro and the micro literatures by examining the effect of financial development on firms' exporting decisions taking into account the potential different responses by heterogeneous firms.

Our conceptual framework is based on the recent theoretical analyses by Chaney (2005) and Manova (2008), who extend the Melitz (2003) model of international trade to study the relationship between firm export decisions and financial constraints. In these theories, given that exporting involves entry costs that need to be paid up front, limited access to financing can prevent the entry of firms into international markets. An implication of these analyses is that a higher degree of financial development should help reducing financial constraints at the firm level, thereby increasing the probability of exporting. Using plant-level data from the manufacturing sector of Chile for the period 1990-2000, we study the effect of financial development on the probability of

[1] For a recent survey, see Wagner (2011).

exporting, and we extend the previous literature by considering explicitly the differential impact of financial development across plants and industries.

Most of the previous empirical papers at the micro level have examined the role of firm-specific credit constraints or financial health on the probability of exporting, but have overlooked the potential role of financial development. While some studies on this area find that firms with lower credit constraints are more likely to export (e.g., Berman and Héricourt, 2009; Bellone, et al., 2010; and Minetti and Zhu, 2011), others find that causality runs in the opposite direction, so that exporting improves firms' financial health (e.g., Greenaway, et al., 2007). Since exporting and financial health are likely to be endogenous, establishing the direction of the causality is a challenge in all these studies.

The only paper that we are aware of that considers the role of financial development explicitly in the export decision is the study by Berman and Héricourt (2009), who use a dataset with information for 5,000 firms from nine developing countries. Similar to our approach, they include in some regressions a measure of financial development interacted with firm-level productivity. They find that financial development disproportionally increases the probability of exporting of more productive firms. Our paper extends the previous literature by analyzing whether productivity and other plant characteristics, such as size, age and foreign ownership, may play a role in determining the effect of financial development on the exporting probability.

In addition, we also look at how the heterogeneous effect of financial development differs across industries depending on their degree of financial dependence. To do this, we use a variant of the identification strategy developed by Rajan and Zingales (1998) to analyze whether financial development has a larger effect on more productive firms (or younger or foreign-owned firms) in those sectors where external financial needs are more relevant. This strategy has been used in a

cross-country setting by Aghion, et al. (2007) to study the effects of financial development on firm dynamics. Their results show that financial development matters most for entry of new firms and post-entry growth in sectors that are more dependent on external financing.[2]

Our econometric results consistently show that financial development benefits more productive and foreign-owned firms in industries that are more dependent on external finance. In contrast, smaller and younger firms do not appear to be particularly affected by financial development. Our results hold to several robustness checks such as the introduction of interactions between aggregate shocks and firm characteristics, and the use of other measures of financial dependence and estimation techniques.

One usual concern when analyzing the effect of financial development is the potential endogeneity of this variable. In our case, since a country's financial development is exogenous to the decision to export at the firm level, our analysis does not need to deal with the issue of causality going in the opposite direction. It can be argued, however, that capital markets development may depend on the industry characteristics of the country, which needs to be taken into account in the empirical analysis. In fact, Braun and Raddatz (2008) argue that changes in the relative strength of trade promoter and trade opponent industries result in changes in the political equilibrium level of financial development. They find evidence that strengthening of promoter relative to opponent industries resulting from trade liberalization is a good predictor of subsequent financial development. Similarly, Do and Levchenko (2007) show that a country's trade pattern can affect its financial development. They present evidence that countries with a higher specialization in financially dependent goods have a higher level of financial development than countries producing

[2] Recent papers using a similar identification strategy with microeconomic data are Jaud and Kukenova (2011) which shows that agri-food products that require more external finance survive longer in foreign markets if the exporting country is more financially developed, and Tsoukas (2011) which presents evidence that stock market development is particularly beneficial to large firms.

goods for which external finance is less important. Given that we use plant-level information we can rule out the effect of industry-specific shocks that can simultaneously affect both financial development and the probability of exporting, by including industry-year fixed effects in all our regressions.

This paper is structured as follows. The second section describes the data and presents some basic patterns. The third section introduces the empirical methodology. Section four presents and discusses the econometric results, and also several robustness checks. In the fifth section, we conclude and discuss the implications of our findings.

2. DATA DESCRIPTION

The analysis is based on the Annual National Industrial Survey (ENIA) carried out by the National Institute of Statistics of Chile (INE). This plant-level survey is representative of Chilean manufacturing plants with 10 or more workers.[3] The dataset is available for the period 1979 to 2000, but we have information for exports and foreign ownership only since 1990. Given that we are interested in studying the relationship between exporting and financial development, we use information only for the period 1990 through 2000.

The INE updates the survey annually by incorporating plants that started operating during the year and excluding those plants that stopped operating for any reason. Each plant has a unique identification number which allows us to identify entry and exit. For each plant and year, the ENIA collects data on production, value added, sales, employment and wages (for production and non-production workers), exports, investment, depreciation, energy usage, payments in foreign

[3] Although a plant is not necessarily a firm, in the case of Chilean manufacturing, most firms have only one plant. Thus, the paper will refer to plants and firms interchangeable.

technology licenses, and other plant characteristics. Plant ownership is identified by the percentage of capital owned by foreigners. We define as foreign-owned plants those plants with any amount of foreign ownership.[4] All plants in the data are classified according to the International Standard Industrial Classification (ISIC) revision 2. Using 3-digit ISIC industry level price deflators, all monetary variables were converted to constant 1985 pesos. Plants do not report information on capital stock, thus it was necessary to construct this variable using the perpetual inventory method for each plant.

Table 1 presents a summary of the industrial structure in Chile. It shows the importance of each 3-digit industry in the total number of plants and employment. The most important sector, both in terms of employment and number of plants, is food manufacturing, with a share of about 30 per cent in terms of employment and number of plants in the year 2000. Other important industries include metallic products, and the wood industry, with employment shares of about seven and six per cent respectively in 2000. As it is evident from the table, the most important industries in Chile in terms of employment and number of plants are sectors that are intensive in the use of natural resources, which is not surprising given that Chile is a relatively natural resources abundant country. The importance of capital intensive industries, such as machinery and transport equipment, is relatively low.

Measures of financial development come from the dataset compiled by Beck, et al. (2010). The variables that we use in our empirical approach are the ratio of private credit by deposit money banks over GDP (Bank Credit) and the ratio of private credit by deposit money banks and other financial institutions over GDP (Dom. Credit). These indicators of size of the financial markets have been commonly used in the economic growth and finance literature. The evolution of both

[4] Most of the plants with foreign ownership have actually majority foreign ownership (over 50% foreign ownership).

variables is presented in Figure 1. As we can see, both measures of financial development tend to move together. Although there was a decrease in these two variables between 1990 and 1991, they have grown continuously since then.

In order to examine preliminarily if the increase in these two measures of financial development has been associated with higher export participation rates among Chilean firms, Figure 2 shows the evolution of export participation rates across quartiles of firm size based on employment, over the period 1990-2000. As it has been shown for several economies, there is a positive relationship between the probability of exporting and firm size. We can see that smaller plants tend to be less likely to participate in export markets than larger firms. For example, while the export participation rate of the group of plants in the first quartile of employment is less than 4% in 2000, almost half of the plants in the fourth quartile are exporters. Looking at the evolution over time, in all four quartiles the export participation rates are higher in 2000 than in 1990, suggesting that financial development may have potentially helped to increase export participation during the period. It is not clear from the graph, however, if one particular quartile benefited more than others from better access to finance. The remainder of the paper examines these issues, and other potential heterogeneous effects of financial development.

3. METHODOLOGY

The empirical analysis is based on the dynamic empirical model developed by Roberts and Tybout (1997) and later employed by Bernard and Jensen (2004). A firm *i* chooses to export $(X_{ijt} = 1)$ if current and expected revenues are greater than current period costs plus any sunk cost of exporting:

$$X_{ijt} = \begin{cases} 1 \text{ if } \hat{\pi}_{ijt} > c_{ijt} + F(1 - X_{ijt-1}) \\ 0 \text{ otherwise,} \end{cases}$$

where $\hat{\pi}_{ijt}$ are current and expected revenues for plant *i* operating in industry *j* in year *t*, c_{ijt} are current costs, and *F* represents the fixed sunk cost of exporting. In order to identify the factors that affect the probability of exporting, we use a binary-choice model of the form:

$$X_{ijt} = \begin{cases} 1 \text{ if } \beta Z_{ijt} + \gamma FD_t - F(1 - X_{ijt-1}) + \varepsilon_{ijt} > 0 \\ 0 \text{ otherwise,} \end{cases}$$

where Z_{ijt} is a vector of plant characteristics, which includes productivity (TFP),[5] size (total employment), the capital-labor ratio, skill intensity (the fraction of skilled wages in the total wage bill), a dummy variable equal to one for importers of intermediate inputs, a dummy variable equal to one for plants with foreign ownership, and age. FD_t is a variable that measures financial development at time *t*.

The binary-choice model is estimated using a linear probability model, which allows us to control for different dimensions of unobserved heterogeneity. The basic specification includes plant-fixed effects to control for all unobserved characteristics at the plant level that may be affecting the probability to export, and also 3-digit level industry-year fixed effects, which control for time-varying unobserved characteristics at the sector level. Thus, the estimated equation is:

$$P(X_{ijt} = 1) = \alpha_i + \alpha_{jt} + \delta X_{ijt-1} + \lambda Z_{ijt-1} + \eta_1 FD_t z_{ijt-1} + \eta_2 FD_t z_{ijt-1} EFD_j + \varepsilon_{ijt},$$

[5] Total factor productivity is measured as the residual of a regression that estimates a Cobb-Douglas production function for each 3-digit industry using the method proposed by Olley and Pakes (1996) and later modified by Levinsohn and Petrin (2003), which corrects the simultaneity bias associated with the fact that productivity is not observed by the econometrician but it may be observed by the firm. In some cases, the production functions were estimated at the 2-digit level due to the small number of observations of some industries at the 3-digit level of disaggregation.

where α_i represents the plant fixed effects, α_{jt} corresponds to the time-varying industry fixed effects, and z_{ijt-1} is a sub-vector of plant characteristics that includes productivity, size, age and the foreign ownership dummy. These plant-level variables are included as interactions with financial development to examine if the effect of financial development has heterogeneous effects on the probability of exporting. In order to avoid potential endogeneity problems, all plant-level variables are included as one-year lags.[6]

The interactions with size, age, and foreign ownership intend to capture the differential effect of financial development on firms likely differing in their access to domestic financial markets. Following Aghion, et al., (2007), given that smaller and younger firms are more likely to be financially constrained in a less developed capital market, it is possible that financial development has a positive, and larger, effect on these plants, and a smaller effect on larger and older plants. In the case of foreign-owned firms, we expect the interaction term to be negative. One reason is that foreign-owned firms are likely to be less dependent on domestic capital markets given that they can obtain credit from their multinational parents. In fact, there is evidence suggesting that foreign-owned firms tend to be less dependent of domestic capital markets (Desai, et al., 2004, 2008). The inclusion of these firms' characteristics is also justified by the evidence provided by Beck, et al. (2006) showing that younger, smaller, and domestically owned firms report more financing obstacles, in a survey of over 10,000 enterprises from 80 countries. Their econometric findings confirm that these variables are a good proxy for financial constraints at the firm level.

[6] Alternative estimation techniques include the use of probit or logit models. These models, however, are not well suited to control for unobserved heterogeneity at the plant, and industry level. Besides, the interpretation of the estimates for the many interaction terms that we have is not clear in non-linear models such as probit or logit. We recognize the limitations of our approach (e.g., that predicted probabilities may lie beyond the 0-1 interval), but since we are not interested in prediction, we opted for using a linear probability model.

The variable measuring industry-specific differences in financial needs (EFD_j) is taken from Rajan and Zingales (1998). This variable is defined as the fraction of capital expenditures not financed with cash flow operations, and it is computed for the median of U.S. firms at the 3-digit ISIC industry level. Rajan and Zingales (1998) argue that this measure, calculated using data for U.S. firms, can serve as a useful measure at the industry level for other countries as well. They assume that this indicator reflects some technological factors for why some industries depend more on external finance than others, and they argue that these technological differences persist across countries. In our context, we are assuming that the ranking of the industries does not differ too much between the U.S. and Chile. However, if this were not the case, these would be the differences that would prevail if Chile had financial markets with no significant restrictions, as in the case of the U.S.

The triple interaction term among financial development, industry financial needs, and plant characteristics is included to examine the heterogeneous effect of financial development across industries depending on their degree of financial dependence. In such a case, we can test if financial development increases more the probability of exporting of smaller (or younger or domestic) plants in more financially dependent industries.

Finally, the interaction term for productivity with financial development and industry financial dependence tries to examine if a more developed financial market allocates resources to more productive plants. This would be in line with findings by Berman and Héricourt (2009) who show that financial development disproportionally increases the probability of exporting of more productive firms. In our case, the inclusion of a triple interaction allows us also to test if this effect is larger in more financially dependent industries.

4. RESULTS

4.1 BASIC RESULTS

Tables 2 and 3 present the basic regression results. Table 2 uses domestic credit as the measure of financial development, while Table 3 proxies financial development with bank credit. Column (1) presents the main results including plant characteristics and the measure of financial development interacted with plant size. Columns (2)-(4) include additional interaction terms between plant characteristics, financial development, and financial dependence. As seen in both tables, and consistent with previous studies,[7] size, capital intensity, and foreign ownership positively affect the probability of export. The estimate for the previous export participation dummy is positive and significant in all cases. Its magnitude suggests that being an exporter in the previous year increases the probability of exporting today by about 24%, which is in line with previous findings (e.g., Bernard and Jensen, 2004).

As seen in columns (3) and (4) of Tables 2 and 3, the only positive and statistically significant interactions are those for financial development, productivity (and foreign ownership) and financial dependence. This reveals that financial development significantly increases the probability of exporting for more productive plants and those with foreign ownership that operate in sectors that are more dependent on external finance. This result for foreign firms is not consistent with the idea that they can be less favored by the development of domestic capital markets. At least in the case of Chile, the evidence suggests that financial development may affect foreign firms more positively. Although we do not attempt to explain this finding, there are some reasons that can be explored further. First, foreign firms may be located in industries where the economy has comparative

[7] See, for example, Roberts and Tybout (1997), Castellani (2002), Bernard and Jensen (2004), and Greenaway, et al. (2007).

advantage and financial resources are allocated to these sectors more than proportionally. Second, foreign ownership may be a signal of lower risk or better opportunities growth. In both cases, these firms can be preferred by financial institutions.

Most of the other estimates for the rest of the interaction terms are not significant with the exception of the estimate for the interaction between domestic credit and age which is negative in Table 2. This would suggest that younger plants benefit more from financial development. As seen in Table 3, however, this result is not robust to the use of bank credit as a measure of financial development.

Interestingly, financial development does not seem to affect differently plants with different size, since the estimates for the interaction terms between financial development, size, and financial dependence in Tables 2 and 3 are all statistically not significant. This result would go against the perception that small plants are more likely to benefit from a higher developed financial system (Aghion, et al., 2007; World Bank, 2008). At least, in terms of export participation, our results so far do not support this common view.

To further investigate this issue, and in order to consider the possibility of a non-monotonic relationship between size and export participation, we include in Tables 4 and 5 dummy variables for plants belonging to the first three size quartiles measured in terms of employment. In the tables, size 1 corresponds to the smallest plants (quartile 1), size 2 to the second smallest (quartile 2), and size 3 is the third smallest group (quartile 3). The omitted category is the group of largest plants (quartile 4). If financial development increases export probability of smaller plants, then the estimate for the interaction between financial development and the small plant categories should be positive and significant.

The results presented in Tables 4 and 5, with the two different measures of financial development show that none of the estimates for the interaction terms between financial development and size are statistically significant. We observe once again that financial development increases export probability of plants that are more productive and plants with foreign ownership in sectors more dependent on external finance. The estimate for the interaction term between the measure of financial development and age is negative and now significant regardless of the measure used to proxy financial development. This suggests that younger plants would be more likely to benefit from financial development. However, this result is not robust to alternative specifications and estimation techniques as we show in the next subsection.

In order to analyze the quantitative importance of these interactions with productivity and foreign ownership, we compute the effect of changes in financial development for different parts of the productivity distribution - and for domestic and foreign-owned plants- and for different values of industry-specific financial needs. In Figure 3, we summarize these results considering low and high productivity firms as those in the 25% and 75% percentile of the productivity distribution, and low and high financial dependence industries as those in 25% and 75% of the distribution of this variable. We present the effect of financial development on the probability of exporting for these firms when moving this variable from the minimum to the maximum of the period. As it can be appreciated, the differences are relatively small. The increase in financial development augments the probability of exporting for low productivity firms by 0.5% in low financial dependent industries, and by 0.9% in high financial dependent industries. For high productivity firms, the effect tends to be more important. The increases in the probability of exporting are 1.1% in industries less dependent on finance and 2.3% in industries with high financial dependence. In the

last case this compares in order of magnitude with an unconditional probability of exporting of 22.5% during this period.[8]

As the results presented above suggest that the effect of financial development is more important for foreign-owned firms in more financial dependent industries, we compute also the effects of changes in financial development on the probability of exporting for foreign-owned and domestic firms in industries with high and low financial dependence. The results are shown in Figure 4. The raise in domestic credit to GDP during the period is associated with an increase of 0.8% in the probability of exporting for domestic firms in low financial dependent industries and 1.6% in industries with higher financial needs. In the case of foreign-owned firms, the increases in the probability of exporting are 1.0% and 1.9%, respectively.[9]

4.2 Extensions and Robustness Checks

One potential concern of using measures of financial development at the aggregate level is that they may be capturing the effect of other macroeconomic variables. In order to investigate this issue, we add a set of interaction terms between plant characteristics and two additional macroeconomic variables: annual GDP growth and the log of the real exchange rate (RER). The first one tries to control for the heterogeneous effects of economic cycles and the second one for changes in export profitability associated with exchange rate movements. The results are presented in Table 6. Column (1) shows the results using domestic credit while column (2) uses bank credit. In both cases we find, once again, that financial development benefits more productive plants and those with

[8] These marginal effects consider the results of column (4) in Table 2 and only the parameters that are statistically significant. In this case, the marginal effects are evaluated at the average of the variable foreign ownership. Given that the econometric results are very similar to those in Table 3 we do not present the effects corresponding to those results.

[9] The high and low financially dependent industries are classified as in the previous exercise. In this case, the marginal effects are evaluated at the average of total factor productivity.

foreign ownership in sectors more dependent on external finance. One difference with our previous results is the estimate for the interaction between financial development, size and dependence on external finance which is now positive and statistically significant, suggesting that larger plants in sectors more dependent on external finance are more likely to export if the development of the financial sector increases.

Following Manova (2010), we check if the results are robust to the inclusion of an additional industry-specific measure of financial dependence used in the literature. This is a measure of assets tangibility developed by Braun (2003) and is defined as the share of net property, plant and equipment in book-value assets. Similar to the measure of Rajan and Zingales (1998), it is computed for the median sector in 3-digit ISIC industry. As seen in Table 7, the inclusion of interactions of this variable with financial development and plant characteristics does not affect the main result that more productive and foreign-owned plants, in sectors more dependent on external finance, are more likely to export in response to improvements in access to credit.

One additional concern with our results is the potential role of unobserved heterogeneity at the regional level. Plants may be more likely to export because they are located in regions that are more favorable for exporting or in regions in which a significant number of plants export, which may potentially create a spillover effect on other plants. In order to control for this possibility we re-estimated all the regressions in Tables 2 through 7 including a full set of region-year fixed effects. The results, not shown here, are similar to our basic findings and indicate that financial development increases the probability of exporting of more productive plants and those with foreign ownership on sectors more dependent on external finance, which is consistent with our previous findings. We also find in some, but not in all, regressions that the interaction between financial development and plant age is negative and significant.

Another concern of our estimations is the possible selection bias due to the fact that we only observe surviving plants in the data. This sample selection may potentially bias our results. In order to deal with this issue we follow the standard Heckman (1976) correction technique, which consists on first estimating the inverse mills ratio from a probit model for survival, and then including the estimated inverse mills ratio in the regressions for export probability. The results of this estimation technique, not shown here, are very similar to our basic results, and confirm that more productive plants and plants with foreign ownership in sectors more dependent on external finance benefit more from financial development. Thus, or results are not driven by a sample selection bias.

Finally, we attempt to deal with the endogeneity problem associated with including a lag of the dependent variable and the possible endogeneity of some of the plant-level explanatory variables, such as size and productivity. Following Bernard and Jensen (2004), we have re-estimated all our regressions using the system GMM dynamic panel estimator. The resulting estimates, not shown here, are similar in magnitude, sign, and statistical significance than our basic estimates. Although not all the regressions pass the tests of over identifying restrictions and the tests of second order autocorrelation, we interpret this evidence as suggestive that endogeneity issues do not drive our basic results.

5. CONCLUSIONS

Motivated by recent models of international trade that emphasize the role of financial constraints on the decision to export, this paper investigated the effects of financial development on the probability of exporting among Chilean manufacturing plants for the period 1990-2000. Using a linear probability model that allowed us to control for unobserved plant and time-varying industry heterogeneity, we found that financial development has a positive effect on the probability of exporting of more productive plants as well as those plants with foreign ownership that operate in sectors that are more dependent on external finance. This result remained robust to the inclusion of additional controls at the macroeconomic level and a measure of financial exposure at the sector level.

We did not consistently find a positive effect of financial development on smaller and younger plants, which suggests that, at least for the case of exporting in Chile, the conventional view that financial development is likely to benefit small and young firms, which are assumed to be more credit constrained, is not supported by the empirical evidence.

Our results imply that financial development cannot be expected to achieve significant changes in firm export performance for smaller and younger firms. As the evidence for other countries shows, exports are, in general, concentrated on a small number of large and highly productive firms. Our evidence for Chile suggests that capital market development is unlikely to be an effective mechanism to change that situation. Unfortunately, with our data we cannot identify the exact reason for this result. One may speculate that the development of financial markets in Chile has not yet translated into better access to credit for smaller and younger firms, or that the relaxation of

financial constraints has not been enough to overcome the additional barriers that these firms face in international markets.

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Table 1: Distribution of Plants and Employment by Sector (%)

ISIC Code	Description	Plants Share		Employment Share	
		1990	2000	1990	2000
311	Food Manufacturing	30.7	28.7	26.5	31.5
313	Beverages	2.1	2.1	3.1	3.8
314	Tobacco	0.1	0.1	0.2	0.2
321	Textiles	7.9	6.3	8.7	5.4
322	Apparel	6.8	5.4	6.1	3.6
323	Leather Products	1.1	0.7	0.8	0.4
324	Footwear	3.4	2.1	3.7	2.1
331	Wood Products	7.2	6.5	7.1	6.3
332	Furniture	2.6	3.2	1.9	1.9
341	Paper	1.4	1.9	2.7	3.2
342	Printing and Publishing	4.1	4.8	3.1	3.7
351	Industrial Chemicals	1.6	1.4	1.3	1.9
352	Other Chemicals	3.7	4.0	5.0	5.0
353	Petroleum Refineries	0.0	0.1	0.3	0.4
354	Petroleum and Coal	0.4	0.4	0.5	0.3
355	Rubber Products	1.1	1.3	1.1	1.1
356	Plastic	4.3	5.0	3.7	4.4
361	Ceramics	0.4	0.1	0.7	0.4
362	Glass	0.4	0.5	0.6	0.6
369	Non-Metallic Minerals	2.6	3.3	2.1	2.7
371	Iron and Steel	0.7	0.7	2.2	1.8
372	Non-Ferrous Metals	0.8	1.3	2.4	4.1
381	Fabricated Metal	7.7	10.8	7.2	7.3
382	Non-Electrical Machinery	3.9	3.9	4.1	3.0
383	Electrical Machinery	1.1	1.3	1.2	1.2
384	Transport Equipment	2.4	2.2	2.8	3.0
385	Professional and Scientific Equipment	0.4	0.7	0.2	0.4
390	Other Manufacturing	1.2	1.2	0.7	0.5

Source: Authors' elaboration based on ENIA, 1990-2000.

Table 2: Basic Results Using Domestic Credit

	(1)	(2)	(3)	(4)
Exported last year	0.247***	0.244***	0.244***	0.244***
	(0.011)	(0.011)	(0.011)	(0.011)
TFP	0.003	0.004	-0.004	-0.005
	(0.003)	(0.003)	(0.022)	(0.022)
K/L	0.010***	0.011**	0.011**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)
Skill (Skilled Wages/Total Wages)	-0.009	-0.011	-0.011	-0.010
	(0.012)	(0.012)	(0.012)	(0.012)
Size	0.052**	0.050**	0.050**	0.046**
	(0.019)	(0.020)	(0.020)	(0.021)
Age	-0.002	-0.003	-0.003	0.036
	(0.010)	(0.010)	(0.010)	(0.027)
Imported Inputs Dummy	0.009	0.009	0.009	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)
Foreign	0.025**	0.025**	0.025**	0.084
	(0.010)	(0.011)	(0.011)	(0.082)
Dom. Cred.*Size	-0.027	-0.030	-0.033	-0.025
	(0.036)	(0.041)	(0.043)	(0.043)
Dom. Cred.*Size*Fin. Dep.		0.029	0.047	0.041
		(0.049)	(0.052)	(0.050)
Dom. Cred.*TFP			0.002	0.004
			(0.039)	(0.039)
Dom. Cred.*TFP*Fin. Dep.			0.053**	0.053**
			(0.024)	(0.024)
Dom. Cred.*Age				-0.094**
				(0.044)
Dom. Cred.*Age*Fin. Dep.				0.006
				(0.053)
Dom. Cred.*Foreign				-0.161
				(0.162)
Dom. Cred.*Foreign*Fin. Dep.				0.199***
				(0.060)
Constant	-0.056	-0.057	-0.056	-0.034
	(0.069)	(0.074)	(0.078)	(0.072)
Observations	37,925	36,749	36,749	36,749
R-squared (within)	0.085	0.084	0.084	0.085
Plants	6,607	6,418	6,418	6,418

Robust 3-digit industry clustered standard errors in parentheses. Significance level *** 1%, ** 5%, * 10%. TFP, K/L (Capital-Labor Ratio), Size (Employment), and Age are in logs.

Table 3: Basic Results Using Bank Credit

	(1)	(2)	(3)	(4)
Exported last year	0.247***	0.244***	0.244***	0.244***
	(0.011)	(0.011)	(0.011)	(0.011)
TFP	0.003	0.004	-0.006	-0.007
	(0.003)	(0.003)	(0.018)	(0.018)
K/L	0.011***	0.011***	0.011**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)
Skill (Skilled Wages/Total Wages)	-0.010	-0.011	-0.011	-0.011
	(0.012)	(0.012)	(0.012)	(0.012)
Size	0.057***	0.056***	0.056***	0.051***
	(0.016)	(0.016)	(0.017)	(0.017)
Age	-0.002	-0.004	-0.004	0.037
	(0.010)	(0.010)	(0.010)	(0.029)
Imported Inputs Dummy	0.009	0.009	0.009	0.009
	(0.005)	(0.005)	(0.005)	(0.005)
Foreign	0.026**	0.026**	0.026**	0.094
	(0.010)	(0.011)	(0.011)	(0.071)
Bank. Cred.*Size	-0.042	-0.047	-0.051	-0.040
	(0.035)	(0.041)	(0.042)	(0.043)
Bank. Cred.*Size*Fin. Dep.		0.029	0.050	0.043
		(0.061)	(0.065)	(0.064)
Bank. Cred.*TFP			0.005	0.008
			(0.037)	(0.038)
Bank. Cred.*TFP*Fin. Dep.			0.061**	0.062**
			(0.027)	(0.027)
Bank. Cred.*Age				-0.124*
				(0.062)
Bank. Cred.*Age*Fin. Dep.				0.003
				(0.073)
Bank. Cred.*Foreign				-0.211
				(0.172)
Bank. Cred.*Foreign*Fin. Dep.				0.224***
				(0.073)
Constant	-0.054	-0.059	-0.057	-0.008
	(0.071)	(0.075)	(0.076)	(0.070)
Observations	37,925	36,749	36,749	36,749
R-squared (within)	0.085	0.084	0.084	0.085
Plants	6,607	6,418	6,418	6,418

Robust 3-digit industry clustered standard errors in parentheses. Significance level *** 1%, ** 5%, * 10%. TFP, K/L (Capital-Labor Ratio), Size (Employment), and Age are in logs.

Table 4: Results by Size (Employment) Quartile - Domestic Credit

	(1)	(2)	(3)	(4)
Exported last year	0.249***	0.246***	0.246***	0.246***
	(0.011)	(0.011)	(0.011)	(0.011)
TFP	0.001	0.001	-0.011	-0.012
	(0.003)	(0.003)	(0.020)	(0.020)
K/L	0.004	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Skill (Skilled Wages/Total Wages)	-0.013	-0.014	-0.014	-0.014
	(0.012)	(0.013)	(0.012)	(0.012)
Size 1	-0.026	-0.021	-0.020	-0.012
	(0.051)	(0.053)	(0.056)	(0.056)
Size 2	-0.052	-0.041	-0.039	-0.032
	(0.048)	(0.048)	(0.049)	(0.050)
Size 3	-0.012	-0.012	-0.010	-0.003
	(0.046)	(0.047)	(0.047)	(0.048)
Age	0.003	0.001	0.001	0.044
	(0.010)	(0.010)	(0.010)	(0.027)
Imported Inputs Dummy	0.010*	0.010*	0.010*	0.010*
	(0.005)	(0.005)	(0.006)	(0.005)
Foreign	0.026**	0.026**	0.026**	0.087
	(0.010)	(0.011)	(0.011)	(0.083)
Dom. Credit*Size 1	-0.025	-0.035	-0.028	-0.045
	(0.097)	(0.117)	(0.124)	(0.123)
Dom. Credit*Size 2	0.034	0.028	0.031	0.017
	(0.084)	(0.091)	(0.094)	(0.094)
Dom. Credit*Size 3	-0.011	-0.015	-0.016	-0.029
	(0.079)	(0.083)	(0.083)	(0.085)
Dom. Credit*Size 1*Fin. Dep		0.011	-0.015	-0.011
		(0.099)	(0.105)	(0.100)
Dom. Credit*Size 2*Fin. Dep		-0.037	-0.058	-0.053
		(0.063)	(0.067)	(0.066)
Dom. Credit*Size 3*Fin. Dep		0.025	0.011	0.017
		(0.044)	(0.046)	(0.047)
Dom. Cred.*TFP			0.012	0.014
			(0.036)	(0.037)
Dom. Cred.*TFP*Fin. Dep.			0.046*	0.047*
			(0.024)	(0.024)
Dom. Cred.*Age				-0.106**
				(0.044)
Dom. Cred.*Age*Fin. Dep.				0.009
				(0.051)
Dom. Cred.*Foreign				-0.167
				(0.164)
Dom. Cred.*Foreign*Fin. Dep.				0.209***
				(0.060)
Constant	0.152***	0.150***	0.153***	0.186***
	(0.034)	(0.035)	(0.035)	(0.029)
Observations	37,925	36,749	36,749	36,749
R-squared (within)	0.084	0.083	0.083	0.084
Plants	6,607	6,418	6,418	6,418

Robust 3-digit industry clustered standard errors in parentheses. Significance level *** 1%, ** 5%, * 10%.
TFP, K/L (Capital-Labor Ratio), and Age are in logs.

Table 5: Results by Size (Employment) Quartile - Bank Credit

	(1)	(2)	(3)	(4)
Exported last year	0.249***	0.246***	0.246***	0.246***
	(0.011)	(0.011)	(0.011)	(0.011)
TFP	0.001	0.001	-0.012	-0.013
	(0.003)	(0.003)	(0.016)	(0.016)
K/L	0.004	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Skill (Skilled Wages/Total Wages)	-0.013	-0.015	-0.015	-0.014
	(0.012)	(0.013)	(0.012)	(0.012)
Size 1	-0.051	-0.047	-0.047	-0.038
	(0.042)	(0.044)	(0.046)	(0.046)
Size 2	-0.071*	-0.065	-0.063	-0.054
	(0.038)	(0.038)	(0.039)	(0.039)
Size 3	-0.016	-0.016	-0.014	-0.006
	(0.045)	(0.046)	(0.046)	(0.047)
Age	0.002	0.000	0.000	0.045
	(0.010)	(0.010)	(0.010)	(0.030)
Imported Inputs Dummy	0.010*	0.010*	0.010*	0.010*
	(0.005)	(0.006)	(0.006)	(0.006)
Foreign	0.026**	0.026**	0.026**	0.095
	(0.010)	(0.011)	(0.011)	(0.072)
Bank Credit*Size 1	0.023	0.014	0.022	-0.000
	(0.096)	(0.116)	(0.124)	(0.123)
Bank Credit*Size 2	0.083	0.085	0.088	0.067
	(0.079)	(0.087)	(0.090)	(0.090)
Bank Credit*Size 3	-0.006	-0.010	-0.011	-0.029
	(0.092)	(0.096)	(0.095)	(0.097)
Bank Credit*Size 1*Fin. Dep		0.017	-0.015	-0.009
		(0.123)	(0.130)	(0.124)
Bank Credit*Size 2*Fin. Dep		-0.045	-0.071	-0.065
		(0.078)	(0.083)	(0.082)
Bank Credit*Size 3*Fin. Dep		0.029	0.011	0.019
		(0.056)	(0.058)	(0.060)
Bank. Cred.*TFP			0.016	0.019
			(0.035)	(0.035)
Bank. Cred.*TFP*Fin. Dep.			0.054*	0.056*
			(0.027)	(0.027)
Bank. Cred.*Age				-0.137**
				(0.063)
Bank. Cred.*Age*Fin. Dep.				0.007
				(0.070)
Bank. Cred.*Foreign				-0.216
				(0.174)
Bank. Cred.*Foreign*Fin. Dep.				0.237***
				(0.073)
Constant	0.151***	0.147***	0.148***	0.201***
	(0.034)	(0.035)	(0.033)	(0.033)
Observations	37,925	36,749	36,749	36,749
R-squared (within)	0.084	0.083	0.083	0.084
Plants	6,607	6,418	6,418	6,418

Robust 3-digit industry clustered standard errors in parentheses. Significance level *** 1%, ** 5%, * 10%.
TFP, K/L (Capital-Labor Ratio), and Age are in logs.

Table 6: Including Other Macroeconomic Variables

	Dom. Credit	Bank Credit		Dom. Credit	Bank Credit
Exported last year	0.243***	0.243***	Growth*TFP	-0.000	-0.001
	(0.011)	(0.011)		(0.001)	(0.001)
TFP	0.139	0.037	Growth*Size	0.001	-0.001
	(0.141)	(0.247)		(0.001)	(0.001)
K/L	0.011**	0.011**	Growth*Age	0.001	0.002
	(0.004)	(0.004)		(0.001)	(0.001)
Skill (Skilled Wages/Total Wages)	-0.011	-0.011	Growth*Foreign	0.000	-0.005
	(0.012)	(0.012)		(0.006)	(0.004)
Size	-0.267	0.158	Growth*TFP*Fin. Dep.	0.000	0.002
	(0.196)	(0.286)		(0.003)	(0.003)
Age	-0.447	-0.443*	Growth*Size*Fin. Dep.	0.001	0.003*
	(0.361)	(0.225)		(0.002)	(0.001)
Imported Inputs Dummy	0.009	0.009	Growth*Age*Fin. Dep.	0.000	-0.001
	(0.005)	(0.005)		(0.002)	(0.002)
Foreign	-2.062	-0.264	Growth*Foreign*Fin. Dep.	0.013***	0.016***
	(1.793)	(1.131)		(0.004)	(0.004)
FD*Size	0.020	-0.168	RER*TFP	-0.019	-0.000
	(0.073)	(0.118)		(0.029)	(0.048)
FD*Size*Fin. Dep.	0.355***	0.429***	RER*Size	0.066*	-0.007
	(0.114)	(0.148)		(0.037)	(0.051)
FD*TFP	-0.094	-0.073	RER*Age	0.085	0.085**
	(0.064)	(0.098)		(0.067)	(0.039)
FD*TFP*Fin. Dep.	0.301*	0.381**	RER*Foreign	0.414	0.093
	(0.153)	(0.180)		(0.325)	(0.213)
FD*Age	0.061	0.058	RER*TFP*Fin. Dep.	-0.033	-0.038*
	(0.104)	(0.144)		(0.021)	(0.021)
FD*Age*Fin. Dep.	-0.240**	-0.234	RER*Size*Fin. Dep.	-0.050***	-0.054***
	(0.092)	(0.169)		(0.013)	(0.015)
FD*Foreign	0.409	-0.255	RER*Age*Fin. Dep.	0.028*	0.025
	(0.599)	(0.367)		(0.016)	(0.017)
FD*Foreign*Fin. Dep.	0.746**	0.751**	RER*Foreign*Fin. Dep.	-0.094**	-0.083**
	(0.279)	(0.304)		(0.037)	(0.036)
			Constant	0.019	-0.002
				(0.083)	(0.079)
Observations				36,749	36,749
R-squared (within)				0.086	0.086
Plants				6,418	6,418

FD means Domestic and Bank credit in each column. Robust 3-digit industry clustered standard errors in parentheses. Significance level *** 1%, ** 5%, * 10%. TFP, K/L (Capital-Labor Ratio), Size (Employment), Age, and RER are in logs.

Table 7: Including Industry Financial Exposure Variable

	Domestic Credit	Bank Credit
Exported last year	0.242***	0.242***
	(0.011)	(0.011)
TFP	-0.013	-0.013
	(0.022)	(0.018)
K/L	0.011**	0.012**
	(0.004)	(0.004)
Skill (Skilled Wages/Total Wages)	-0.010	-0.010
	(0.012)	(0.012)
Size	0.040*	0.047**
	(0.022)	(0.017)
Age	0.040	0.032
	(0.028)	(0.027)
Imported Inputs Dummy	0.011*	0.011*
	(0.005)	(0.005)
Foreign	0.087	0.099
	(0.083)	(0.071)
FD*Size	0.105	0.109
	(0.078)	(0.086)
FD*Size*Fin. Dep.	0.028	0.026
	(0.042)	(0.053)
FD*TFP	-0.003	-0.005
	(0.047)	(0.049)
FD*TFP*Fin. Dep.	0.049*	0.058*
	(0.025)	(0.028)
FD*Age	-0.041	-0.016
	(0.068)	(0.111)
FD*Age*Fin. Dep.	-0.000	-0.009
	(0.047)	(0.063)
FD*Foreign	-0.023	-0.046
	(0.159)	(0.167)
FD*Foreign*Fin. Dep.	0.184***	0.206***
	(0.060)	(0.070)
FD*Size*Assets Tang.	-0.362**	-0.413*
	(0.174)	(0.202)
FD*TFP*Assets Tang.	0.071	0.088
	(0.057)	(0.068)
FD*Age*Assets Tang.	-0.189	-0.273
	(0.199)	(0.257)
FD*Foreign*Assets Tang.	-0.444*	-0.546*
	(0.229)	(0.277)
Constant	-0.045	-0.051
	(0.057)	(0.056)
Observations	35,658	35,658
R-squared (within)	0.085	0.085
Plants	6,226	6,226

FD means Domestic and Bank credit in each column. Robust 3-digit industry clustered standard errors in parentheses. Significance level *** 1%, ** 5%, * 10%. TFP, K/L

(Capital-Labor Ratio), Size (Employment), and Age are in logs.

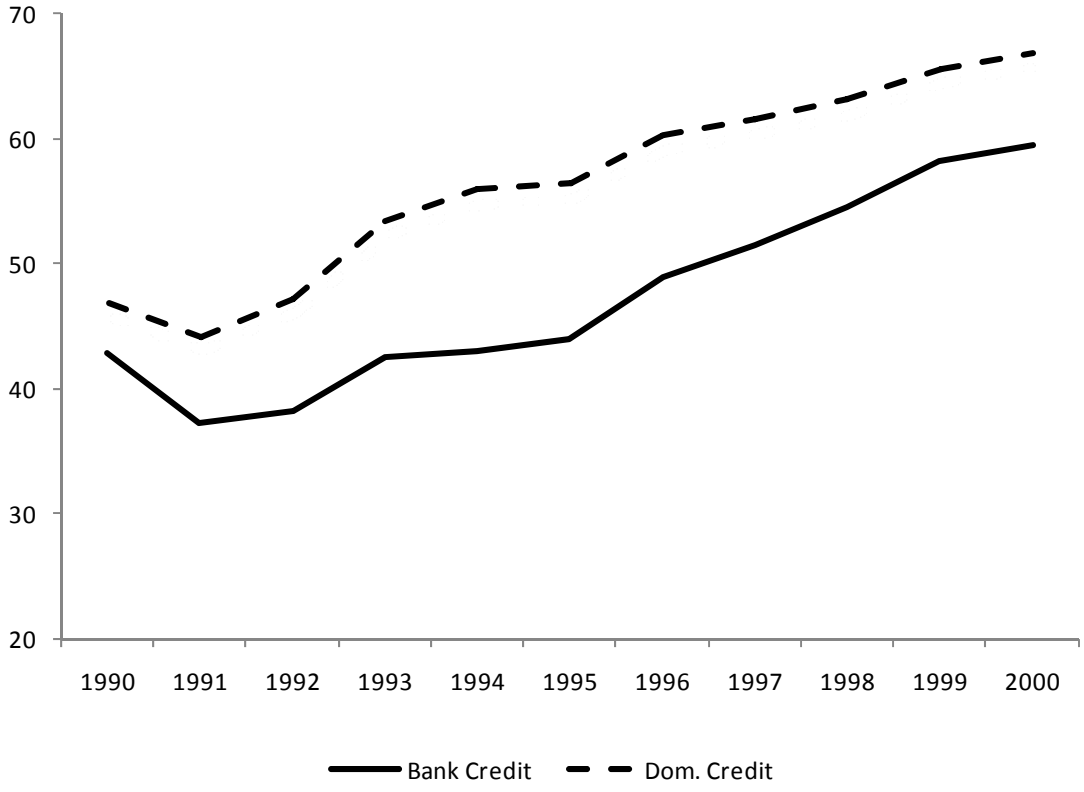

Figure 1: Measures of Financial Development for Chile

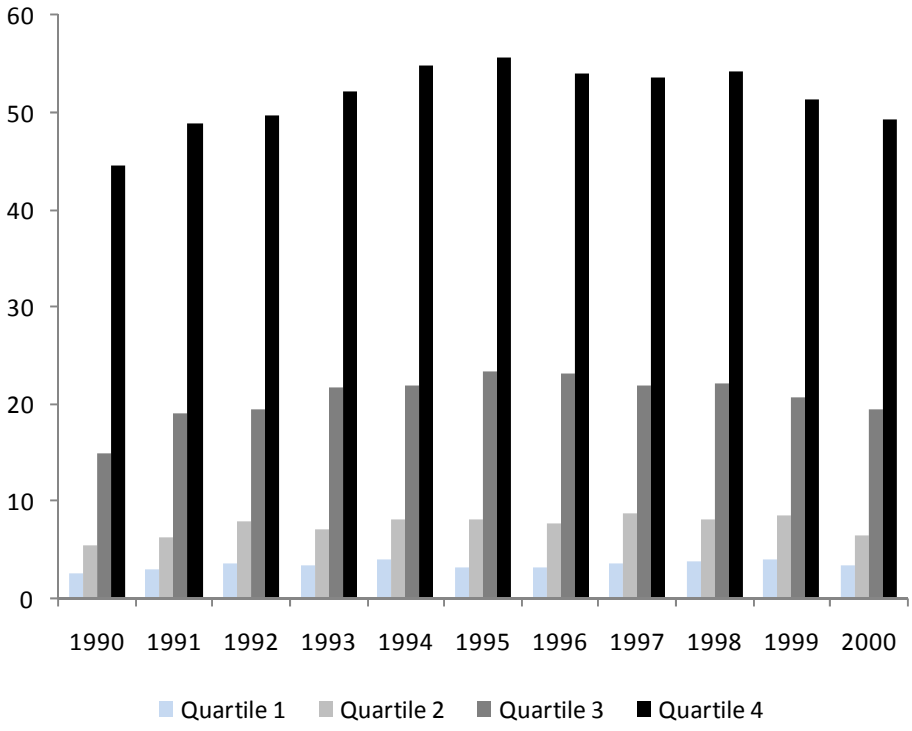

Figure 2: Export Participation Rates by Plant Size (Employment) Quartile

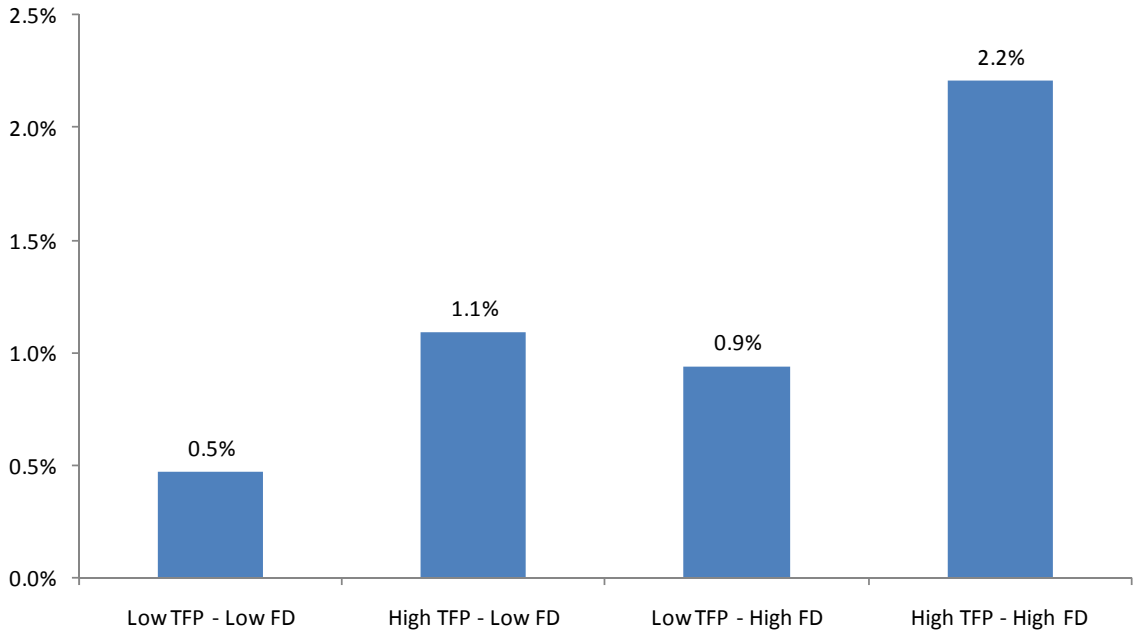

Figure 3: Comparative Effects of Changes in Financial Development by Productivity

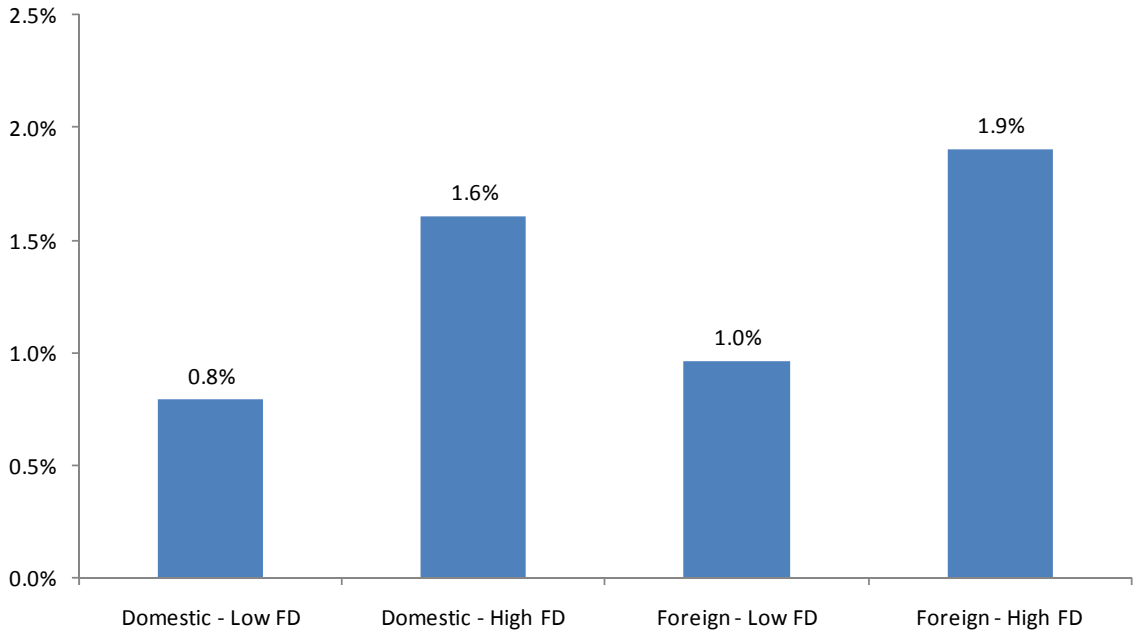

Figure 4: Comparative Effects of Changes in Financial Development by Ownership

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