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Chinese Competition and the Manufacturing Sector:

Evidence for Chilean Plants

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Abstract

During the last decades, China's exports have enormously increased and nowadays is one of the largest exporting economies in the world. This phenomenon has had an important effect on the Chilean economy, since Chinese imports increased from being less than 1% of the total imports in the country in 1980 to 20% in 2010. Using information about Chilean manufacturing plants from 1995 until 2006, we attempt to measure the impact that Chinese competition over the manufacturing sector. In order to do this, we have focused our attention on 3 key variables: productivity, employment and firm survival. For this purpose, we have elaborated an import penetration index for 80 manufacturing industries, and we instrument the Chinese competition with the Chinese import share in other American countries. The results obtained from this are just conclusive: Chinese competition has had a negative impact on employment and survival probability of Chilean plants. However, we do not find any significant effect of import competition on productivity growth. It seems to be that, in contrast to developed economies, manufacturing plants in less develop countries are not capable of making the most of trade gains, and produce rises of productivity.

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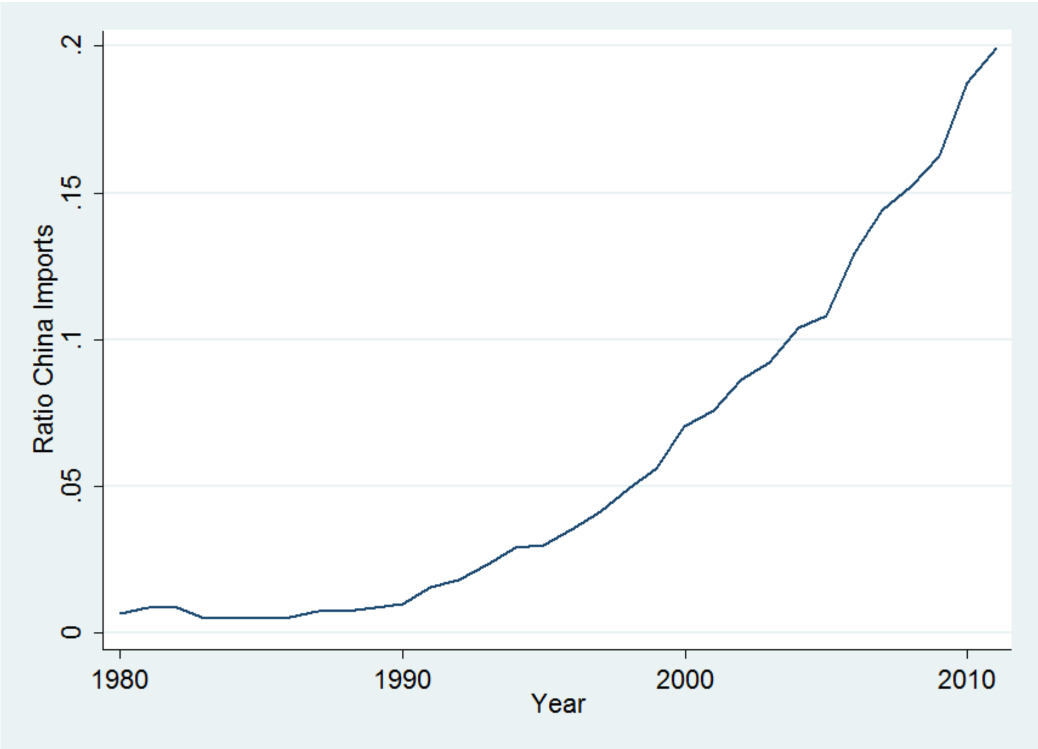
1. Introduction

During the last two decades, the impact of globalization and international trade on different countries of the world has become one the most important issues for debating, especially considering the strong participation of China in the world market since the 90's, including its certain incorporation in the World Trade Organization in 2001. China has been one of the countries that has had an outstanding exports rise, by more than 15% during the last 25 years[3]. Currently, China is the most important exporting economy in the world, and its products make more than 15% of world's exports[4], what has brought a substantial fall in the prices of consumption products, especially in those countries where a great number of Chinese items are commercialized, and Chile has been part of this phenomenon as well.

As we can see on figure 1, during the 80's China was not an important commercial partner for Chile, although, since the very start of the 90's, the imports coming from China started gaining more and more space within the manufacturing industry. By the late 90's, Chinese exports made 20% of the total amount of imports in the manufacturing area, having already surpassed that threshold. Despite this fact, this rise in product volume has not been homogeneous through all the manufacturing industry, since industries such as textile (321), wearing apparel (322), printing (341) and furniture (332) have been the sectors with the highest rise in Chinese imports, while food goods (311), timber forest (331), chemicals (351), base metals (371) and machinery (382) have experienced minor rises. This has triggered a rising reliance on Chinese manufacturing, as the level in which the inner demand is covered by this kind of imports has risen significantly, ever since China became part of global markets, what has caused the rise in Chinese imports from 0,87% in 1990 to 9% in 2006, that is to say, a rise of ten times its value in 16 years

[3] See Bloom et al (2016)
[4] See Autor et al (2016)

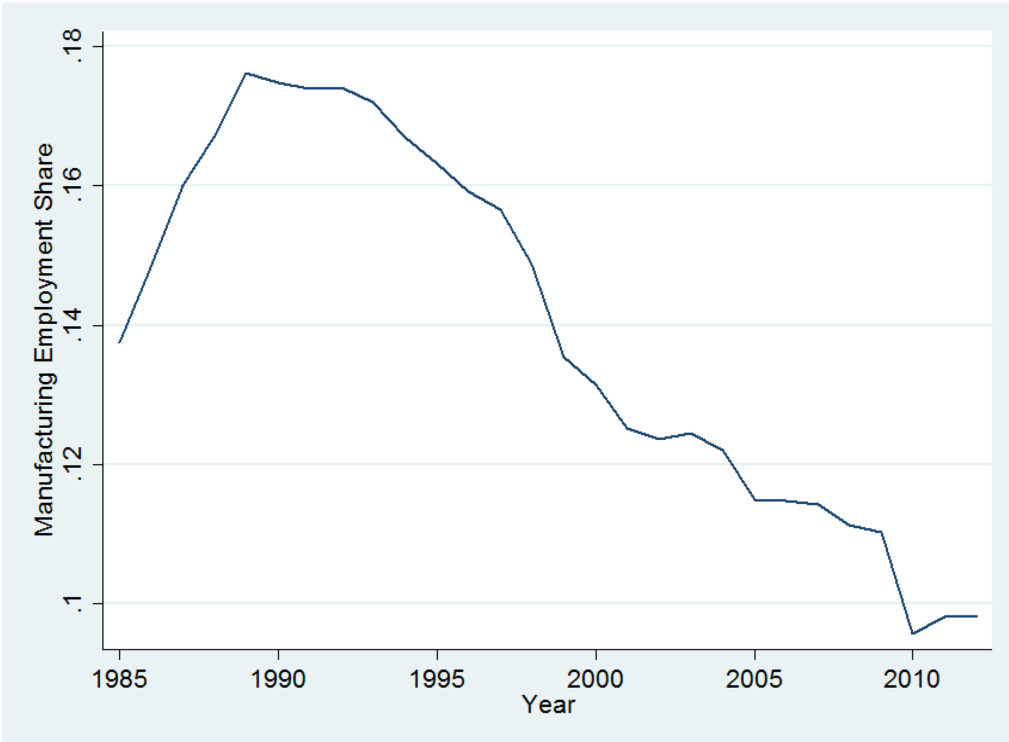
Figure 1: Chinese Imports Share Evolution



Source: Own calculations based on Badacel.

In this regard, some questions should arise, such as the effects that this constant rise of competition against China has caused on different outcomes of the Chilean manufacturing industry. As we can see in figure 2, manufacturing employment has lost participation considerably, over total employment in the economy, what has sharply become more notorious from the mid 90's. In addition, this phenomenon has been featured by the stuck in the number of labour in this sector, nonetheless, there is clear heterogeneity through the sectors that have experienced a more significant setback in this regard, being textile (321), wearing apparel (322), leather items (323), and electrical machinery (383) the ones the most affected. On the other hand, industries such as food (311), timber forest (331), chemicals (351), base metals (371), and machinery (382) have been those affected the least, with minor losses in comparison to all manufacturing industry.

Figure 2: Manufacturing Employment Share Evolution



Source: Own calculations based on 10-Sector Database.

Authors such Rodrik (2016) have called this phenomenon premature deindustrialization, as developing economies that have not been able to reach full industrialization, they have gone through a permanent fall in employment participation and manufacturing production. According to this author, the conventional explanation for the process of deindustrialization lies in the existence of different technical progress rates in the economy, in which manufacturing industry would go through technical progress rates relatively higher than the rest of the economy. This ends up in a reduction of manufacturing employment when the elasticity of substitution between manufacturing sector and other industries of the economy is lower than 1[5]. The main problem about this theory, in the case of the countries under development, lies in the fact that these countries, being small ones, they cannot affect international prices, therefore prices are fixed in the limit. In this regard, a higher productivity growth in the domestic manufacturing industry should cause an industrialization process, regarding employment as well the product, although, evidence proves precisely the opposite. According to the author, the explanation for this phenomenon lies on the rise of trade and globalization, since those economies without a strong

[5] The evidence suggests that the greatest loss of employment comes from unqualified employment.

comparative advantage in the production of manufactured items will become net importers of this sort of items. In addition, the reduction of the relative price of manufactured items relative price pushes under developed countries' industries, which has led to a strong reduction in terms of labour and production shares in under developed economies, particularly in Latin America[6].

Different studies have attempted to explain the impact on manufacturing industry of the growth of Chinese competition, however, these studies have mainly set the focus on developed economies such as USA or some European countries, and that is why this study attempts to contribute to the literature related to the topic, by adding new evidence for the case of Latin America, specifically Chile. In order to reach our goal, we have used the data base ENIA (Industrial National Survey), a panel from the Chilean manufacturing industry, which contains information about 5000 manufacturing plants which employ more than 10 employees, since 1995 until 2006. As a difference from most of the literature existing, data allows us to build up a very disaggregated index of import penetration, which considers 80 manufacturing industries, following 4-digit ISIC Rev2 classification

In this way, we search for quantifying the impact in terms of China's competition rise on different variables that may affect Chilean plants, such as: productivity, employment and firm survival. In addition, in order to isolate the effect of exposition to trade with China, and following recent literature, we aim at carrying away endogeneity existing in terms of imports penetration, by using as an instrument the ratio of Chinese imports within 10 American economies[7].

Results suggest that the growth of imports coming from China has negatively and significantly impacted the manufacturing employment growth rate, as well possibilities of surviving for Chilean plants. In economic terms, China's competition impact is equivalent to employment growth rate existing during the period of study. Regarding the probability to exit markets, evidence found claims that a rise in one percentage point increases probability to exit markets in period T+2 by 0,3 percentage points, although, there is no evidence proving that these impacts are greater on intensive sectors in terms of physical resources or human ones.

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[6] Papers such as Molina and Martins (2016) analyze the process of premature deindustrialization in Latin America, but like Rodrik (2016) the analysis is at the aggregate level.

[7] The instrument includes 10 American economies: Argentina, Bolivia, Brazil, Colombia, Ecuador, Mexico, Peru, Uruguay, Canada and the United States. In addition, the exogenenity test, shows that import penetration should be treated as an endogenous variable. While the first stage test of weak instruments shows that the proposed instrument eliminates the endogeneity in the variable of interest.

Finally, after controlling by non-observable, and utilising different specifications, we did not find evidence in favour of productivity rises linked to foreign competition growth. The two first outcomes are consistent to most of literature carried out mainly for developed countries, while the last is in contradiction to main forecasts coming from the models of current economic theory. In this regard, it seems to be manufacturing plants of a small and economically open country as in the case of Chile cannot escape from foreign competition, through productivity rises.

The organization of this paper is the following: in section two, we revise literature about the effects caused by the growth of competition from China and trade on manufacturing industry in the world and Latin America. Then, in section three we develop the theoretical framework, and in section four, it is explained data utilised and exposed main stylized facts of this phenomenon in Chile. In section five, empiric strategy is explained, and in section six, main results found are presented. Lastly, in section seven conclusions are exposed.

2. Literature Review

A clear way to understand possible effects of trade with China, it is presented on Table 1, which gives us a clear summary about possible channels through which trade with China may affect different countries. According to Edwards and Jenkins (2015), trading with China implies direct and indirect effects, and at the same time, there are competitive and complementary impacts depending on grade of substitution existing between China's and Chile's productive mix. Clearly, competitive effects are materialised in products that have a high grade of substitution, therefore domestic producers are displaced within the country, being this the direct effect on importing sector, whereas the indirect effect is materialised in terms of a participation loss in global markets. On the other hand, direct-complementary effects are related to possibilities to export complementary goods to their country of origin, and in parallel, getting benefits for accessing to import new goods. Besides, indirect effect corresponds to join participation within domestic production. There is extensive literature attempting to study the effects of China's great growth on manufacturing industries in different countries around the world.

Table 1: China Competition Effect

	Competitive	Complementary
Direct	Imports displace local producers.	Increase in bilateral trade with China.
Indirect	Loss of market share in other countries.	Participation in global production.

Source: Edwards & Jenkins (2015)

In this regard, trade models have evolved into the new trade theory, which has been able to add heterogeneities at different levels of productivity and efficiency in each of firms. One of the most important works is by Melitz (2003), which concludes that, in front of a context of trade liberalization, low productivity companies will just be able to participate in domestic production -or leave the market-, whereas those firms with higher levels of productivity will be able to compete in international markets, through exports. This occurs due to fix costs, which can be skipped just by the most productive companies. In this sense, the aggregate productivity of the country will increase, due to the exit of less productive firms. At the same time, Bernard et al (2007) highlight processes of trade liberalization can help in the creation of competitive advantages, through a process creative destruction. By the other hand, Melitz and Ottaviano (2007) foresee that trade may cause different effects on companies, depending on domestic market's size. For instance, companies' mark ups are negatively related to domestic market's size, and positively related to firms' productivity. On the other side, imports penetration causes a negatively effect on mark ups, what does not occur on export intensive manufacturing plants. In the same way, we can mention other works by Arkolakis et al (2012) and Melitz –Redding (2015) which have highlighted the profits foreseen by these models.

Despite great breakthroughs shown by literature, most of the works have focused on analysing trade effects, specially import penetration effects on developed economies. In the case of England, we can highlight works by Hine and Wright (1998) and Greenway et al (1999), which, through the use of panel data for different industries during the 80's and early 90's, have found that growth of imports penetration, globalization and FDI have caused a negative impact on manufacturing labour in short time. In the case of Italy, we can mention Altamonte et al (2014), work that concentrates in studying effects of import penetration on manufacturing firms' productivity in Italy from late 90's until early 2000's, finding positive effects on productivity. In the same way, recent works by Yahmed and Dougherty (2017) using a panel at plant level for 14 countries from OECD, study the impact of regulation and import penetration on plants' productivity, and the authors show that exposition to foreign competition rises productivity just for those firms near to the technological frontier, while for the rest, impact is not significant. In parallel, Ashournia et al (2014) believe that rise exposition to competition from low income countries, including China, has caused a negative impact on non-qualified labour demand in Denmark, reducing these group's salaries. In added terms, Kollner (2016) claims that import penetration rise has had a very slight impact on manufacturing industry employment growth rate in different countries of Europe.

On the other hand, in the case of USA, Bernard et al. (2006) introduces a new import penetration measure, which measures the degree of exposure of industries to trade with different low-income countries , and the authors have found evidence about a negative effect on growth employment, and firm survival, although, this effect would be weaker on high productivity and intense capital plants, as they produce different goods from the ones imported from low income countries. In this same context, newer works by Autor et al (2016) and Acemoglu et al (2016) are focused on studying the unexpected manufacturing employment fall over the last decades in USA, emphasizing the direct effects on exposed industries, and in parallel, the indirect effects on competition for related industries. For this, the authors quantify trade's effect through import penetration, showing that international trade exposition has reduced the number of labour, and caused a change in the distribution of employment within the different sectors, specially affecting those workers with a lower level of qualification. In parallel, Pierce and Schott (2016) explore this relation using China's becoming part of World Trade Organization –WTO-, as an exogenous variation, by eliminating the potential rise in prices in USA on Chinese imports in 2000. By using the methodology of difference by difference, the authors show that industries keeping a wider difference in tariffs have gone through a greater fall in employment, what has been increasing over the years.

In the Latin American context, evidence is mix and concentrated in just some works. In the case of Álvarez and Opazo (2011), they study the effect caused by the rise of China's and low income countries' on the real wages in Chile, since 1995 until 2005. The results suggest that the import rise from China has tended to reduce salaries from 3% to 15%, depending on the firm's size and industry, being small and intensive in work companies the most affected ones. Perhaps, one of the most relevant studies is the one by Pavcnik (2002), who studies the effects of trade liberalization on Chile during the 80's, which led to profits in productivity within Chilean industries, although these profits partly derived from the elimination of the least productive plants[8].

On the other side, in the Argentinian context, Castro et al (2007) argue trade liberalization during the 90's caused a substantial rise of manufactured imports from China and India, what has led to a re assignation of resources in the economy, making grow employment in some industries, and reducing it in some others. In order to estimate the effect of China's import rise, the author develops a theoretical model which aims at isolating the effect of imports from China and India. The results suggest that the total rise of import penetration is the explanation for the 20% drop in the Argentinian manufacturing employment since 1993 until 2003. Whereas Chinese imports represent a 5% of this drop. Other closer countries such as Brazil see a quite bigger effect, almost double. In parallel, products from India have not caused a significant effect on manufacturing employment, due to India's low participation in the country's total imports[9]. At the same time, Bustos (2011) claims Argentina's tariff reduction, thanks to becoming part of MERCOSUR produced a rise in technology investment within the Argentinian manufacturing companies in the 90's. Other studies in Latin America about this topic are Iacovone et al (2013) for the Mexican case, and Jenkins (2015) for Brazil[10].

In a different field, Lederman et al (2007) claim that specialization patterns in manufacturing industry of Latin America, especially since 1990 until 2004, they have diverged from those in China and India, in other words, countries such Chile, Colombia, Peru and Brazil, among others, have tended to produce complementary goods from those imported from China and India, being Mexico the exception in Latin America. Precisely, there is a negative co-relation over the time between China's RCA index and Latin

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[8] Recent works such as Alvarez and Vergara (2010) have updated these results, using data until 2000.

[9] Other studies focused on developing economies are Jenkins and Sen (2006) for the case of African economies and Edwards and Jenkins (2015) for South Africa

[10] However, these papers use data at the aggregate level, focusing on industries rather than firms.

American countries, but Mexico. The authors argue intensive sectors in qualified and non-qualified labour have been negatively affected, while intensive sectors in natural resources and scientific knowledge have been benefited by the growth in trade with China and India.

3. Theoretical Framework

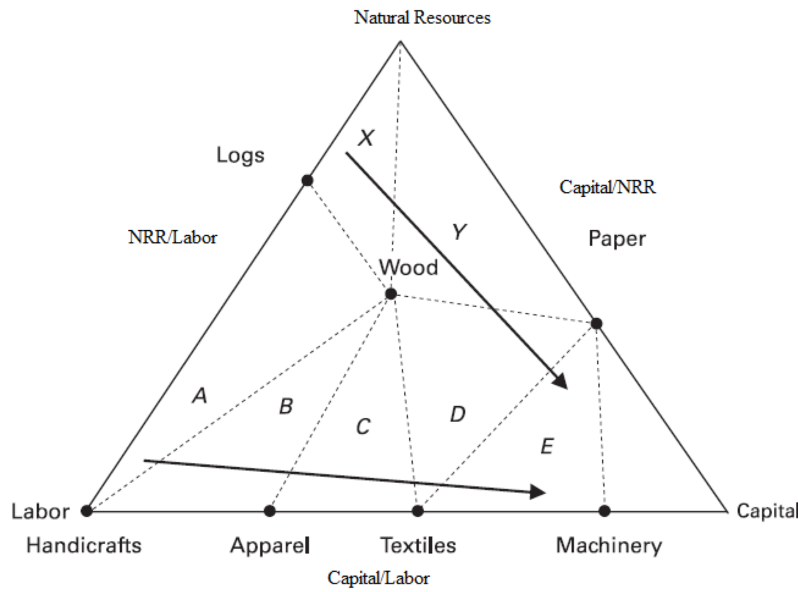
Theoretically speaking, one of the Heckscher-Ohlin model's forecast is that the distributional effect of trade and trade liberalization works through price change in tradable goods, as a result of trade expansion. This model's basic result explains why employment adjustments take place through industries, as wage change responds to goods' final price change, which exclusively rely on the trade level existing. In this regard, production of goods in a country will mainly rely on factor endowment. Countries having a great capital presence and qualified workers should become experts on those goods where the use of these factors is relatively intensive. On the contrary, countries less developed, such China, where non-qualified workers exist in an important number, should become experts on work intensive good manufacturing. For instance, manufacturing industries such chemicals or machinery will be profited by countries owning a great capital dotation, because of this kind of goods are intensive in capital, while textile industry or wearing apparel will be manufactured just in countries having an extensive number of labour[11]. In this way, there will be not direct competition between these two economies.

This is because the work intensive goods' relative price (non-qualified labour) should fall at a trade opening, causing a drop in inputs' prices used to their manufacturing, nonetheless, as an answer for this, there should be a rise in demand for this kind of work throughout economy. According to this model, international trade outcomes should lead to an employment re-distribution from the sector import substituting to the sector exporting. Greenway et al (2000) just argue the rise in imports by countries would cause an employment drop, while the opposite would occur if countries increase exports.

Regarding Latin American economies, it is relatively different, as they are rich economies in terms of natural resources, where the productive mix lies on intensive goods production in this kind of factor. For this reason, Leamer (1995) develops a model with 3 factors and n goods, which includes natural resources as a new production factor. This way, it is possible to analyse different specialization patterns in countries with different resource dotation. Figure 3 shows the Leamer triangle, which reflects different development patterns in relation to the initial factor dotation. This triangle's vertexes represent 3 production factors: work, natural resources, and capital, human as well physical, in which each of the triangle's points defines the factor dotation for countries and for the productive industries.

[11] See Lerner (1957)

Figure 3: The Leamer Triangle and Paths of Development



Source: Leamer 2012

The points represent seven different industries. Throughout the lower border we can find activities that do not use natural resources. According to their capital intensities, firstly we see handcrafting, then wearing apparel, textiles and machinery. Other 3 ways to make use of natural resources are also represented by points. "Logs" refers to a way of work-intensive use of natural resources. In the middle we can find different activities that are slightly intensive in capital, like wood. Finally, in the right border we can find activities where work usage is very reduced, as in the case of paper.

At the same time, there are two ways of specialization, represented by the arrows of figure 3. The pattern X-Y-D-E represents rich countries in natural resources, which start in the cone X, where natural resources are used to manufacture relatively work-intensive goods –Logs-, then "Logs" are produced and wood, and then wood products replace the "Logs." Summarising, first stages of development require a processing natural resources in a more and more intensive way in terms of capital. Natural resources have a relatively low value when they get cone D, and capital is partially absorbed by textile manufacturing. On the other side, path A-B-C-D-E represents countries with relatively little natural resources. These economies start by cone A, manufacturing handcrafted goods, "Logs" and wood. Thanks to the accumulation of capital, wearing apparel replace "Logs", then textile goods replace handcrafted products, and paper replaces clothes, and finally, on cone E, machinery has replaced wood. This way, one of the main conclusions coming from Leamer's model is that countries which are rich in natural resources should not fear Chinese competition, as items manufactured by these economies will not directly compete against Chinese ones.

Nevertheless, evidence proves that, even rich countries in natural resources are present in international markets, offering items in which they do not necessarily have a competitive advantage. For example, if we add the employment share in textile, wearing apparel, leather items and footwear, this did represent, by 1995, 15% of manufacturing labour, however, by the end of the study period, it was equivalent to 7%, which means employment share in these industries dropped more than 50% in 11 years. In parallel, work-intensive industries' exports, such as textiles and wearing apparel represented 5% of the total manufactured exports in 1990, while in 2006 they fell at near 2%, accompanied by an important rise of imports coming from China[12].

Clearly, one of the biggest setbacks for using Heckscher-Ohlin model with 3 factors and n goods[13] at the time of explaining plants' behaviour, it is its focus on industries over companies, Although Bernard et al (2005 and 2006) deliver an intuitive and reasonable solution for this issue, which consists just on assuming that plants produce packets of disaggregated products. Under this interpretation, a plant's entry intensity gives clear signal about its productive mix, and therefore, about its exposition to foreign imports. In this regard, those plants more intensive in labour within an industry that produces more intensive goods in terms of labour will be weaker at facing Chinese competition, as this country shows a comparative advantage at producing this kind of goods.

[12] Trade data from BADECEL, ELAC.
[13] Eventually, the model can be extended to a model with k factors and n goods.

4. Stylized Facts

The data used for this work was collected from different sources. Firstly, we can count the data base of the Chilean manufacturing sector called ENIA (National Industrial Survey), which approximately covers 5.000 Chilean plants with more than 10 employees, since 1995 until 2006[14]. This panel contains information related to the number of employees, salaries, industrial production, sales, value added, capital stock, use of energy, materials, exports, and other plants' features. Besides, plants are classified based on the International Standard Industrial Classification (ISIC) Rev2 and Rev 3 at 4-digit. On the other hand, trade data are collected from BADECEL, the statistics data base of foreign trade, belonging to ECLAC, and which is complemented by information coming from "TradeProd", which is CEPII's trade data base[15].

Table 2 presents descriptive statistics of some key variables used in this work. Firstly, we count with complete firms' participation, and as we can see, the average income goes around 5.000 CLP millions, although, there are notorious heterogeneities in terms of distribution, as firms from percentile 10 of distribution get annual income near 90 CLP millions, while plants from percentile 90 get much higher income. At the same time, we can see that the average number of workers is 75 per manufacturing plant, while the medium is 27 employees per plant.

On the other hand, the Skill ratio is defined as the proportion of skilled employees over the total number of employees per each firm[16]. As we can see, 33% is the average figure of trained workers, which is very different from companies belonging to percentile 90, where around 90% of employees are classified as trained workers. The last 2 rows give us information about growth rates of 2 important variables: productivity and employment. Firstly, we can see that during all the period of study, the average growth rate in productivity was positive, near 2%, but with clear differences between industries and companies. These values are not far from the outcomes found by Bergoeing and Repetto (2006)[17]. On the other hand, employment shows a negative growth rate, -1,2%

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[14] Unfortunately, it is not possible to extend the panel with the new versions of the survey, because the identifier code of each firm was removed.

[15] See de Sousa and Zignago (2012)

[16] Following Fernandes and Paunov (2010) the group of qualified people corresponds to: Managers, administrative staff and skilled workers involved in production.

[17] The results suggest that between 1997 and 2001 the total change in the productivity growth rate was 5.3%. On the other hand, Almeida and Fernandes (2011) argue that during the period 1992-2004 the aggregate productivity growth rate in the manufacturing sector was 0%

Table 2: Descriptive Statistics

Variable (1000 CLP)	Mean	SD	P10	P50	P90
Total Income	5670426	48400000	93484	481500	7596283
Employment	75.4355	160.459	10	27	173
Wage per Worker	3579.52	3884.08	1271.50	2743.34	6590.85
Skill Ratio	0.331	0.30	0.043	0.218	0.875
K/L	16310.37	173598.9	192.78	3852.83	25640.79
TFP Growth	0.0202	0.593	-0.511	0.0304	0.537
Employment Growth	-0.0122	0.293	-0.262	0.000	0.223

Source: Own calculations based on ENIA Panel.

Plus, the 67.03% of the sample is concentrated in companies that do not have more than 50 employees, 23.38% corresponds to plants which employ from 50 to 200 people, while 9.59% corresponds to big companies with more than 200 hired workers. Following this pattern, in terms of employed people, small size companies with less than 50 employees concentrate 19.26% of total employment, around 80.000 workers. The second group of companies get 29.04%, which is 120.000 employees, and finally, we find big size companies which reach 51.70% of total number of people employed, which means 212.000 workers.

Table 3: Firm and Employment Distribution

Size	Firms	Employment
N<50	67.03%	19.26%
50<N<200	23.38%	29.04%
N>200	9.59%	51.70%

Source: Own calculations based on ENIA Panel.

On the other hand, table 4 gives us information about rates of average exit among the periods T, T+1 and T+2. When we consider unconditional exit between periods T and T+1, the lowest exit rate is presented during the first years of the period, especially since 1995 until 1996, when the average exit rate reached 8,5%. In this same context, the most important exit rate reaches 11,3%, if we consider a time gap of one year[18]. On the other side, if we perform this exercise by using a gap of two years, exit rates are considerably higher

[18] Alvarez and Vergara (2010) estimate similar exit rates, in the period 1995-2000.

Table 4: Plant Exit Rate

T, T+1		T, T+2	
1995/96	8.5%	1995/97	16.9%
1996/97	11.4%	1996/98	19.7%
1997/98	11.2%	1997/99	19.3%
1998/99	9.6%	1998/2000	18.6%
1999/2000	10.7%	1999/2001	19.5%
2000/01	10.6%	2000/02	16.3%
2001/02	9.9%	2001/03	19.3%
2002/03	13.7%	2002/04	18.2%
2003/04	10.8%	2003/05	22.0%
2004/05	15.8%	2004/06	23.2%
2005/06	11.0%	2005/07	19.5%
2006/07	12.2%	2006/08	-
Mean	11.3%		17.8%

Source: Own calculations based on ENIA Panel.

In order to quantify the effect of Chinese imports on manufacturing employment, we have followed the methodology proposed by Bernard et al (2006). This approach allows to picture in a better way the impact caused by Chinese imports on employment, due to re-assignation of resources at inter and intra industry level responds to trade existing among countries with different endowments. In other words, we can expect that, for a country in particular, Chinese imports have a different impact in comparison to imports coming from other countries. This measure gives us a clear signal about the level of exposition to Chinese trade that different industries face, as this can be interpreted as the level of satisfaction for domestic demand by imports coming from a country in particular. Differently from most of literature existing, in this study we attempt to disaggregate at the highest level possible each of the industries. This is why we designed an import penetration index by utilising ISIC Rev2 classification at 4-digit, which permits us to identify 80 manufacturing industries.

Now, we can find the definition for import penetration:

$$IP\_Partner_{jct} = \frac{Imp\_Partner_{jct}}{ImpTotal_{jt} + GDP_{jt} - ExpTotal_{jt}} \quad (1)$$

Where variable $Imp\_Partner_{jct}$ corresponds to imports coming from a country in particular, in our case China, for industry j of country c in year t, while $ImpTotal_{jt}$ represents total imports, GDP_{jt} is the production and $ExpTotal_{jt}$ are total exports. Summarising, import penetration is defined as import participation coming from a country (or a group of countries) in particular on domestic consumption of industry j, in year t[19].

Table 5 shows some patterns of Chinese import penetration for each of the manufacturing industries, aiming at simplifying descriptive analysis, it is used ISIC Rev2 classification at 3-digit[20]. It is easy to observe that Chinese import penetration is not equally distributed through different industries, rise has been much more important for labour intensive sectors such as textile (321), wearing apparel (322), leather items (323) and footwear (324), where China's participation growth has clearly been more relevant than the one of other industries. For instance, in textile industry, import penetration has risen from 0,5% to 12% between 1990-2006, and for leather items and footwear this indicator has risen its value from 0,3% in 1990 to 33% in 2006, however the sector with the highest rise is wearing apparel, rising by 40%. Other industries that have gone through an important import penetration growth are industries related to plastic products (356), machinery industry, electrical (383) as well non-electrical (382), scientific and medical products (385). Within this group, electrical machinery has experienced exponential growth, from 0,6% to 14% during the study period, together with scientific and medical equipment (385), which increased from 1,7% to 11% in 2006.

[19] The total output of industry j is created using the sum of the output of all firms in industry j, over a given period. All the monetary variables of the ENIA survey are expressed in Chilean pesos (CLP), these were converted into US dollars using the official exchange rates of the IMF.
[20] The 1990 column was built based on CEPII trade data.

Table 5: Import Penetration, Averages

	Import Penetration from China			
Industry	1990	1995	2000	2006
Food products	0.06%	0.02%	0.02%	0.04%
Beverages	0.00%	0.00%	0.00%	0.00%
Tabacco	0.00%	0.00%	0.00%	0.00%
Textiles	**0.53%**	**2.47%**	**5.86%**	**12.20%**
Wearing apparel	**2.59%**	**10.39%**	**30.97%**	**43.68%**
Leather products	**0.33%**	**5.65%**	**20.11%**	**33.88%**
Footwear	0.11%	5.16%	15.43%	26.85%
Wood products	0.02%	0.07%	0.40%	0.82%
Furniture except metal	0.09%	0.62%	3.57%	8.28%
Paper and products	0.00%	0.02%	0.23%	0.29%
Printing and publishing	0.03%	0.16%	0.31%	0.87%
Industrial chemicals	0.42%	0.65%	1.04%	0.83%
Other chemicals	0.08%	0.20%	0.30%	1.56%
Petroleum refineries	0.00%	0.00%	0.00%	0.00%
Rubber products	**0.02%**	**0.33%**	**0.84%**	**6.52%**
Plastic products	**0.28%**	**1.78%**	**4.13%**	**8.56%**
Glass and products	0.25%	0.40%	1.72%	5.18%
Other non-metal min. prod.	0.01%	0.01%	0.05%	0.87%
Iron and Steel	0.05%	0.40%	0.29%	5.38%
Non-ferrous metals	0.00%	0.10%	0.76%	0.10%
Fabricated metal products	0.56%	1.09%	3.12%	7.77%
Machinery except electrical	**0.33%**	**0.43%**	**2.61%**	**9.65%**
Machinery electric	**0.60%**	**3.18%**	**6.45%**	**14.35%**
Transport equipment	0.11%	0.17%	1.07%	2.58%
Prof. and sci. Equipment	**1.74%**	**2.36%**	**7.38%**	**11.55%**
Total	0.84%	1.69%	5.11%	8.77%

Source: Own calculations based on BADECEL and CEPII.

On the other hand, intensive industries in terms of natural resources experienced very little import penetration growth during the study period, if we compare it to intensive industries in the regard of labour. As an example of this, food and drink industry (311-313) just rose from 0,2% in 1995 to 0,04% in 2006, what is very similar to the process experienced by tobacco industry (314), which has not shown any Chinese import penetration growth. In parallel, forest goods (331-332-341), non-metallic mineral product manufacturing (369) and base metals (381) have just seen little growth, which can be mainly explained by the comparative advantage that Chile presents at manufacturing this kind of products. It is also necessary to highlight that industries such chemicals (351-352), where exposition to Chinese competition has been less significant over the years, has not reached values over 3%. On average, exposition to Chinese imports in Chile has grown from 0,8% in 1990 to 9% in 2006, what means a growth of 10 times its value in 16 years. This clearly reflects the importance of imports coming from China on Chile's domestic demand.

Table 6: Employment Composition

	Manufacturing Employment Share		Change in Manufacturing Employment Share
Industry	1995	2006	1995-2006
Food products	24.75%	28.24%	14.13%
Beverages	3.22%	4.35%	35.04%
Tabacco	0.13%	0.14%	4.55%
Textiles	6.49%	3.30%	-49.20%
Wearing apparel	5.68%	3.66%	-35.63%
Leather products	0.79%	0.42%	-46.85%
Footwear	3.29%	1.35%	-59.16%
Wood products	6.75%	8.86%	31.23%
Furniture except metal	2.30%	1.04%	-54.79%
Paper and products	3.19%	3.48%	9.22%
Printing and publishing	3.69%	2.91%	-21.20%
Industrial chemicals	1.34%	2.71%	102.85%
Other chemicals	5.07%	5.28%	4.20%
Petroleum refineries	0.30%	0.08%	-75.03%
Rubber products	1.29%	0.89%	-30.73%
Plastic products	4.96%	4.58%	-7.73%
Glass and products	0.58%	0.67%	15.84%
Other non-metal min. prod.	2.63%	2.31%	-12.26%
Iron and steel	1.60%	2.15%	34.33%
Non-ferrous metals	2.20%	6.55%	197.77%
Fabricated metal products	7.53%	7.92%	5.11%
Machinery except electrical	3.80%	3.24%	-14.85%
Machinery electric	1.57%	1.11%	-28.92%
Transport equipment	3.25%	2.21%	-31.92%
Prof. and sci. equipment	0.27%	0.61%	123.03%

Source: Own calculations based on ENIA.

If we want to analyse manufacturing employment evolution, Table 6 gives us information of changes experienced by different industries at added level since 1995 until 2006. When revising employment participation of each industry over total manufacturing labour, it is possible to identify clear heterogeneities. Firstly, it is clear that the greatest employment concentration lies on food industry (311), which showed an increase of 4 percentage points during the study period, reaching 28% participation. By the other side, those sectors where import penetration has shown the greatest rises share some features such considerable participation losses, and clear examples of this are textile industry (321), wearing apparel (322), leather goods (323) and footwear (324). At the same time, natural resource intensive industries noted a growth that led them to own a greater share in manufacturing sector.

5. Empirical Strategy

In this section, we will discuss the empiric strategy used to estimate the effect of import penetration on (i) productivity, (ii) employment, and (iii) firms' survival.

The basic model can be expressed in the following way:

$$Y_{ijt} = \alpha_0 + \alpha_1 IPChina_{jt} + \alpha_2 X_{it} + \delta_i + \theta_t + \mu_{it} \qquad (2)$$

Where depending Y variable stands for TFP growth rate, employment growth rate, and lastly, the death probability of a firm in period T+2. On the other side, $IPChina_{jt}$ stands for Chinese import penetration in industry j, in year t. At the same time, we control by fixed effects at firm (δ_i) and time (θ_t) level.

Now, we will precisely explain each of the specifications and the hypothesis existing behind them.

5.1 Rate of Growth of Total Factor Productivity.

To reach our goal, we firstly estimate total productivity of factors (TFP), which measures use of efficiency for each of the factors from different plants. The TFP is estimated as the residual of a Cobb-Douglas function, expressed in logarithms, which can be symbolised in the following way:

$$y_{it} = \alpha \ + \ \beta {l_{it}}^s + \partial {l_{it}}^u + \gamma k_{it} + \epsilon_{it} \qquad (3)$$

Where y_{it} corresponds to value added, ${l_{it}}^s$ y ${l_{it}}^u$, respectively represent qualified and non-qualified work, while k_{it} the capital of firm i in year t. Clearly, by estimating the previous equation through OLS, we will obtain biased parameters, although, we can express the error term in the following way:

$$\epsilon_{it} = \omega_{it} + \mu_{it} \qquad (4)$$

In this way, firm's productivity is decomposed in one part that is observed by the plant ω_{it}, but it is not available in terms of data, and other part which cannot be observed by the firm nor by the econometrician either, μ_{it}. However, firms can choose their inputs based on their efficiency knowledge. Undoubtedly, those companies anticipating a higher efficiency level will hire more workers, and will use more inputs, what cause a parameter overestimation. Following Levinsohn and Petrin (2003)[21], it is possible to assume that ω_{it} is a function of capital (k_{it}) and of intermediate inputs (m_{it}), which corresponds to expenses in materials and energy. Precisely, the authors claim that materials or intermediate inputs can be symbolised

[21] Several works using Chilean data have used this methodology, among them we can name: Alvarez and Vergara (2010) and Almeida and Fernandes (2011)

this way: $m_{it} = m_{it}(k_{it}, \omega_{it})$ where m_{it} is a growing monotonic function in ω_{it} In this way, the term ω_{it} can be expressed by:

$$\omega_{it} = f(m_{it}, k_{it}) \qquad (5)$$

Therefore, production function can be symbolised by this equation:

$$y_{it} = \alpha + \beta l_{it}{}^{s} + \partial l_{it}{}^{u} + +\gamma k_{it} + f(m_{it}, k_{it}) + \mu_{it} \qquad (6)$$

$$TFP_{it} = A_{it} = \exp\left(y_{it} - \hat{\beta} l_{it}{}^{s} - \hat{\partial} l_{it}{}^{u} - \hat{\gamma} k_{it}\right) \qquad (7)$$

Now, it is possible to estimate each parameter, considering that intermediate input variation is not co-related to error term μ_{it}[22]. Once total factors' productivity is estimated, we can get growth rate symbolised as the difference of logarithms: $\Delta LnA_{it} = LnA_{it} - LnA_{it-1}$

In this regard, as new trade theory argues, growth competition effect should cause a rise for companies' productivity, as this is one of the main mechanisms to escape from foreign competition. Clear examples of this are the recent empiric studies carried out by Altomonte et al (2014), Bloom et al (2015) and Yahmed and Dougherty (2017), which have found positive effects on productivity and innovation for developed countries. In this regard, a crucial variable is the distance to the technological frontier, since those plants that are closer to the productivity frontier will be able to escape more easily from competition, through rises in productivity, what will not happen to those companies that are lagging behind

In order to picture the effect caused on companies by the distance to the technological frontier, we define this, inside each industry, as the group of companies located in percentile 99 of productivity distribution. In addition, as Yahmed and Dougherty (2017) pointed out, frontier's productivity growth rate is one of the determinants for firm productivity growth, as the most productive companies produce positive externalities in establishments far from the frontier. In this way, we estimate the following econometric model:

$$\Delta LnA_{it} = \alpha_0 + \alpha_1 IPChina_{jt} + \alpha_2 \Delta LnA_{jt}^{f} + \alpha_3 GAP_{ijt} + \alpha_4 X_{it} + \delta_i + \theta_t + \mu_{it} \qquad (8)$$

Where ΔLnA_{ijt} represents productivity growth rate for plant i, belonging to sector j, in year t. At the same time, variable $IPChina_{jt}$ corresponds to Chinese import penetration in industry j, ΔLnA_{jt}^{f} is the frontier's productivity growth, GAP_{ijt} represents distance to the technological frontier. On the other

[22] The estimations suggests that it is not possible to reject the null hypothesis that there are constant returns to scale.

hand, X_{it} is a matrix containing different controls that vary in terms of firms and time, mainly in terms of firms' different characteristics. It is important to highlight that this model includes fixed effect at plant level, which allows to control by non-observable features of different firms.

On the other hand, by incorporating a time fixed effect, it is possible to isolate shocks' effect affecting plants during certain time, as shocks of terms of trade -ToT-, fluctuations in exchange rates, economic liberalization programs (variations in tariffs), labour market changes, or any macro-economic shock. Consequently, this model allows us to understand the way Chinese import penetration has impacted on manufacturing plants' productivity.

5.2 Employment Growth Rate

The empirical model proposed in this document is straightforward, as we aim at estimating the effect of import penetration on employment growth rate for different manufacturing companies since 1995 until 2006, this way we can define the model like this:

$$Employment\ Growth_{it} = \alpha_0 + \beta * IPChina_{jt} + \gamma * Z_{it} + \delta_i + \theta_t + \mu_{it} \qquad (9)$$

In this case, the dependent variable is $Employment\ Growth_{it}$, which represents employment growht rate in periods T and T+1. The previous equation is based on works by Bernard et al (2006), Mion et al (2010) and Mayda et al (2012), which estimate this model by using data from USA, Belgium and Japan, respectively[23]. These studies conclude that, effectively, import penetration has had a negative impact on manufacturing employment, mainly in those labour intensive industries. Being this the scenario, and just being the same case in developed countries, the previous equation's main hypothesis is that import penetration effect is negative, as Chinese competition rise tends to displace domestic production for those industries directly competing against China, causing a direct effect on employee hiring by companies.

By the other hand, matrix Z_{it} contemplates an important number of firms' controls, such as: size, age, productivity, skill ratio, capital/labour relation, variables that search for isolating the effect of Chinese competition. The literature has insisted on the fact that young firms, with higher productivity rates show higher employment growth rates[24].

[23] Bernard et al. (2006) used the growth rate between t and t + 5, however, it is possible that during this period many firms have been closed or created. For this reason, it is more reasonable to use the growth rate between t and t + 1.
[24] See Alvarez and Goerg (2007), Mayda et al (2012) and Criscuolo et al (2014)

5.3 Survival

Finally, we also aim at studying the effects of Chinese competition on firms' survival probability. Clearly, an adjustment by firms at facing foreign competition growth, should be exit markets, what brings direct consequences on manufacturing industry employment.

As Rigby et al (2016) correctly state, new trade theory, based on models developed by Melitz (2003) and Helpman (2004), it has focused on explaining main determinants for entering international markets. The main feature of these models is the presence of fixed costs, what profoundly limits participation in worldwide trade. This way, just the most productive companies will be able to assume these costs, and so become exporters.

Different studies have widened these models, attempting to explain imports' impact on exporter's performance. Nonetheless, the study of the effects of trade and particularly of import penetration on the probability of survival is relatively scarce[25]. Studies such those by Bernard et al (2006), Mayda et al (2013), and Rigby et al (2016) report significant effects of import penetration on firms' survival, although, intensive firms in capital, and belonging to multinationals, they run a lower risk of exiting market. While Inui et al. (2009) and Mion and Zhu (2013) do not report significant effects on Japanese and Belgian firms respectively. This basically reflects all carried out studies are focused on developed economies, while empiric evidence about developing countries is more limited.

Following Bernard et al (2006), and Rigby et al (2016), we aim at estimating the following l lineal probability model[26]:

$$\Pr(Death_{i,t+2}) = \mathrm{f}(\alpha_0 + \alpha_1 IPChina_{jt} + \ \alpha_3 X_{it} + \delta_i + \theta_t + \mu_{it}) \qquad (10)$$

Where variable Death gets value 1, if firm i stops participating in market during period T+2 and 0 in the opposite case[27]. According to the current literature, we expect that bigger, older, more capital intensive and more productive firms will have greater chances to survive. At the same time, those plants that participate in international markets will have higher survival rates. In addition, Bernard and Jensen (2007) claims that multinational and multi-unit firms have lower chances of surviving, due to their greater adjustment grade at facing external shocks. In Chile, Álvarez and Vergara (2010) incorporate different controls that can affect exit probability, such as licenses bought by firms, variable that measures

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[25] See Castellani et al. (2010) and Bas and Strauss-Kahn (2014),

[26] Following the literature, we used a linear probability model because this allows us to control by fixed effect at firm level.

[27] We also estimate the model considering the probability of survival in period t + 1.

a firm's technologic activity, Herfindahl index, which aims at controlling inner competition inside each industry, and exporting condition. On the other side, as in the case of previous models, we controlled by non-observable, including fixed effects at firm and time level

5.4 Endogeneity

Models previously presented set a great challenge, which is related to existing endogeneity in Chinese import penetration, according to Álvarez and Claro (2009), and Edwards and Jenkins (2015), non-observable shocks can affect manufacturing industry, and import penetration, causing a bias in import penetration coefficient. It is also possible to argue double causality, as productivity growth can produce a rise in competition within domestic producers, leading to import reduction. In literature, it is possible to find different instrumental variables aiming at ending up with this endogeneity. Bernard et al (2006), and Castro (2007) use trade costs, measured as tariffs and transportation costs in the case of USA and Argentina, respectively. Additionally, Acemoglu et al (2016) use exposition to trade with China in countries with high income as an instrument in the case of USA, claiming that shocks of import demand are not correlated among high income countries, while Bloom et al (2015) utilise year 2000 tariff share level, before China becoming part of WTO, as this way it is possible to skip from endogeneity existing in tariff shares post-2005[28]. Following Autor, Dorn and Hanson (2013), and Acemoglu et al (2016)[29], it is proposed to use the Chinese import share on total manufacturing imports for 10 American economies as an instrument for Chinese import penetration[30]. In this sense, we define our instrument in the following expression:

$$CHN\_Share_{jct} = \frac{ImpChina_{jct}}{ImpTotal_{jct}} \quad (11)$$

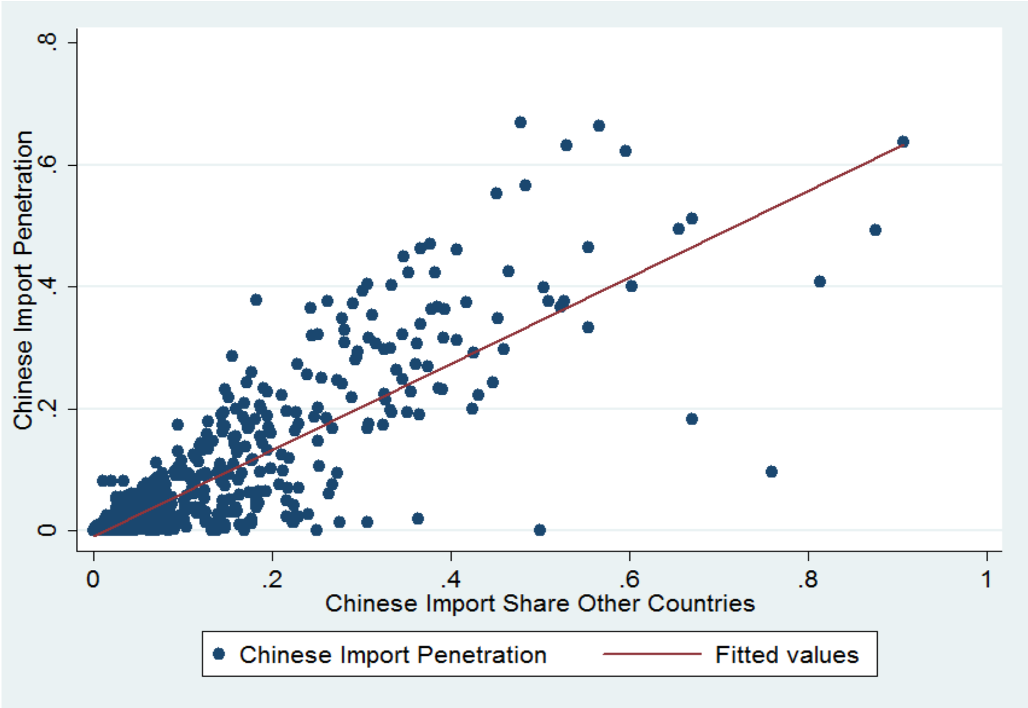
Where variable $ImpChina_{it}$, represents total Chinese imports in industry j, in country c, in year t y $ImpTotal_{jct}$ corresponds to Chinese industry's total imports j, in the country c in year t. Our instrument The China's import share in 1995 was 3.3% with a standard deviation of 4%, but in 2006 this value grows reaching 11.7% with a standard deviation of 13%.

[28] Other works such as Pierce and Schott (2016) use China entry to the WTO as an experiment in the case of USA.
[29] They instrument the variable of interest using the import growth of eight other-high income countries: Austria, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland.
[30] Argentina, Bolivia, Brazil, Colombia, Ecuador, Mexico, Peru, Uruguay, Canada and the United States.

The identification assumption lies on that the instrument is capturing productivity improvements in China and not demand factors that are correlated between Chile and 10 American economies. In this regard, as in the case of countries with high income[31], there is no correlation between Latin American countries' Chinese import demand shocks and Chile. The Paerson correlation coefficient shows there is a positive and significant 0,66% correlation between import penetration and this instrument during the complete period of study[32]. At the same time, correlation between employment growth rate and the instrument is -0,006% although, this is not significant, what a priori proves instrument's exogenous condition. This occurs for each of the independent variables of this study, therefore, our instrument meets the two necessary conditions defining a good one: relevance and its exogenous condition[33].

In this sense, figure 4 reflects the positive relationship between Chinese import penetration and our instrument. The scatter plot represents the first stage of our estimations, and the results suggests that an increase of 1 percentage point in the Chinese import share will leads to an increase of 0.77 percentage points in our variable of interest.

Figure 4: First Stage Scatter Plot



Note: Each point represents a 4-digit manufacturing industry and lines are fitted by OLS regression

[31] See Acemoglu et al (2016)

[32] These are the same results given by Autor, Dorn and Hanson (2013) and Acemoglu et al (2016).

[33] Autor et al. (2016) gives an interesting discussion of China's unexpected boom in international trade, arguing that it is possible to identify the causal effect of the trade shock.

6. Results

In this section, the main results obtained will be discussed, for each of the three specifications.

6.1 Productivity

Firstly, we shall star the analysis by studying the impact of Chinese competition on the productivity growth rate. Table 7 delivers us the main results found, by utilising the base model.

As we know, one of the most important predictions of new trade theory is that growth in competition will improve firms' productivity, as this is one of the most relevant mechanisms to adjust when plants compete, although, after carrying away endogeneity existing in Chinese import penetration, estimations show that competition growth coming from China has not had a positive impact on productivity growth rate[34]. In fact, when separating sample in terms of distance to the productivity frontier, we do not find differences in our variable of interest[35]. These results are not illogical to recent empiric studies, Yahmed and Dougherty (2017) show that import penetration does not have any effect on firms positioned far from the frontier, that is to say, below to the median productivity of their sector. But in the case of firms located close to the frontier the impact of import penetration is positive and statistically significant.

Additionally, going on in our analysis, we can prove that the growth rate of the technological frontier has a positive effect on productivity, being this a significant effect for each of the specifications, however, as it is reflected on columns (3) and (6), the effect is more notorious on firms positioned far from the frontier. This is consistent to Álvarez and Claro (2009), since they find find a positive effect of the frontier growth on the productivity of the Chilean firms, while when separating the sample in terms of proximity to frontier, we can prove that the impact of frontier's productivity growth is significant just for firms positioned closer to it, what is consistent to Yahmed and Dougherty (2017) for the case of European countries. This means that firms placed in industries where the growth rate of the productivity frontier is higher, will see higher growth rates as well, so, most productive firms produced positive externalities on establishments placed far from the frontier, just if they belong to the group of most productive firms[36]. We find that on average, an increase of 1 percentage point in the growth rate of the productivity frontier produces an increase of 0,01 percentage points in firms' productivity growth rate.

[34] Related to the first stage test, the F statistic is higher than 80 in each specification, so it is possible to reject the null hypothesis that the instrument is weak. Therefore, we are in the presence of a good instrument. In addition, using the Hausman endogeneity test we can verify the existence of endogeneity, because the null hypothesis of exogenous regressors is rejected. Then, the Chinese import penetration must be treated as an endogenous variable.

[35] In our analysis, we used the firms that are in the 95th and 99th percentile as the technological frontier, but we did not find significant differences.

[36] See Griffith et al (2009)

On the other hand, the case of Chile is different from USA, as technological catch-up theory does not completely meet, since variable GAP, which measures distance between firm's productivity and technological frontier has a negative and significant effect. There is very little evidence in Latin America to explain these outcomes, although it seems to be that in the case of Chile, least productive firms do not reach higher rates of growth. In fact, they go through lower rates of productivity growth, however, the effect is economically insignificant. When taking coefficient of variable GAP, and multiply by the effective GAP of each firm, and then represent it as annual productivity growth percentage, our results reflect that the "negative" catch-up explains less than 1% of productivity growth. It is necessary to emphasise that, in terms of heterogeneity at firm level, we found that plants' age do not have any impact on productivity, just as human capital intensity, these results go along the same line of studies such Griffith et al (2009)

Table 7: Productivity Growth Estimations

VARIABLES	(OLS) All Firms	(OLS) Close to the Fronier	(OLS) Far from the Frontier	(IV) All Firms	(IV) Close to the Fronier	(IV) Far from the Frontier
IP China	-0.263*	-0.0804	-0.332	-0.265	-0.189	-0.125
	(0.141)	(0.112)	(0.271)	(0.319)	(0.328)	(0.621)
Frontier Growth	0.102***	0.154***	0.0159	0.0993***	0.147***	0.0124
	(0.0182)	(0.0233)	(0.0278)	(0.0157)	(0.0176)	(0.0254)
Age	-0.00263	0.00690	-0.00235	-0.00155	0.00753	-0.000964
	(0.00801)	(0.0170)	(0.0134)	(0.00967)	(0.0160)	(0.0141)
Log(K/L)	-0.0298***	-0.0159*	-0.0196**	-0.0314***	-0.0178*	-0.0217**
	(0.00543)	(0.00923)	(0.00783)	(0.00601)	(0.00923)	(0.00880)
Skilled	0.00458	-0.0109	0.00912	0.00381	-0.0124	0.00845
	(0.0182)	(0.0219)	(0.0313)	(0.0196)	(0.0217)	(0.0321)
Size2	-0.0687***	-0.0581***	-0.110***	-0.0688***	-0.0579***	-0.112***
	(0.0182)	(0.0187)	(0.0405)	(0.0190)	(0.0186)	(0.0403)
Size3	-0.131***	-0.139***	-0.170	-0.128***	-0.138***	-0.178
	(0.0374)	(0.0355)	(0.127)	(0.0409)	(0.0361)	(0.122)
GAP	-8.24e-05***	-7.29e-05***	-4.45e-05*	-0.000109***	-8.84e-05***	-2.56e-05
	(1.67e-05)	(1.87e-05)	(2.36e-05)	(2.05e-05)	(2.94e-05)	(2.60e-05)
Observations	36,227	16,962	18,916	34,649	15,306	17,005
R-squared	0.010	0.019	0.009	0.010	0.016	0.006
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, clustered standard error by 4-digit industry
*** p<0.01, ** p<0.05, * p<0.1

On the other hand, Table 8 incorporates new controls aiming at determining if there are heterogeneities in the effect of import penetration, and for that we have incorporated import penetration of other economies, and interactions between Chinese import penetration and firms' characteristics. In addition, just as Yahmed and Dougherty (2017), we have included in our estimations Herfindahl index, variable that reflects market concentration, what means it searches for controlling inner competition inside each industry. This index is calculated standardly, corresponding to the sum of the squares of the market shares of the firms within the industry, higher values of the index indicate a greater market concentration[37].

Firstly, we can clearly see that variables mentioned on the previous table keep their signs and significance levels. In this regard, we definitely have not found evidence proving that Chinese competition growth has caused efficiency gains for Chilean firms. Plus, interactions of Chinese import penetration with factor intensities do not show significant results, what proves that, independently from firms' characteristics, Chinese competition growth has not led to improvements in productivity for Chilean manufacturing industry, opposite from the case of most of developed countries. Nevertheless, an interesting point is that import penetration of rest of countries has a significant as well negative impact, just if we consider the complete sample. Regarding this, an increase of 1 percentage point should cause a drop of 0,08 percentage points in productivity growth rate. This is a minor effect if we consider standard deviation for productivity growth rate is 0,59. A possible explanation for this is found in Álvarez and Claro (2009), who argue that products coming from high and medium level income countries may discourage domestic firms' productivity levels improvement, as these countries compete in markets where items are more sophisticated, therefore, competition is stronger too, however, as we have already noted, effect is not economically significant.

Summarising, this section's most important results refute main predictions by new trade theory, as, even though literature shows that these predictions become reality in most of developed countries[38], it seems that, in the case of a small, open and developing economy, the manufacturing firms did not escape from foreign competition through growth in its productivity levels, during a period in which Chinese competition rose significantly. Even more, when separating sample in terms of productivity, neither we find evidence proving that firms closer to the productivity frontier get benefits from foreign competition. In this sense, it is possible that in developing countries, where physical as well human capital ae relatively scarce, it is more difficult to make the most of trade benefits and generate productivity growth[39].

[37] This variable is constructed based on the total sales of the plants in each industry

[38] See Altomonte (2014) and Bloom et al (2015) for developed countries.

[39] Although, the evidence is scarce for developing countries, these results are in the same line of recent works such as Doan et al (2016).

Table 8: Productivity Growth Estimations

VARIABLES	(OLS) All Firms	(OLS) Close to the Fronier	(OLS) Far from the Frontier	(IV) All Firms	(IV) Close to the Fronier	(IV) Far from the Frontier
IP China	-0.0908	0.0438	0.0322	-0.321	-0.148	-0.118
	(0.121)	(0.121)	(0.232)	(0.433)	(0.441)	(0.837)
Frontier Growth	0.0984***	0.152***	0.0111	0.0958***	0.145***	0.00772
	(0.0180)	(0.0233)	(0.0273)	(0.0156)	(0.0177)	(0.0254)
Age	-0.00383	0.00555	-0.00318	-0.00271	0.00650	-0.00266
	(0.00803)	(0.0172)	(0.0135)	(0.00965)	(0.0160)	(0.0140)
Log(K/L)	-0.0303***	-0.0163*	-0.0187**	-0.0324***	-0.0185**	-0.0213**
	(0.00548)	(0.00933)	(0.00792)	(0.00609)	(0.00934)	(0.00903)
Skilled	0.0239	0.00982	0.0357	0.0138	0.000400	0.0299
	(0.0206)	(0.0245)	(0.0368)	(0.0276)	(0.0303)	(0.0476)
Size2	-0.0675***	-0.0583***	-0.108***	-0.0685***	-0.0580***	-0.113***
	(0.0182)	(0.0187)	(0.0405)	(0.0190)	(0.0186)	(0.0402)
Size3	-0.129***	-0.139***	-0.167	-0.128***	-0.138***	-0.178
	(0.0374)	(0.0355)	(0.127)	(0.0409)	(0.0360)	(0.122)
GAP	-8.22e-05***	-7.27e-05***	-4.35e-05*	-0.000110***	-8.87e-05***	-2.66e-05
	(1.67e-05)	(1.87e-05)	(2.35e-05)	(2.07e-05)	(2.96e-05)	(2.60e-05)
IP Other	-0.0864	-0.00746	-0.142**	-0.0799**	-0.0106	-0.134**
	(0.0531)	(0.0517)	(0.0640)	(0.0326)	(0.0500)	(0.0589)
IPChn*Skilled	-0.405**	-0.487**	-0.512**	-0.206	-0.302	-0.390
	(0.164)	(0.241)	(0.254)	(0.398)	(0.463)	(0.663)
IPChn*K/L	5.82e-06*	2.50e-06	2.69e-06	6.84e-06	3.40e-06	3.39e-06
	(3.46e-06)	(5.82e-06)	(4.32e-06)	(4.37e-06)	(5.46e-06)	(6.63e-06)
Herf	0.148*	0.0485	0.103	0.152**	0.0728	0.122
	(0.0763)	(0.0743)	(0.129)	(0.0773)	(0.0816)	(0.127)
Observations	36,227	16,962	18,916	34,649	15,306	17,005
R-squared	0.011	0.019	0.010	0.010	0.017	0.007
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, clustered standard error by 4-digit industry
*** p<0.01, ** p<0.05, * p<0.1

6.2 Employment Growth

In this section, we will analyse effects of Chinese import penetration growth on manufacturing employment growth rate. Results can be found on tables 9 and 10.

Table 9 shows that Chinese import penetration has a negative as well significant effect, on estimation by OLS, as well on estimation by instrumental variables. A point to be highlighted is that on specifications (1) and (2), the effect of our variable of interest is being underestimated, since by correcting endogeneity the effect becomes larger and remains statistically significant. In this regard, Chinese imports average in the rest of American countries proves to be a good instrument to explain Chinese import penetration in Chile, since first stage weak instrument test give us a F-statistic bigger than 100 in each of the specifications. In addition, in each specification we reject the null hypothesis of the Wald test, which confirms that our variable of interest must be treated as endogenous.

In terms of firms' characteristics, we can observe that results are consistent to most of literature. Most productive firms present higher rates of employment growth, as well the youngest and smallest plants. Previous results are solid, as they repeat in each of the four specifications. Additionally, we can see that those firms that are intensive in physical, as well human capital, also show greater rates of employment growth.

By the other hand, we can see that competition from the rest of countries has negative and significant effects on the rate of employment growth, specifically an increase of 1 percentage point would cause a drop of 0,01 percentage points in employment, although, this result is clearly much smaller than the one of Chinese import penetration, due to import penetration from the rest countries slightly increased from 20% to 21% between 1995 and 2006.

Table 9: Employment Growth

VARIABLES	(OLS) Employment Growth	(OLS) Employment Growth	(IV) Employment Growth	(IV) Employment Growth
IP China	-0.0581***	-0.0470***	-0.0795***	-0.0746***
	(0.0160)	(0.0168)	(0.0270)	(0.0278)
Log(TFP)	0.0399***	0.0399***	0.0401***	0.0401***
	(0.00218)	(0.00218)	(0.00220)	(0.00220)
Skilled	0.0200***	0.0210***	0.0197***	0.0206***
	(0.00456)	(0.00459)	(0.00457)	(0.00459)
Log(K/L)	0.0115***	0.0117***	0.0114***	0.0116***
	(0.000879)	(0.000885)	(0.000888)	(0.000895)
Age	-0.00602***	-0.00601***	-0.00602***	-0.00600***
	(0.000720)	(0.000719)	(0.000720)	(0.000720)
Size2	-0.0505***	-0.0506***	-0.0505***	-0.0506***
	(0.00368)	(0.00368)	(0.00369)	(0.00369)
Size3	-0.0943***	-0.0948***	-0.0946***	-0.0950***
	(0.00601)	(0.00602)	(0.00603)	(0.00603)
IP Other		-0.0116***		-0.0100**
		(0.00411)		(0.00431)
Observations	47,777	47,777	47,594	47,594
R-squared	0.031	0.032	0.032	0.032
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, clustered standard error by 4-digit industry
*** p<0.01, ** p<0.05, * p<0.1

Following with our analysis, table 10 extends base model, including new controls. Firstly, we can notice endogeneity correction allows us to find statistically significant effects, as estimation by OLS does not introduce evidence proving any significant impact on our dependent variable. In this sense, growth of Chinese competition has a negative and significant effect on each of the specifications estimated by instrumental variables. We found evidence proving that rise of 1 percentage point in Chinse import penetration causes a drop of 0.17 percentage points in the employment growth rate. As we know, employment growth noted -1.2 per cent average during the period of study, thus, in economic terms, the impact of Chinese competition is very significant. A rise of one standard deviation in variable IP China, that is, 8 percentage points, causes a reduction of 1.37 percentage points in the employment growth rate. This later point is relevant, since the increase in imports of a country has an impact on employment equivalent to the average growth rate of manufacturing employment during the study period. Theses results are in line with very most of literature. Mion et al (2010) finds similar results for Belgian firms since 1996 until 2007. At the same time, Mayda et al (2012) argue that an increase of 10 percentage points in Chinese import penetration leads to a fall of 2.5 percentage points in employment growth rate for Japan. However, different from the Belgian case, competition coming from the Asian country has not generated a clear reallocation of resources through the economy, since we did not find evidence proving heterogeneous effects when including interactions between our variable of interest and firms' characteristics, although we can state the effect of import penetration on employment growth is lower for those firms that are less productive, though the difference existing is slight.

It should be noted that former outcomes are very similar in the case of import penetration from the rest of the countries, though, both of the effects are statistically different. Noticeably, average effect is smaller in the case of the rest of the economies, since a rise of 1 percentage point in this variable causes a drop of 0.009 percentage points in employment growth rate. One standard deviation for this variable reaches 27 percentage points, thus a rise of 1 standard deviation leads to a drop of 0.243 percentage points in employment growth rate, equivalent just to a 15% of the effect of Chinese import penetration. Additionally, we must take into account that over the study period, import penetration variation from the rest of countries was very low, a rise of 20% to 21%, what explains the slight effect. However, a relevant point reflected on specifications (2), (3), and (4) is that the effect of competition from China as well from the rest of countries, it does not necessarily depend on firms' characteristic, as interactions between import penetration and resource intensity is irrelevant in both of the cases. In other words, foreign competition growth seems to equally affect all Chilean plants, since, just interaction between import penetration and total factor productivity presents a significant effect, that is to say, import penetration impact is lower on most productive firms. Besides, equally to former specifications, heterogeneities at firm level present expected signs, and are statistically significant[40].

[40] In general terms, the results found until now are in same line of other studies carried out for developing countries, such as Castro et al (2008), Filomeni (2011) and Edward and Jenkins (2006). However, these works use data at the aggregate level.

Table 10: Employment Growth

VARIABLES	(OLS) Employment Growth	(IV) Employment Growth	(IV) Employment Growth	(IV) Employment Growth
IP China	-0.0437	-0.124*	-0.139*	-0.174**
	(0.0316)	(0.0733)	(0.0744)	(0.0823)
Log(TFP)	0.0388***	0.0383***	0.0385***	0.0399***
	(0.00228)	(0.00241)	(0.00241)	(0.00241)
Skilled	0.0260***	0.0224***	0.0227***	0.0208***
	(0.00509)	(0.00575)	(0.00573)	(0.00640)
Log(K/L)	0.0120***	0.0119***	0.0120***	0.0121***
	(0.000894)	(0.000901)	(0.000898)	(0.000897)
Age	-0.00604***	-0.00601***	-0.00602***	-0.00600***
	(0.000720)	(0.000721)	(0.000720)	(0.000720)
Size2	-0.0509***	-0.0510***	-0.0511***	-0.0518***
	(0.00368)	(0.00369)	(0.00369)	(0.00370)
Size3	-0.0953***	-0.0953***	-0.0951***	-0.0956***
	(0.00602)	(0.00604)	(0.00604)	(0.00604)
IP Other	-0.0121***	-0.0114***	-0.00960**	-0.00636
	(0.00417)	(0.00420)	(0.00424)	(0.00878)
IPCHN*Skilled	-0.122**	-0.0348	-0.0314	-0.0341
	(0.0546)	(0.0895)	(0.0897)	(0.0940)
IPCHN*K/L	-1.20e-06*	-1.25e-06*	1.23e-06	7.33e-07
	(6.81e-07)	(6.91e-07)	(1.47e-06)	(1.46e-06)
IPCHN*TFP	0.000874*	0.00140*	0.00138*	0.00217***
	(0.000515)	(0.000720)	(0.000719)	(0.000836)
IPO*K/L			-1.57e-07*	-1.11e-07
			(8.20e-08)	(8.23e-08)
IPO*Skilled				0.0104
				(0.0164)
IPO*TFP				-0.000122**
				(5.35e-05)
Observations	47,777	47,594	47,594	47,594
R-squared	0.032	0.032	0.032	0.032
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, clustered standard error by 4-digit industry
*** p<0.01, ** p<0.05, * p<0.1

6.3 Survival

Finally, our last effort consists on quantifying import penetration effect on manufacturing firms' survival. As we previously stated, there is extensive literature finding negative effects of foreign competition on plants' survival, especially for developed countries.

Table 11 introduces base model estimations, which firstly includes controls at firm level. About this model, outcomes are consistent to empiric evidence previously found. In general, we can see that most productive firms run lower risks of market exit, as a 1% rise firms' productivity is linked to a 0.03 percentage points reduction in market exit probabilities, being these solid outcomes for each of the specifications. Besides, big firms have higher chances to stay in market, especially plants with more than 200 workers. Despite the former statement, older firms run a higher marker exit risk, what matches results found for Chilean manufacturing industry by Álvarez and Vergara (2010), although, there is a contrast to firm learning models[41].

On the other hand, we note export firms run lower risk of market exit, what confirms Melitz (2003) model predictions, which states only most productive firms will be able to overcome existing costs for entering international markets, and consequently, having export activity, while least productive plants will run higher risks of market exit. This generates productivity gains at the aggregate level, because, less productive firms will leave the market, so that the aggregate productivity will increase[42]. In parallel, we have included variable MNC, what corresponds to a dummy variable getting value 1, in case of a foreign firm[43]. The intuition behind including this variable comes from the chance for foreign firms of having a different performance in comparison to domestic companies. Foreign companies are more flexible and own a bigger grade of freedom for facing domestic issues, as by being part of an international net of production, change of location is cheaper, although, once we have controlled by non-observable, estimations reflect that multinational firms located in Chile do not run real risks of market exit, what goes in line with Álvarez and Gorg (2009).

[41] See Jovanovic (1982)
[42] Helpman et al (2004) go a step further and affirm that within the group of firms that exports, only the most productive will be involved in FDI. A rich discussion of these models is found in Melitz and Trefler (2012).
[43] Firms with more than 50% of the property belonging to foreign people, are classified as foreign firms following Alvarez and Gorg (2005)

Table 11: Import Penetration and Firm Death

VARIABLES	(OLS) Death	(OLS) Death	(IV) Death	(IV) Death	(IV) Death	(IV) Death
IP China	0.121**	0.121**	0.264***	0.264***	0.264***	0.269***
	(0.0492)	(0.0492)	(0.0618)	(0.0618)	(0.0618)	(0.0618)
Log TFP	-0.0387***	-0.0386***	-0.0375***	-0.0374***	-0.0374***	-0.0375***
	(0.00328)	(0.00328)	(0.00315)	(0.00315)	(0.00315)	(0.00315)
Skilled	0.00265	0.00271	-0.00171	-0.00165	-0.00164	-0.00175
	(0.00896)	(0.00896)	(0.00761)	(0.00761)	(0.00761)	(0.00761)
Log(K/L)	0.0162***	0.0163***	0.0164***	0.0164***	0.0164***	0.0164***
	(0.00236)	(0.00236)	(0.00209)	(0.00209)	(0.00209)	(0.00209)
Age	0.159***	0.159***	0.224***	0.224***	0.224***	0.224***
	(0.00540)	(0.00540)	(0.00615)	(0.00615)	(0.00615)	(0.00616)
Size2	-0.0273***	-0.0271***	-0.0229***	-0.0228***	-0.0228***	-0.0229***
	(0.00834)	(0.00835)	(0.00750)	(0.00750)	(0.00751)	(0.00751)
Size3	-0.0668***	-0.0663***	-0.0576***	-0.0574***	-0.0574***	-0.0576***
	(0.0145)	(0.0145)	(0.0128)	(0.0128)	(0.0128)	(0.0128)
IP Other	-0.0144*	-0.0143*	-0.0209***	-0.0209***	-0.0209***	-0.0203**
	(0.00783)	(0.00783)	(0.00810)	(0.00810)	(0.00810)	(0.00808)
Exporter	-0.0229***	-0.0227***	-0.0202***	-0.0201***	-0.0201***	-0.0201***
	(0.00725)	(0.00724)	(0.00653)	(0.00653)	(0.00653)	(0.00653)
MNC		-0.0279*		-0.0231	-0.0231	-0.0228
		(0.0150)		(0.0154)	(0.0154)	(0.0154)
Licenses					0.000197	0.000248
					(0.00751)	(0.00751)
Herf						-0.0359
						(0.0251)
Observations	58,203	58,203	45,977	45,977	45,977	45,977
R-squared	0.144	0.144	0.154	0.154	0.154	0.154
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses, clustered standard error by 4-digit industry
*** p<0.01, ** p<0.05, * p<0.1

Following with the analysis, we can see that variable Licenses has a negative effect on firms' exit, however, this effect is not significant for any of the specifications, what can be explained by the fact that our proxy does not necessarily reflects, in a correct way, innovation process inside firms. Crespi and Zuñiga (2010) prove, by using different surveys on innovation in Latin America that, firms that invest more on innovation are capable of rising their productivity, and as we know, more productive firms are more likely to survive in the markets.

An aspect that is important and in line with existing literature for developed countries, it is that import penetration rise over the period of study negatively impacted on firms' market survival. Firstly, in concordance to Bernard et al (2006), our variable was being under estimated, since when correcting endogeneity issue, the marginal effect of Chinese competition rose around 0.14 percentage points[44]. By revising specification 1 in table 12, we can conclude that an increase of 1 percentage point in the import penetration ratio generates an increase of 0.3 percentage points in the probability exiting in the following two periods. This effect is considerably lower if we compare it to Bernard et al (2006), who argue a rise of 1 percentage point in interest variable reduces survival probability in 3,4 percentage points, although, the main reason for such result divergence comes from the fact of they use import penetration from low income countries, and study survival probabilities over a lapse of 5 years.

On this hand, a rise of one standard deviation of our variable of interest produces an increase of 1,6 to 2,4 percentage points in terms of market exit feasibility over period T+2. Clearly, this effect is economically considerable, as average exit rate for this case reaches 17,8%, that means around 14% of this rate is explained by Chinese import penetration growth[45], what goes in agreement to results found by Rigby et al (2017) for the case of USA since 1992 until 2007. Additionally, by checking specification of table 12, it is possible to come to the conclusion that the effect of Chinese import penetration on plants' exit is lower for those firms that are more productive, however, we did not find conclusive evidence about this effect being different depending on plants characteristics. Interaction between Chinese import penetration and human capital intensity is not statistically significant for any of the specifications.

[44] We reject the null hypothesis in the Wald test for each specification. While, for the test of weak instruments we find a F statistic much higher than 50 in each specification.
[45] As proof of robustness we estimate the model using as a variable the probability of leaving in the period t+1. The results are similar and reaffirm the evidence found until now.

Table 12: Import Penetration and Firm Death

VARIABLES	(IV) Death	(IV) Death	(IV) Death	(IV) Death
IP China	0.269***	0.263***	0.255***	0.302***
	(0.0618)	(0.0625)	(0.0793)	(0.0913)
Log TFP	-0.0375***	-0.0375***	-0.0375***	-0.0354***
	(0.00315)	(0.00315)	(0.00315)	(0.00329)
Skilled	-0.00175	-0.00177	-0.00299	-0.00362
	(0.00761)	(0.00761)	(0.00864)	(0.00860)
Log(K/L)	0.0164***	0.0162***	0.0162***	0.0161***
	(0.00209)	(0.00210)	(0.00210)	(0.00210)
Age	0.224***	0.224***	0.224***	0.224***
	(0.00616)	(0.00616)	(0.00616)	(0.00616)
Size2	-0.0229***	-0.0228***	-0.0228***	-0.0229***
	(0.00751)	(0.00751)	(0.00751)	(0.00751)
Size3	-0.0576***	-0.0575***	-0.0574***	-0.0572***
	(0.0128)	(0.0128)	(0.0128)	(0.0128)
IP Other	-0.0203**	-0.0206**	-0.0208***	-0.0173**
	(0.00808)	(0.00810)	(0.00798)	(0.00780)
Exporter	-0.0201***	-0.0202***	-0.0202***	-0.0203***
	(0.00653)	(0.00653)	(0.00653)	(0.00653)
MNC	-0.0228	-0.0228	-0.0228	-0.0227
	(0.0154)	(0.0154)	(0.0154)	(0.0154)
Licenses	0.000248	0.000348	0.000364	0.000395
	(0.00751)	(0.00751)	(0.00751)	(0.00750)
Herf	-0.0359	-0.0348	-0.0350	-0.0349
	(0.0251)	(0.0251)	(0.0251)	(0.0251)
IPCHNxK/L		6.76e-07	6.71e-07	8.87e-07
		(5.51e-07)	(5.48e-07)	(5.42e-07)
IPCHNxSkilled			0.0263	0.0391
			(0.0952)	(0.0935)
IPCHNxTFP				-0.00125**
				(0.000514)
Observations	58,203	58,203	45,977	45,977
R-squared	0.154	0.154	0.154	0.154
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses, clustered standard error by 4-digit industry
*** p<0.01, ** p<0.05, * p<0.1

7. Conclusions

China's radical change over the last decades has led to a strong penetration of its products in most of the countries and industries around the world. In 1980, Chinese manufacturing products represented a very little portion within global context, however, just in 30 years China has become the most important exporting economy in the world. Regarding this, we should wonder about the effects of permanent import growth from China on the economy, mainly in manufacturing sector, due to this is the sector that has undergone the highest rises in imports.

This phenomenon has been widely studied in the case of developed economies such as USA or most of European countries, although, for most developing countries the literature is not extensive, and results are not conclusive, and that is why this paper aimed at contributing to provide with new evidence of impacts caused by Chinese competition growth on manufacturing industries in developing economies such the case of Chile, since the time of becoming part of international markets in 2001. This study set its focus on three key aspects of plants: productivity, employment and firms' survival. In order to reach our goals, we utilised a panel from the Chilean manufacturing sector, which contains information about 5000 firms, and covers period since 1995 until 2006. This data base was combined with trade data from ECLAC, what was used to create an index of Chinese import penetration for 80 manufacturing industries following the ISIC Rev2 classification at 4-digit. On this sense, exogenous test results suggest that Chinese import penetration must be treated as an endogenous variable, and that is the reason why, based on recent literature, we have used as an instrument the share of Chinese imports on total imports for each of industries within 10 American economies.

Firstly, results show Chinese import penetration has not been linked to a growth in productivity for Chilean firms, in opposition to what is stated by new trade theory's predictions, as after using different specifications, we did not find evidence pro these predictions. Moreover, after separating sample according to productivity levels, the effect is not statistically significant. It seems that manufacturing firms of a small and developing economy did not escape from foreign competition by rises of productivity, over a period in which Chinese competition rose significantly. One explanation for this is the fact that it is more difficult to take advantage of trade gains for small and developing country, where there is, in relative terms, scarcity of physical as well human capital.

Nonetheless, we have found conclusive evidence about the negative and at the same time economically relevant effect that import penetration has on manufacturing employment, that means, manufacturing industry standstill is partially explained by China's competition growth. In general terms, an increase of one standard deviation in our variable of interest causes a reduction of 1.2

percentage points in the manufacturing employment growth during the study period. In addition, firm exit probability is positively related to Chinese import penetration, as around 15% firms' exit rate during period T+2 is explained by our interest variable, what rectifies the fact that import penetration growth has displaced domestic firms. These results go in line with literature, which reflects a negative relation between import penetration and formerly described variables. Something to emphasise is that we did not find heterogeneous effects of import penetration, that means, firms owning certain characteristics are not affected in a different way by Chinese import penetration.

Although in this paper we have broached 3 key variables when studying firms' behaviour, many questions are still unsolved. One of them is the relation between import penetration and innovation levels in firms. Evidence shows that foreign competition growth can lead to investment rises of R&D, what will bring improvements in terms of productivity levels. Another possible question is the relation between import penetration and firms' exporting activity, especially the way it is affected the mix of exported and domestically sold products by plants, at facing a rise of import penetration. A possible reaction by manufacturing plants is to make changes about their productive mix, and in that way to start producing items that do not directly compete with imported products.

Many developed countries have attempted to answer these questions, however evidence at firm level in Latin America is limited, and this is why it would be interesting to research about new areas in which foreign competition may affect manufacturing plants.

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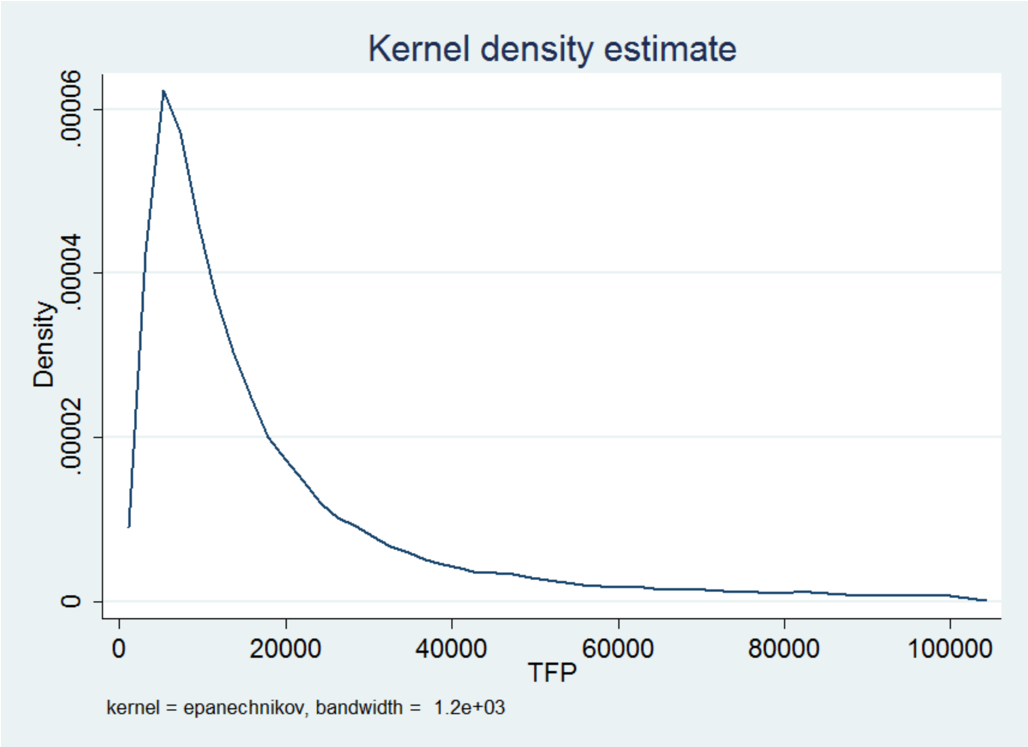
9. Appendix

A1: Total Factor Productivity Distribution



Source: Own calcultions based on ENIA.