"Post financial crisis and exports expansion: Micro-evidence from Chilean exporters"

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20 July 2014

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Abstract

This paper analyzes the performance of Chilean exporting firms during the period after the financial crisis of 2008 and 2009. After the crisis, world imports increased sustainably, which was used by Chilean firms in particular and the country in general. Specifically, larger firms, and those that had lower external financing needs, were benefited the most from the new international context, increasing their exports to markets that already exported before and recovering the markets they lost during the crisis. While the recovery is mainly due to the intensive margin, the present work shows that the larger firms also increased their export destinations, so that recovery takes place in the 2 types of margins. Finally, in a survival analysis, the results indicate that larger firms needed less time to regain its level of exports that have before the financial crisis.

Keywords: Global Trade, Export Finance, Firm Size, Intensive and extensive margins, Financial crisis.
JEL Classifications: F14, F19, F34, G01

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1. Introduction

As a result of the financial crisis that occurred between 2008 and 2009, world trade experienced a significant drop, falling by 42% between July 2008 and its lowest point in February 2009, according to data from the International Monetary Fund. Since then, world exports recovered steadily, reaching average growth rates of around 14% during 2010-2012.

The decline in world trade during the crisis has been widely studied by the literature, which has found 3 main explanations for its depth. First, a significant decline in global demand, especially durables and capital goods as well as commodities, what caused a sharp fall in prices (Baldwin (2009); Eaton et al.(2009); Benassy-Qeure et al.(2009); Levchenko et al.(2009)). Second, to the financial difficulties faced by firms due to the decline in sales, must be added the restriction of liquidity from the financial system, which probably created a new channel for the dissemination of the crisis (Iacovone & Zavacka(2009); Amity & Weinstein(2011); Chor & Manova(2010)). Finally, inventories also may have played a role, as firms along the production chain, use or sell stocks of inventories rather than buying new supplies. The postponements of purchases of inputs have affected most to firms producing capital goods, because these are at the end of the productive chain (Altomonte et al (2012), Zavacka (2012)).

In general, when exports of a firm increase, this can be explain by two factors. The first, called intensive margin corresponds to the increase of sales in products already marketed. While the second is related to the export of these products to new markets, new products to existing markets, or new products to new markets, the sum of these three elements is what is called extensive margin.

Regarding the extensive margin, adjustments in this can have severe and prolonged consequences to the export performance of a country. This is because costs for re-export to a market are high (Das et al. (2007) and Roberts et al. (1997)), this may imply that those firms that exited the market during the crisis, will no return. This phenomenon is known as "hysteresis" of exports (Baldwin (1990), Roberts et al. (1997)). The hysteresis, through the exit of firms during the crisis, can lead to a permanent reduction in the number of exporters, increasing the concentration of foreign sales in a small number of firms.

In terms of the effect of the crisis and the subsequent recovery of world trade, at the level of firms, the

literature has found that the reduction in exports is mainly explained by a fall in the intensive margin, while the extensive margin does not seem to have been relevant. Moreover, the crisis would have affected more large firms and those that relied to a greater extent on external financing (Brincogne et al. (2009) for France; Aisen et al. (2012) y Wu (2012) for Chile; Rappoport et al. (2011) for Peru; Lo Turco et al. for Turkey (2012)). Meanwhile, Claessens et al. (2011), through cross-sectional data, examines the performance of manufacturing firms in 42 countries, concluding that the impact of the crisis was greater in those firms that have a high sensitivity to aggregate demand and international trade. In addition, Görg et al. (2013), using a survival model with data from British firms, finds that the probability of exit foreign markets during the crisis, were higher for firms that have a high proportion of short-term liabilities, low liquidity, and must pay heavily in terms of interest.

Despite the wide range of literature that examines the causes of the decline in trade, literature concerned with the subsequent recovery has been meager. Ando et al. (2012) and Altomonte et al. (2012) discussed the recovery at products level, the first focusing on Japan, while the second in France. In Japan, firms belonging to machinery parts and components were more likely to increase their exports, and re-enter the markets that had abandoned during the crisis. In the case of France, trade in intermediate goods had a quicker recovery compared to other sectors.

Wagner (2013), using firm-level data for Germany, states that the recovery was mainly through the intensive margin, the export growth of the largest companies, those one with more than 500 employees was fundamental.

This study attempts to fill two gaps that are presents in the current literature regarding the recovery of post-crisis exports. First, the current literature has not studied the factors that led to the recovery of exports in emerging countries. Second, in the analysis performed for both the crisis period as well for recovery, generally was used dummy variables to identify the period of contraction or expansion of global sales. This has generated some discrepancy between the dates chosen for the different papers, so the crisis period definition has varied according to each author. Therefore, the analysis so far can be considered arbitrary, because it does not include some sort of accurate variable. To correct this problem, in this study, the global demand by industry is used in order to capture the fluctuations of world trade.

Taking the above into consideration, this paper examines the factors underlying the recovery in exports

of Chilean firms, both at the intensive margin and extensive margins. To perform the analysis, both factors inherent to firms such as size, financial dependence, or industrial sector are considered; as well as external factors, like global demand. The underlying hypothesis is that firms with certain characteristics have greater advantage in exploiting increase in global demand. Specifically, it seeks to determine whether larger firms, and those with less financial dependence, benefited to a greater extent of the international context.

From the results, we conclude that the intensive margin accounts for much of the oscillations of exports of Chilean firms, both in the fall and subsequent recovery. Moreover, large companies and those with a low dependence on external financing, have further increased their exports during recovery, and had a greater chance of entering new markets, because they have been able to take advantage of the increase in global demand. Also, such firms are more likely to re-enter a market which they abandoned during the crisis, and to recover the intensive margin they had prior to this.

The following section describes the data used, emphasizing some stylized facts. Section 3 presents the econometric results for both the intensive margin as extensive, while in Section 4 a survival analysis reinforces the results found in previous sections. Finally, the last section is dedicated to conclusions.

2. Data and Stylized facts

This study uses a detailed firm level dataset with monthly information on exports by product (at the eight-digit level of the Harmonized system) and destination country for Chilean exporting firms during the period January 2007 to December 2011. The data is collected by customs and covers all exporting firms during the period.

The original records are monthly, and include both the quantity exported and its value per firm, product and destination. We use the data of exports excluding copper. Copper is the most important exported product by Chile, but the variation in export value has been heavily driven by large variations in its international price. For this reason, we concentrate in the non-copper Chilean exports.

We first show some stylized facts on the export performance of the Chilean economy during and after the financial crisis. Table N° 1 shows the performance of Chilean exports during and after the crisis. Similar to the experience of other economies, Chile experienced a huge trade contraction during the 2008-09 crisis. Chilean exports fall an average of 28.67% y/y, a bigger number that the world average of a fall of 20% y/y.

Table 1: Exports

(Annual change, average, %)

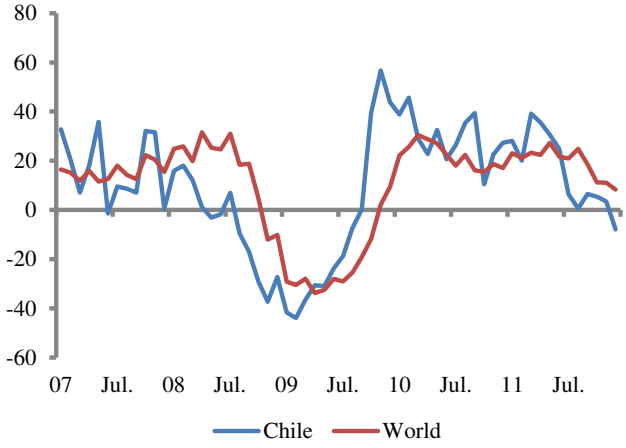
	2006m1-2008m08	2008m09-2009m08	2009m09-2011m12
World	17.99	-19.58	17.10
Developed	14.94	-21.78	13.76
Emerging	24.74	-20.66	23.07
Chile	23.46	-28.67	24.42

Source: Author's calculations based on International Monetary Fund.

However, beginning in 2009, a strong rebound in Chilean exports and also worldwide was recorded, as can be seen in Figure 1. During the period 2009M09-2011M12, Chilean exports grew at an average rate of 24%, similar to the figure recorded in other emerging economies, but considerably higher than that observed in developed countries.

Figure 1: Change in trade

(Annual change, %)

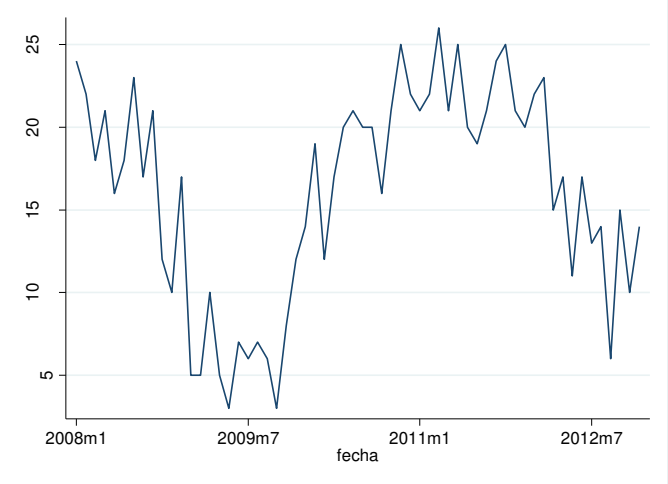


Source : Bloomberg.

During the crisis, the decline in exports was widespread among countries and among industries. Figure N° 2 shows the evolution of the number of industries[3] whose exports increased from year to year (positive annual change) for the period between January 2008 and December 2012. As you can see, the number of industries that increased their exports fell sharply during the crisis, while their number increased considerably during recovery. From the results, it follows that the contraction and recovery in exports was widespread among industrial sectors.

[3] At the level of disaggregation ISIC-3.

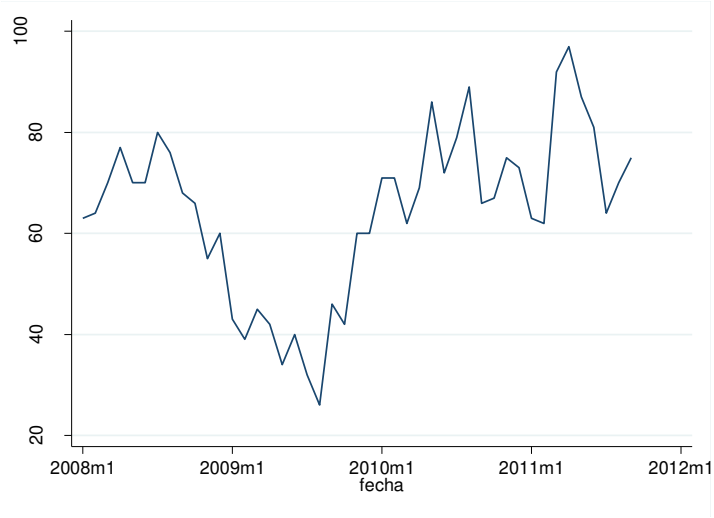
Figure 2: Number of industries where exports increased



Source: Author´s calculations based on data from the National Customs Service of Chile.

Figure N° 3 performs the same exercise for the countries of destination, i.e. the number of countries where Chilean exports increased during the same period. As can be seen, an expansion of Chilean exports in a number of destinations in the recovery period was recorded.

Figure 2: Number of countries where exports increased



Source: Author´s calculations based on data from the National Customs Service of Chile

Figure N° 4 shows a comparison between the recovery of Chilean exports and the recovery of exports worldwide, using the methodology of Hazard Rate. Ando et al. (2012) performed a similar exercise for the case of Japan, taking as a measure the time that Japan take to return to export a given product to a given country, whose sales were disrupted during the crisis period. While this exercise could be done to Chile , it will not be useful for comparison with the global recovery, as the world exports all possible products. To solve this problem, we estimated the probability that the sum of exports in the last 12 months, for each product, its back to being at least 90% of the amount exported prior to the crisis,. The Hazard Rate is estimated for the period between April 2009 and December 2012.

The results of the above are shown in Figures 4 and 5, from which it follows that the recovery path followed by Chile is similar to that followed by global exports. At the same time, it can be concluded that the recovery starts earlier in Chile, probably due to its high concentration in primary products.

Figure 4: Hazard Rate: failure

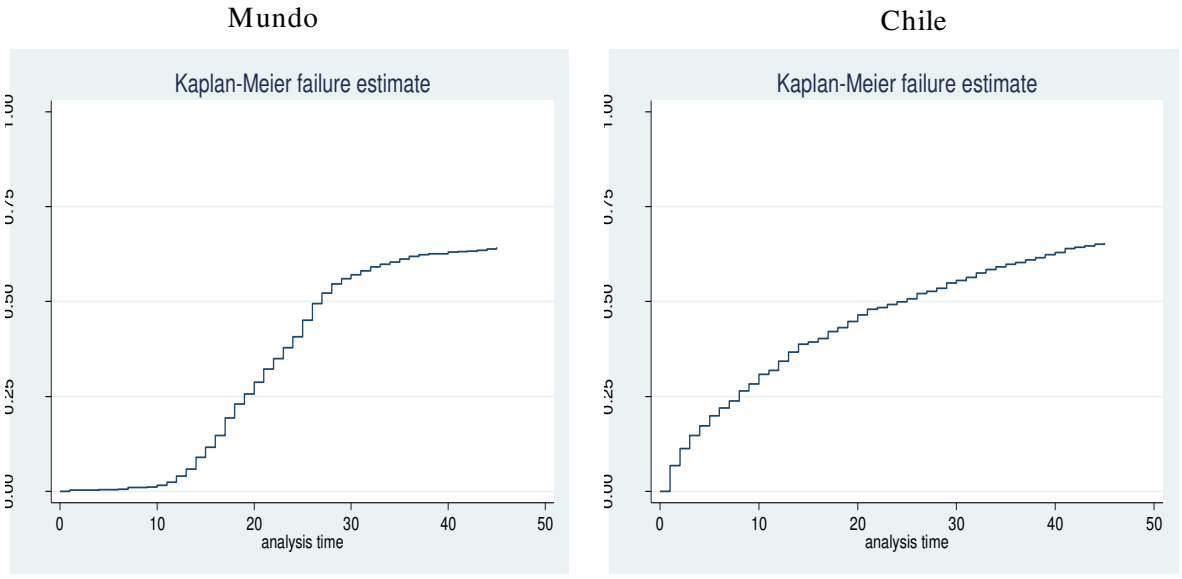
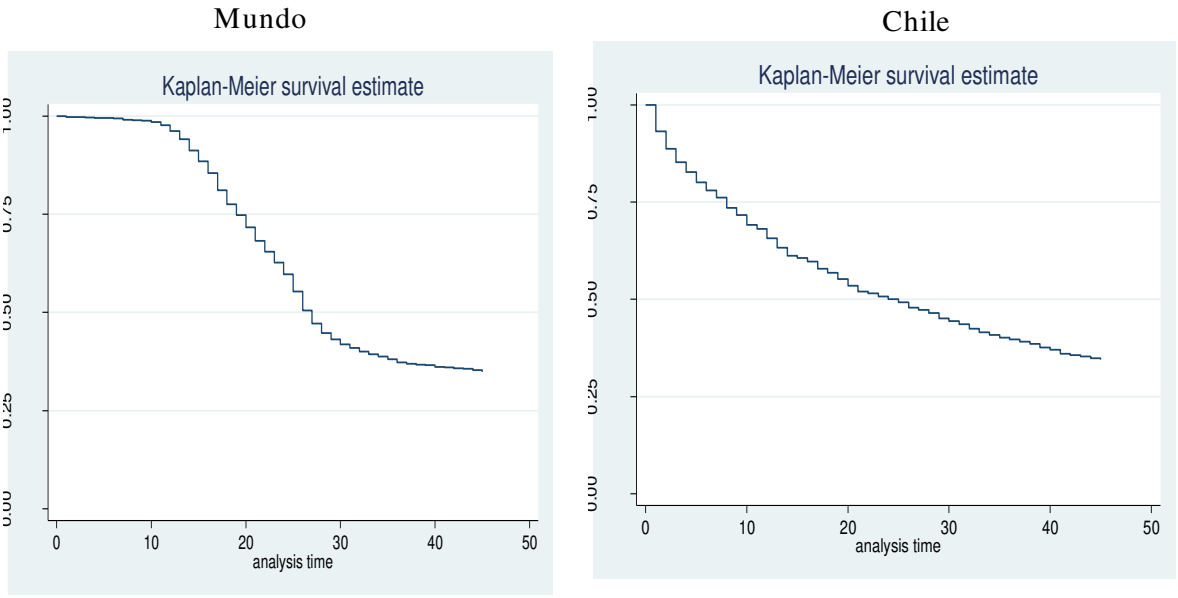


Figure 5: Hazard Rate: Survival



Source: Author´s calculations based on data from the World Trade Organization.

Following Bernard et al. (2009), we decompose the annual variation of Chilean non copper exports in the intensive margin, taking in consideration the average exports, $\bar{x}_t^c = \frac{x_t^c}{f_t^c p_t^c}$., and also in the extensive margin, that take in consideration the number of firms that trade (f_t^c), the average number of products $(\bar{p}_t^c)$, and the average number of country of destinations. $(\bar{C}_t^c)$. Equation N° 1 shows that Chilean exports are the product of the three variables described.

$$(1) \quad x_t^c = \bar{x}_t^c f_t^c \bar{p}_t^c \bar{c}_t^c$$

o In logarithm:

$$(2) \quad \tilde{x}_t^c = \tilde{\bar{x}}_t^c + \tilde{f}_t^c + \tilde{\bar{p}}_t^c + \tilde{\bar{c}}_t^c$$

where $\tilde{y}_t = \log(y_t)$. To achieve the final decomposition we need to get the following equation:

$$(3) \quad \Delta\tilde{x}_t^c = \Delta\tilde{\bar{x}}_t^c + \Delta\tilde{f}_t^c + \Delta\tilde{\bar{p}}_t^c + \Delta\tilde{\bar{c}}_t^c$$

where

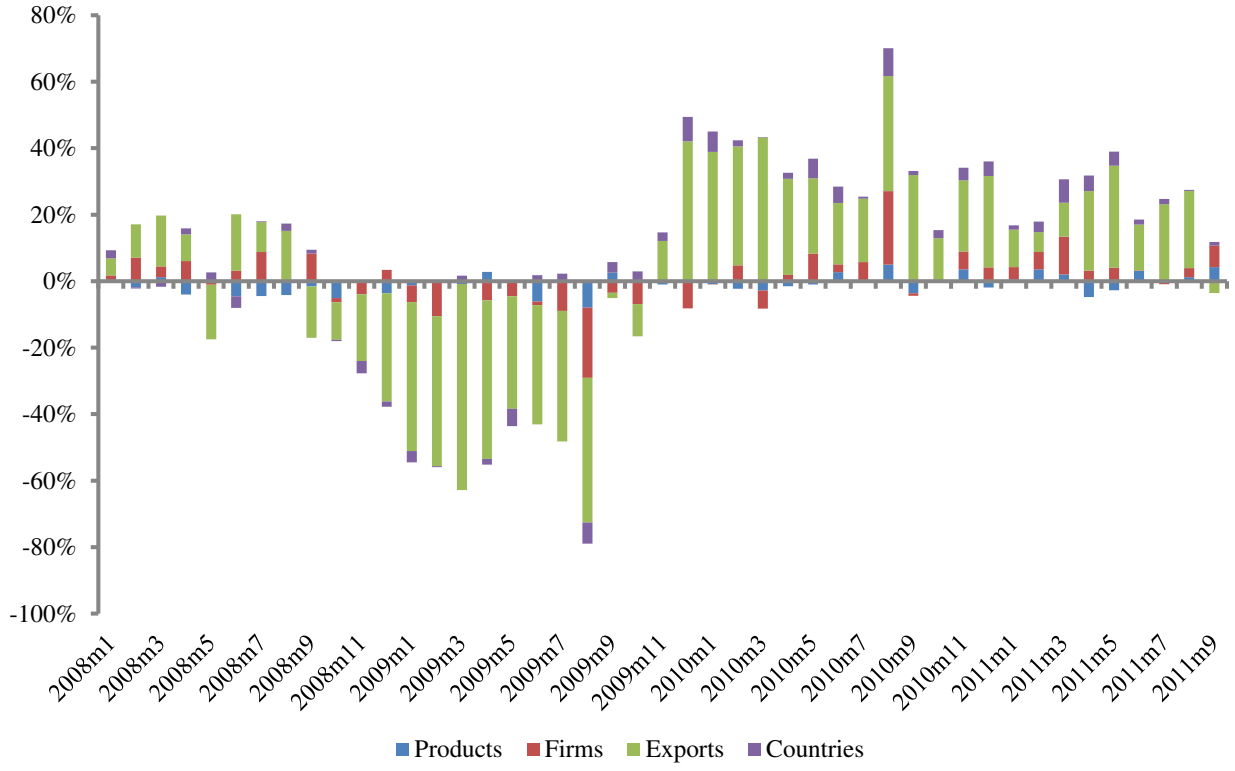
$$(4) \quad \Delta\tilde{y}_t^c = \tilde{y}_t^c - \tilde{y}_{t-1}^c$$

The first term $\Delta\tilde{\bar{x}}_t^c$ corresponds to the intensive margin, while the sum of the other three, $\Delta\tilde{f}_t^c$, $\Delta\tilde{\bar{p}}_t^c$,

$\Delta\tilde{\tilde{c}}_t^c$, represent the extensive margin.

The above equation is estimated using data from the period 2008m01 and 2011m09m01 and the results are shown in Figure N°6, which presents the descomposition of the annual variation of Chilean exports. Similar to what was found in the literature mentioned in the introduction to this study, it is concluded that the decline in exports is mainly explained by the decrease in the intensive margin. Prior to the crisis, this margin represented 80% of the change in annual exports, while during the crisis represented 57%. During the post-crisis recovery, intensive margin was also crucial, representing about 67% of the increase in exports.

Figure 6: Decomposition of the annual variation of Chilean exports

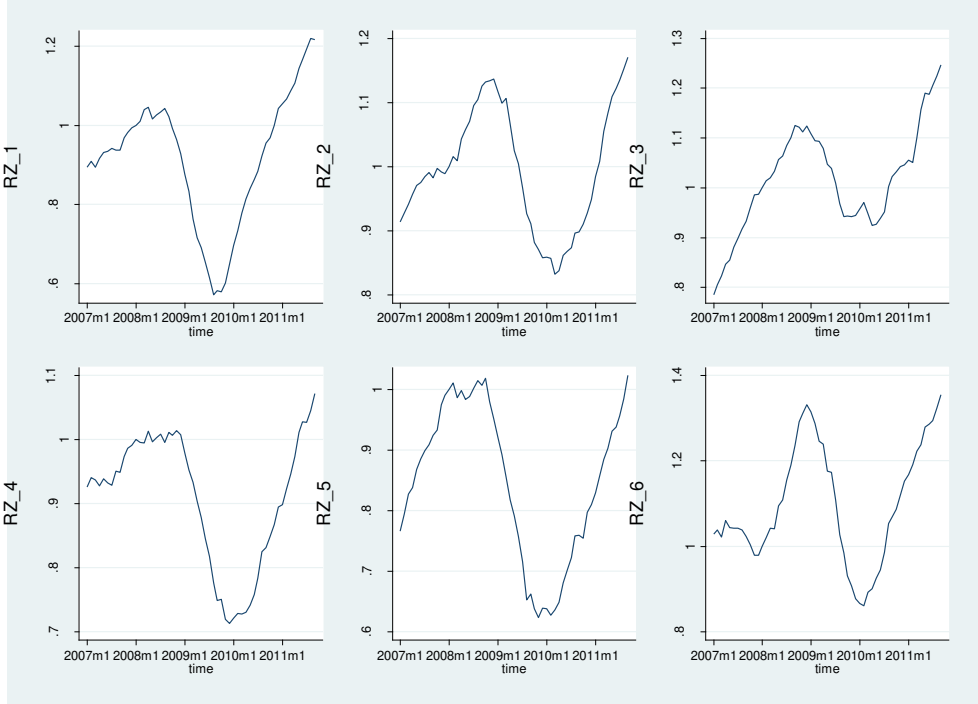


Source: Author´s calculations based on data from the National Customs Service of Chile

Figure N° 7 shows the pattern of recovery followed by industries with different need for financing dependence, measure by the variable constructed by Rajand and Zingales (1998), who develop an index of external financial dependence at the industry level, constructed as the difference between investment and cash flow generated from the operations of the firm. This variable is relevant because

firms with greater external financing need were those most affected during the crisis, so it would be expected that those with lower needs are those who benefit the most during the recovery. To analyze this, six categories were created form the index developed by Rajan et al (1998), where RZ_1 groups firms that have the lowest external financial requirements and RZ_6 those with greater dependence. In order to compare the values of each category, we index the values to January2008=100. From Figure 7 we conclude that firms that had less dependence had a higher increase in exports during the recovery.

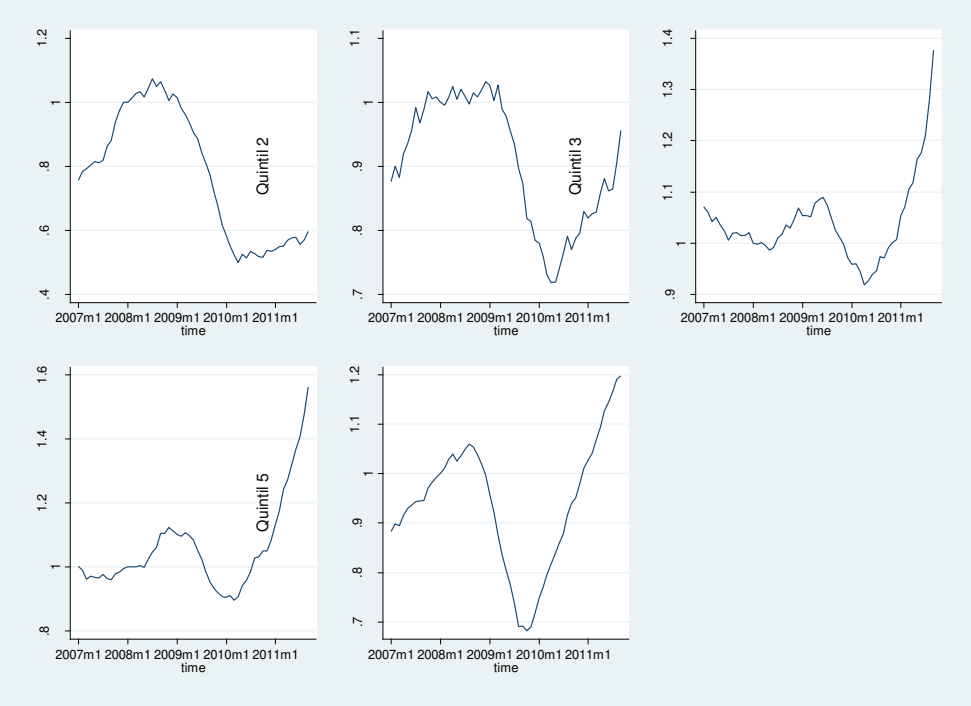
Figure N° 7: Recovery according to external financing needs.



Source: Author´s calculations based on data from the National Customs Service of Chile.

Finally, in figure N° 8 the same exercise is performed by quintiles of firm size, where quintile n°5 is the one of larger firms. During the crisis, were the largest companies who view more affected their sales, so during recovery we assume that foreign sales of large firms should have reached a steady state, so it will be more likely that these decrease rather than increase. As the graphs shows, exports by large firms had the largest oscillations in both the crisis and the recovery.

Figure N° 8: Recovery according to firm size.



Source: Author´s calculations based on data from the National Customs Service of Chile.

3. Empirical approach

Since previous studies have emphasized the importance of global demand, external financing and firm size in explaining both contraction and subsequent recovery of trade, the objective of this work is to identify the impact of these variables on the performance of Chilean exporting firms.

From the analysis of the descriptive statistics presented in the previous section, we shows that the recovery of Chilean exports followed a similar path that the one of the global imports. The increased in global demand have generated higher external sales by Chilean firms, however this mainly benefited to firms with specific characteristic: low dependence on external financing and large size. The aim of this section is to ascertain whether increased global demand was determined to increase exports of Chilean firms and their entry into new markets, and what type of firms would have benefited in this context.

3.1 Intensive Margin

The intensive margin was fundamental in both the fall and subsequent rise of Chilean exports. Therefore, this section determines what factors explain this phenomenon, taking into account both, the increase in worldwide demand and the characteristics of firms, that could have possible leverage the increased demand for products. For this, the following equation is estimated:

$$(5) g_{fcit} = \alpha_f + \alpha_t + \alpha_i + \alpha_c + \beta_1 Demand_{it} + \beta_2 Size_{fit} + \beta_3 Size_{fit} * demand_{it} + \beta_4 Size_{fit} * RZ_i + \beta_5 Rate_t * RZ_i + \beta_6 Demand_{it} * RZ_i + \beta_7 Ddemand_{it} * RZ_i * Size_{fit} + \beta_8 Rate_t * RZ_i * Size_{fit} + \beta_9 Rate_t * Demand * RZ_i + \beta_{10} NER_{ct} + \varepsilon$$

Where the dependent variable is the *mid-point growth rate* of firm's *f* export value to country destination *c* in industry *i* in month *t*. This variable is defined as:

$$(6) \quad g_{fcit} = \frac{(X_{fcit} - X_{fcit-12})}{(X_{fcit} + X_{fcit-12})/2}$$

Typically, this estimate was made using annual data, because with monthly data is more complex. Monthly data lead to an unbalanced panel, since most of the firms do not export every month. To this

must be added the problems arising from the seasonality of the economy and different patterns of business days of each month. Therefore the mid-point growth rate is used, as controlled by these factors.

The demand variable corresponds to the variation of global imports by industrial sector, isic-2. This indicator is constructed from imports data from 67 countries that are on the website of the World Trade Organization.

As a second determinant was including firm size, defined as exports made by firm *f* in industry *i* relative to Chile total exports in the same industry, ie $\frac{X_{fcit-12}}{X_{cit-12}}$. This measure is used as the exported amount can be large or small depending on the amounts sold by other exporters in the same industry, and follow the methodologies used by Bricogne et al. (2001) and Aisen et al (2012).

RZ is a variable that measures the industry-specific dependence on external (to the firm) resources, the indicator developed by Rajan and Zingales (1998) captures differences in financing needs that are unrelated to international trade credit.

Finally, the variable rate correspond to the average interest rate of foreign trade in dollars between 90 and 180 days and comes from Central Bank of Chile, while the variable NER corresponds to the variation (annual) of the nominal bilateral Exchange rate, and it comes from Bloomberg.

We also added a series of interactions between the variables described and global demand. The central idea is that the recovery of Chilean exports was mainly due to increase in global imports, hovewer, some firms may have a greater advantage in exploit the opportunities presented in the external environment, either by their relative size or low financial dependence. To capture this purpose we include the interactions.

Finally, are incorporated fixed effects corresponding to the firm, the time, the industrial sector and the country of destination, in order to control for the heterogeneity of firms and potential shocks that might have affected different markets and products. In each regression we corrected by clustered standard errors at firm level.

It is expected that the coefficient, β_1, to be positive, since an increase in global demand should have

involved an increase of Chilean exports. As for the size variable, a negative impact on the dependent variable is expected, as exports of large firms should have reached a steady state, these being more likely to decrease rather than increase (Albornoz et al. (2011)). NER is expected a positive impact, as currency depreciations should have increased exports of Chilean firms by making foreign markets more attractive.

As for interactions, it is expected that the coefficient β_3 to be positive, ie, that the bigger a firm, the greater the ability to exploit the opportunities offered by increased foreign demand. The underlying intuition is that larger firms could more easily increase their production to meet the new external demands, and how they possess a deeper network of external suppliers would provide several advantages to taking new business opportunities because of the information they handled. In addition, during the crisis were the largest firms that experienced greater declines in their exports, so a symmetrical movement of recovery is expected.

The coefficient β_4, associated with the interaction between *size* and *RZ*, should be negative, since *RZ* reinforces the negative impact of the size of the firm, while a similar sign of β_6 is expected, since those sectors with higher external financing needs should have had bigger problems to support the general operations, or required investment to increase sales because to the increased demand because they do not have the capital to do so.

As for the triple interactions *Demand * Size * RZ* should have a negative impact, since those large firms with a high dependence on external financing would have fewer options to exploit an increase in global demand, compared to large firms with less dependence. *Rate * Size * RZ* interaction should have a negative coefficient, because the variables *RZ* and rate reinforces the negative impact of firm size, while *Rate * Demand * RZ* is expected to be negative, since firms with limited access to financing (*rate * rz*) should be less able to take advantage of increasing global demand.

Table 2: Intensive Margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Global Demand	0,205***		0,177***	0,175***	0,203***	0,177***	0,205***		0,176***	0.178***
	(0,000)		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)		(0,000)	(0,000)
Size		-1,761***	-1,809***	-1,806***	-1,302***	-1,337***		-1,303***	-1,337***	-1.321***
		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)		(0,000)	(0,000)	(0,000)
Size*demand			1,481***	1,374***		1,530***			1,525***	1.279***
			(0,000)	(0,000)		(0,000)			(0,000)	(0.003)
Size*RZ					-2,459***	-2,545***		-2,523***	-2,536***	-3.017***
					(0,005)	(0,005)		(0,006)	(0,005)	(0.002)
Rate*RZ						0,005	0,004	0,013*		-0.004
						(0,512)	(0,666)	(0,074)		(0.684)
Demand*RZ						-0,184*	-0,346		-0,189**	-0.522**
						(0,052)	(0,126)		(0,035)	(0.022)
Demand*RZ*Size										1.826
										(0.208)
Rate*RZ*Size								0,016		0.096
								(0,863)		(0.189)
Rate*Demand*RZ							0,042			0.068
							(0,375)			(0.152)
Bilateral nominal Exchange rate				0,214***					0,211***	0.211***
				(0,000)					(0,000)	(0,000)
Observations	245.566	245.566	245.566	245.566	245.566	245.566	245.567	245.568	245.569	245.323
R2	0.0185	0.0213	0,0229	0,0233	0,0226	0,0235	0,0186	0,0219	0,0239	0.0240

Clustered standard errors at country-industry-year level between parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Controlling for firm, time, industrial sector and country fixed effects.

Table N° 2 shows the econometric results obtained through the fixed effect panel estimation of regression N° 5. As expected, in all specifications the parameter associated with the *global demand* is positive and significant. That is, the increase in global demand result in an increase in exports of Chilean firms. The value of β_2, associated with firm size is also the expected significant negative sign in all estimations. Larger firms increased their exports to a lesser extent.

Column 3 adds the interaction between the variables size and demand. The associated coefficient is significant and positive, ie, large firms take more advantage of the opportunities provided by external demand. This result is consistent with the findings of Wagner (2012), which indicates that the recovery of German exports came through big firms.

The fourth estimate controlled by the bilateral nominal exchange rate, having a positive effect on exports. That is, a currency depreciation of the Chilean peso leads to an increase in foreign sales. At the same time, the results found in the above specifications are maintained.

Column 5 adds the interaction between firm size and *RZ*, which has a negative impact, a result that was maintained in the rest of the specifications. In column 6, we add the interaction between *demand* and *RZ*, this coefficient is negative and significant, showing that those firms belonging to sectors with a high dependency to credit advantage to a lesser extent the increase in foreign demand. This result is consistent with the point made by Iacovone and Zavacka (2009), who argue that export growth should be slower in sectors dependent on external finance. Moreover, the interaction *rate* * *RZ* has a positive impact on exports, this being contrary to the expected result. However, this variable is only significant in the specification N°8.

Finally, columns 8, 9 and 10 incorporate three-way interactions; however, none of these appears to be significant.

The annexes to the present study shown the results of the regression considering the pre and post crisis years respectively. The results are quite similar to those shown in Table N° 2.

3.2 Extensive Margin

Increasing global demand could also have had an impact on the diversification of destinations of firms. The increased demand for certain foreign markets should have been covered by new players, who had the capacity to fulfill new orders. Therefore, the impact of the global demand in the entry to new markets is analyzed through the following equation:

(7) $Entry_{cit} = \alpha_{ct} + \alpha_{it} + \beta_1 Demand_{it} + \beta_2 Rate_t * RZ_i + \beta_3 Demand_{it} * RZ_i + \beta_4 Demand_{it} * Rate_t + \beta_5 Demand_{it} * Rate_t * RZ_i + \beta_6 NER_{ct} + \varepsilon$

For the estimation of extensive margin we use annual data, avoiding complexities of defining entry with monthly data. The problem with monthly data arises when a firm exports in one month of the year *t*, but not exported in the same month of the previous year, which is designated as entry. However the same company could have exported in the months subsequent or prior to such month. Given this, we define entry in the year *t* as the number of firms that exported in any month of *t* but not exported in any month of year *t-1*. The number of firms that entered a given market divided by the average Chilean firms exported to that market between *t* and *t-1* was considered as the dependent variable.

The estimates were made using a linear probability model instead of a non-linear, such as a logit, because this allow to control more suitable for time fixed effects, industry and country basis.

Through the equation N° 9 regressions for the total firms and for quintiles of them were estimated, in order to detect differences that explanatory variables may have had on firms of different sizes.

It is expected that the increase in global demand increases the likelihood of entering new destinations, as firms receive orders from places that had not previously exported. This result is expected especially for the bottom quintile, since large firms have more ability to meet new orders generate by the increased demand. Meanwhile, a greater need for external financing, combined with high interest rates, β_2, should lead to a lower probability of entering new markets, because it will be complex to get the resources to expand the scope of export activity. This should be particularly important for firms in the first quintile. As for the signs of β_3, β_4, y β_5 is expected to be negative, because firms with a high need for external financing, or that face high interest rates, could use in a lesser extent the increase in global demand. Finally, β_6, the coefficient associated with the

Exchange rate, is expected to have positive sign, because a depreciation of the peso makes Chilean exports more attractive, increasing the likelihood of entering a new market.

The results are in Table No. 3, for the total of firms and for the division by quintile.

Table 3: Extensive margin: Entry

	Total	Q1	Q2	Q3	Q4	Q5
Global Demand	0.393**	0.088	-0.223	-0.105	0.273	0.394**
	(0.024)	(0.826)	(0.537)	(0.708)	(0.307)	(0.038)
Rate*RZ	-0.043*	-0.048	0.0344	-0.089**	-0.0034	-0.019
	(0.089)	(0.352)	(0.492)	(0.017)	(0.926)	(0.514)
Demand*RZ	-1.448**	-1.568	0.802	-2.484**	-0.486	-0.894
	(0.037)	(0.271)	(0.561)	(0.021)	(0.667)	(0.271)
Demand*Rate	-1.090**	-0.045	0.047	0.021	-0.068	-0.090*
	(0.014)	(0.663)	(0.610)	(0.767)	(0.329)	(0.064)
Demand*Rate*RZ	0.395**	0.435	-0.243	0.652**	0.113	0.268
	(0.027)	(0.239)	(0.493)	(0.020)	(0.696)	(0.201)
NER	0.197***	0.098	0.075	0.169*	0.047	0.202***
	(0.000)	(0.374)	(0.399)	(0.068)	(0.466)	(0.000)
R2	0.029	0.036	0.030	0.0276	0.026	0.033
N° observations	7896	3500	3644	4140	4788	6509

*** p<0.01, ** p<0.05, * p<0.1

As expected, the recovery in global demand has a positive effect on the dependent variable and statistically significant for both the total firms and also the largest firms (quintile 5). That is, it is the group of largest firms which benefits most from increased in global demand. Similarly, the coefficient β_2 which includes the impact of the interaction between *rate* and *RZ* is significant and with the expected sign, but only for all firms and quintile 3. That this variable has a negative impact on only one of the lower quintiles means that the need for external financing is especially important for small firms, who may not have the ability to self-finance the sunk costs required to start exporting to new destinations, and therefore are more dependent on external financing.

Meanwhile, the interaction between *global demand* and *RZ* is also negative and significant, but only in the first and fourth columns. A high dependence on external funding creates problems for get the resources needed to enter those markets where demand has increased.

Similarly, coefficient β_4 turns out to be negative and significant for both the specification with all the firms and for the bottom quintile, which reinforces the conclusions already reached with the interaction between *demand* and *RZ*. Finally, the triple interaction gives a sign opposite to the expected one.

4. Survival Analysis

This section discusses the recovery of Chilean exporting firms, in order to determine the factors that contributed to it. In particular, the probability that firms have to return to the markets that abandoned during the crisis, and the time it took to retrieve the intensive margin in markets that remained is estimated. Again some heterogeneity between firms is expected, since the increase of world exports should have been used by larger firms, and those with less need for external financing.

To perform this exercise, the chance of recovery is estimated at both the extensive and intensive margin, through the semi-parametric Cox model. This model is used because, unlike other methods, can easily incorporate variables that vary with time. Also, does not require a particular functional form, so it is more robust than parametric methods, especially when the functional form of the data is still unknown.

In the Cox model, the dependent variable is the *hazard rate* at which the risk of leaving a certain state is accumulated, ie, the time between the start of a certain state until the end, and as explanatory variables we have the time and a set of other variables. The effect of time is captured by a common component for all individuals called *baseline hazard,* and that indicates how the risk of failure changes as a function of time. Thus, a firm *f* faces the same risk that all but modified by the explanatory variables, x_j.

$$h\,(t/x_j) = h_o(t) * \exp(x_j\beta_x\,)$$

where $h_o(t)$ is the *baseline hazard*.

In the case of an extensive margin, it requires to review how many months takes a company to export again to a market that was abandoned because of the financial crisis. For instance, we must consider the companies that exported during the pre-crisis period (between September 2007 to August 2008), that didn't exported during the crisis (September 2008 to August 2009), and those we expected a reinstatement after crisis (September 2009 to December 2011). Therefore, on this exercise the hazard rate would be the conditional probability of reinstate given that the company wasn't active the last 12 months.

This estimation helps to corroborate the possible existence of hysteresis during the crisis. Because

adjustments on the extensive margin can have severe and long term consequences in the exporter performance of a country, due to the high sunk cost of re-entering an export market (Das et al. (2007) y Roberts et al. (1997)), the companies that abandoned the external markets would have problems to export again after the crisis. The sunk cost dimensions are fundamental on the decisions the company takes, since their magnitude can't overcome the expected benefits so the company decides to reenter a market.

Therefore, we are looking to estimate what is the possibility of a company to re-enter an abandoned market, through the next equation,

$$(8)\ \ h_f(t) = h_o(t) * \exp(Size_{fi} + RZ_i + Demand_{it} + Rate_t + NER_{ct})$$

The dependent variable is the hazard rate that the firm is no longer out of the markets that abandoned during the crisis, ie, that re export to that market, while the explanatory variables are the same used in the previous regressions. It is expected that the size of the company increases the probability of reentering a market, since the big companies will have a bigger capacity to comply with the request of the suppliers. An increase of the world demand should also increase the probability of reentering a market. In fact, is probable that suppliers of a determined country choose to supply with products from those companies that they had work in the past, since it is less expensive in terms of information required for the transaction. On the contrary, it is expected that the variable RZ_i has a negative effect, because those companies that have a high external credit dependency would have problems to increase their sales.

Table 4: Extensive margin

	Marginal effects	Average marginal effect
Size	0.02	0.02
	(0.26)	(0.26)
RZ	-0.32**	-0.32**
	(0.028)	(0.028)
Global demand	0.90**	0.91**
	(0.036)	(0.035)
Rate	1.12***	1.14***
	(0.000)	(0.000)
NER	-0.235	-0.0238
	(0.967)	(0.967)
N° Observations	33.268	33.268

*** p<0.01, ** p<0.05, * p<0.1

As you can observe on the table Nº4, the world demand has a positive impact on the probability of reenter a market, as expected, ie, that the *hazard rate* increases and hence the expected duration of time required for the firm get back into the market. In this case, the *hazard* is 0,02 units bigger when global demand increases by one unit The *size* variable has a positive coefficient, but is not significant. While we expected a bigger significance, its low value may be due that the exits occurs mainly between the small firms, so that we would be comparing firms that do not have the size required to re enter the market.

Finally, the dependence on external financing has a negative effect; ie, in firms with greater financing dependence needs the hazard rate decreases, and increases the expected duration of staying out of the market. The hazard rate changes by -0.32 units when the RZ variable changes by one unit, ie the greater the dependency firms take longer to return to the markets.

A similar exercise was done for the case of the intensive margin. For this, we consider those companies that exported previous the crisis and that reduced their sales on more that a 10% during the crisis. The condition for survival was established on the time that took for them to re-export at

least 90% of its pre-crisis sales. Specifically, this are defined as the value of exports between September 2007 and august 2008, while the sales between April 2008 and march 2009 should be less than the pre-crisis sales by at least 10%. The recovery window is set between April 2009 and December 2011, so we estimated the probability that sales of the last 12 months were at least 90% of sales recorded prior to the crisis. That is, the dependent variable is the *hazard rate* that the firm re-export their pre crisis level.

For this, we estimated the following regression:

$$(9)\ \ h_f(t) = h_o(t) * \exp(Size_{fi} + RZ_i + Demand_{it} + Rate_t + NER_{ct})$$

It is expected that a bigger size company will take less time in recover the exported values, since they would have the capacity to comply with the new requests, whileRZ_i should have the opposite effect. An increase in the world demand, meanwhile should diminished the recovery time, and give new opportunities to the companies that have remained in the market.

Table 5: Intensive Margins

	Marginal effects	Average marginal effect
Size	0.151***	0.156***
	(0.000)	(0.000)
RZ	-0.124	-0.128
	(0.625)	(0.625)
Global demand	1.797***	1.860***
	(0.000)	(0.000)
Rate	0.323***	0.334***
	(0.000)	(0.000)
NER	1.182**	1.223**
	(0.024)	(0.024)
N° Observations	184.913	184.913

*** p<0.01, ** p<0.05, * p<0.1

As you can observe on the table Nº5, the size variable has the expected sign, positive, which implies that the hazard rate increases and thus decreases the expected duration of the firm resume the pre-crisis levels. In this case, the hazard is 0,151 Units bigger when the size of the Company in incremented by one unit. That is, large firms take less time to recover, which reinforces the results found in Table No. 2.

The variable dependency on external financing, RZ, has a negative effect on the recovery of the firms, due to the high dependence on external financing inhibits an increase in exports. However, it is not significant. This is not entirely surprising, because external financing is used primarily for specific fixed costs of entering a market (Manova et al (2009)), rather than to expand production capacity. Therefore, this variable should be more important in explaining changes in the extensive margin rather than the intensive.

Global demand, and the bilateral Exchange rate depreciations, , have a positive impact in the likelihood of the recovery from intensive margin, intensive, what was expected, because the recovery of Chilean exports was due largely to the rise in global sales. The hazard rate is bigger in 1.79 and 1.182 respectively when the global demand and depreciation increases in one unit, and thus decreases the expected duration required for the firm to resume the pre-crisis export levels.

5. Conclusions

The aim of this paper is to analyze the recovery of Chilean exports which occurred after the decline in trade during the financial crisis of 2008-2009. Using monthly data on exports at the level of firms, the impact of global demand was examined, and certain inherent features of the signatures on the different margins of export.

The stylized facts show that recovery, like the fall, was widespread across industries and countries of destination,, while the recovery of Chilean exports has been faster than the global recovery. .Also, the intensive margin explains the majority of the rebound of Chilean exports during the period post crisis.

At intensive margin level, the econometric results are that the increase in global demand impacted in an increase in Chilean exports, being the largest firms which took further the opportunities presented by the external environment, while those with greater dependence on external financing took a lesser extent the circumstances.

In terms of entry, larger firms are also those who benefit most from increased demand, with greater opportunities to enter new markets, while a high dependency to external financing makes it hard to enter a new market.

Also, are the largest firms and those less financing dependent, who, in case of exit the market during the crisis, are more likely to return, and who regained their intensive margin faster.

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Anex 1

Table 1: Intensive Margin: Period 2008-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Global Demand	0.233***		0.217***	0.216***	0.238***	0.212***	0.230***		0.213***	0.211***
	(0,000)		(0,000)	(0,000)	(0,000)	(0,000)	(0,000)		(0,000)	(0,000)
Size		-1.714***	-1.612***	-1.613***	-1.311***	-1.172***		-1.304***	-1.173***	-1.188***
		(0,000)	(0,000)	(0,000)	(0,001)	(0,002)		(0,000)	(0,002)	(0,001)
Size*demand			1.535***	1.531***		1.592***			1.582***	1.429***
			(0,000)	(0,000)		(0,000)			(0,000)	(0,001)
Size*RZ					-2.483**	-2.608**		-2.778**	-2.606	-2.758*
					(0,005)	(0,013)		(0,005)	(0,013)	(0.008)
Rate*RZ						-0.015	-0.006	-0.017		-0.127
						(0,512)	(0,752	(0,280)		(0.473)
Demand*RZ						-0.150	-0.463		-0.119	-0.492
						(0,052)	(0,241)		(0,291)	(0.212)
Demand*RZ*Size										0.918
										(0.491)
Rate*RZ*Size								0.069		0.050
								(0,463)		(0.617)
Rate*Demand*RZ							0.075			0.073
							(0,376)			(0.391)
Nominal Exchange rate				0.170***					0.169***	0.172***
				(0,000)					(0,000)	(0,000)
Observations	101.457	101.457	101.457	101.358	101.457	101.457	101.457	101.457	101.358	101.358
R2	0.0271	0.0290	0.0315	0.0317	0.0308	0.0321	0.0271	0.0296	0.0323	0.0324

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Intensive Margin: Period Sep2009-2011

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Global demand	0.205***		0.177***	0.175***	0.203***	0.1766***	0.206***		0.1757***	0.117**
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)				(0.018)
Size		-1.761***	-1.809***	-1.806***	-1.302***	-1.337***		-1.303***	-1.337***	-1.318***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Size *demand			1.481***	1.474***		1.530***			1.525***	0.632**
			(0.000)	(0.000)		(0.000)			(0.000)	(0.016)
Size *RZ					-2.459***	-2.545***		-2.523***	-2.536***	-1.997
					(0.005)	(0.005)		(0.006)	(0.005)	(0.151)
Rate*RZ						0.005	0.004	0.013*		0.015
						(0.512)	(0.666)	(0.074)		(0.763)
Demand*RZ						-1.84*	-0.346		-0.189**	0.159
						(0.0529	(0.126)		(0.035)	(0.809)
Demand *RZ*Size										0.807
										(0.319)
Rate*RZ*Size								0.016		-0.307
								(0.863)		(0.236)
Tasa*Demanda*RZ							0.042			-0.118
							(0.375)			(0.618)
Tipo de cambio nominal				0.214***					0.211***	
				(0.000)					(0.000)	
-										
Observations	245566	245566	245566	245323	245566	245566	245566	245566	245323	111108
R2	0.0185	0.0213	0.0229	0.0233	0.0226	0.0235	0.0186	0.0219	0.0239	0.0179

*** p<0.01, ** p<0.05, * p<0.1