

An Empirical Study on the Impact of the United States Chile Free Trade Agreement on Chilean
Employment and Value Added

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I Introduction

There is widespread support among economists for greater free trade among the nations of the world. One of the arguments in favour of greater international trade is that if countries focus on producing more of the goods and services for which they have a comparative advantage and trade those goods and services with another country for goods and services that the first country does not have a comparative advantage in both countries will be made better off. This will lead to greater output than if both countries did not participate in trade. In this paper I want to test to see if this conventional view of trade holds empirically. I will be looking at the impact of lower ad valorem tariffs in a large developed economy on the level of employment and value added in a medium-sized developing economy. Specifically, I will be looking at the impact of the United States Chile Free Trade Agreement (USCFTA). I want to measure the impact that the lower import ad valorem tariffs for Chilean industries, when exporting to the United States, had on their levels of employment and value added.

In this paper I look at 45 different Chilean industries at the 3 digit International Standard Industrial Classification of All Economic Activity (ISIC) level over a period of 15 years with data for 14 of the 15 years. The time period of my sample is from 1997-2011 excluding 2009 because there was no data reported in that year . In this paper I run a difference in difference method. I take the difference in the tariff rate that Chile faced when exporting to the U.S compared to the most favoured nation (MFN) rate. I then take the difference in employment and value added before and after the signing of the USCFTA. I then take the difference of the two differences. In practice I augment my difference in difference strategy with a full set of both year and industry fixed effects.

In this paper I find that the USCFTA did not have any statistically significant impacts on employment and value added from the implementation of the free trade agreement in 2004 to the end of the sample period in 2011. These results were similar if I ended the sample in 2008, if textiles and apparel were excluded or both the sample ended in 2008 and textiles and apparel were excluded. I chose to exclude 2010 and 2011 from the sample because there was a large drop in both employment and value added after 2008 and it is believed that those data points are being driven by the residual impacts of the 2008 financial crisis. In addition, I chose to exclude textiles and apparel because in 2005 the Agreement on Textiles and Apparel was terminated and Chile may have faced increase competition from China. I also used output as a robustness check and I found that the impact of the lower ad valorem tariffs did not have any impact on output.

This paper will be organized into 8 parts. In part 2 I provide background details about the USCFTA and Chilean trade. Part 3 discusses some of the relevant literature on the topic. In part 4 I discuss the data that was used. I then describe the empirical strategy that I used in part 5. In part 6 and 7 I provide the summary statistics and the main results of the paper respectively. In the final section I summarize my conclusions and I offer some suggestions for future research.

II Background

Chile has been active in signing free trade agreements. Chile has signed free trade agreements with most of its major trading partners. Some of the countries that Chile has signed a free trade agreement, in addition to the U.S, include Canada in 1997, Mexico in 1999, the European Union in 2003, Japan in 2006 and the China in 2006¹.

¹ The dates listed are the dates that the trade agreements came into effect not the date that they were signed

The U.S Chile Free trade agreement was signed on June 6th, 2003 and came into effect on January 1st, 2004. According to the Office of the United States Trade Representative (USTR) initially the trade deal led to the elimination of duties on 87 percent of bilateral trade. Furthermore, both countries agreed to eliminate all duties by 2016. Chile applies a near universal 6% tariff on all imports, while according to the World Integrated Trade Solution Trade Stats (WITS) the average MFN duty rate that Chile faced in 2003 was 1.40 percent. This low average MFN rate seems to mainly be driven by the relatively low mineral tariffs that the U.S charges².

The United States is a significant trading partner with Chile. According to the WITS in 2003, the year before the USCFTA came into effect, Chilean exports to the United States were 3.79 billion in US dollars and imports were 2.81 billion. This represented a total of 20.10% and 14.62% of Chilean exports and imports respectively. This made the US Chile's largest source of exports and 2nd largest source of imports, behind only Argentina. By 2011 Chilean exports and imports to the US had risen to 9.03 and 15.96 billion US dollars respectively this represented 11.09 % of Chilean exports and 20.10% of Chilean imports. This made the US Chile's 3rd largest source of exports, behind only China and Japan, and the largest source of imports. Furthermore, the total amount of trade increased from 6.60 billion in US dollars in 2004 to 24.99 billion in US dollars in 2011 which represents approximately a 279% increase in trade.

Both Chile's imports and exports tend to be focused on a couple industries. According to the WITS the Chilean exports as of 2011 are dominated by metals and minerals. They represent a total of 61.49 percent of Chilean exports 39.09 and 22.40 percent of respectively. Chile's largest imports are fuels, machinery and electrical machinery, and transportation equipment.

² The average ad valorem duty rate for minerals, HS codes between 25000000 and 27999999, was 0.35% in my dataset.

They represent a total of 59.50 percent of Chilean imports 24.31, 21.30, and 13.89 percent respectively.

III Literature Review

It is hypothesized that lower tariffs on Chilean goods in the U.S will lead to an increased demand for Chilean goods. This increased demand for Chilean goods will lead to an increase in trade between Chile and the U.S. The increase in trade will then lead to an increase in employment and value added. Thus, an important thing to consider is do tariff cuts lead to a increase in trade?

Baier and Bergstrand (2001) try to address the question of what leads to increased international trade. They look at 3 possible causes of the increase in trade: decreases in tariffs, decreases in transportation costs, and increased income convergence. Increased income convergence is hypothesized to increase trade because countries that are closer in income will be able to focus more of their production on products for which they have a comparative advantage. Thus, allowing for greater specialization and greater benefits from trade. They look at the average level of trade between 1958 and 1960 and compare it to the average level of trade between 1986 and 1988 between 16 OECD countries. Their data for 1958-1960 is from the IMF's Direction of Trade while the data for 1986-1988 is from the OECD. They use a gravity equation to estimate the impact of trade liberalization, the decrease in transportation costs and income convergence on bilateral trade flows. The gravity model of international trade is used to estimates the bilateral trade flows of two countries. It uses both the size and the geographic distance between two countries to estimate bilateral trade flows. The main result of this paper is that an increase in real GDP growth explains 67-69% of the increase in trade, trade liberalization

explains 23-26%, the decrease in transportation costs 8-9%, and the income convergence played no role in the increase in trade.

Since the end of World War 2 the General Agreement on Tariffs and Trade (GATT) and its successor the World Trade Organization (WTO) have promoted international trade. A part of the membership in the GATT/WTO is that you must charge other member states your MFN tariff rate. Thus, a member nation cannot charge another member nation a higher tariff rate than what it would charge its most favored nation. This has led to a decrease in global tariffs. Furthermore, if my hypothesis is correct then I would be expected that membership in the GATT/WTO would led to higher levels of trade.

Rose (2004) looks at the effect of WTO membership on levels of trade. He uses the Direction of Trade data from the IMF. This data covers bilateral trade data from 1948 to 1999 with gaps. The data on GDP is from the Penn World Table, the World Bank's World Development indicators and the IMF's International Financial Statistics. In his paper Rose uses a standard gravity model to estimate the impact of GATT/WTO membership on the level of trade. Rose finds that member countries of the "GATT/WTO do not have significantly different trade patterns than nonmember" (98). Rose also finds similar results when he excludes industrial countries and he looks at only years after 1970. He also includes time fixed effects to his equation. When he includes time fixed effects the results are positive, but Rose claims that they are small relative to other regional effects. Such as, regional trade associations, the long-term growth of trade, and the expectations around membership in the GATT/WTO.

However there has been criticism of the results that Rose obtained. Tomez et al. (2007)

criticizes the methodology that Rose employed in his paper. Specifically, they criticize Rose's classification of non member participants, colonies, de facto members and provisional members, as belonging to the same group as the countries that had no rights or obligations under the GATT. They argue that these countries, although not formal members, did have the right to MFN tariff rates and the obligation to charge MFN tariff rates, this being the primary benefit of being a member of the GATT, which means they should have been included in the same group as the formal members. Using the same data and model as Rose they reran his regressions. The only thing that they changed was his classification of member countries in the GATT/WTO. Their results for both the OLS and FE estimations are positive and both economically and statistically significant for the impact of GATT/WTO on the level of trade.

Another potential issue with the results of the paper by Rose is demonstrated by Baier and Bergstrand (2007), although they are not directly criticizing Rose in their paper. In their paper they look at how treating trade policy as being an exogenous variable has led to a systematic downward bias by the gravity equation. The goal of their paper is to address the question of whether free trade agreements increase the level of international trade of their signatories. In their paper they use data on bilateral trade flows every five years from 1960 to 2000 using the IMF's Direction of Trade Statistics for 96 potential trading partners. The data on GDP is from the World Bank's World Development Indicators. They find that when properly accounting for the endogeneity of trade policy, using bilateral fixed effects for both time and country, that an FTA will increase 2 countries' trade by about 100% over 10 years which is about 7 times higher than the estimates using OLS.

Returning to my original hypothesis, if there is an increased demand for Chilean goods that leads to an increase in employment and value added then it is also expected that this would lead to improved welfare outcomes, e.g higher incomes and lower poverty rates. Although a increase in welfare outcomes does not necessarily mean that there will be an increase in employment and value added or vice versa it is expected that the two will generally be highly correlated. I will next address two papers that look at the welfare impacts of trade. First Frankel and Romer (1999) which looks at the welfare impacts of trade. Second, and more relevant to this paper, McCaig (2011) which looks at the welfare impacts of a bilateral trade agreement.

The goal of the paper by Frankel and Romer (1999) is to look at how international trade affects people's standard of living. In this paper the authors use geographic factors as an IV to measure the impact of international trade on income per person. The data in this paper on bilateral trade is from the IFS Direction of Trade Statistics. It is for the year of 1985 and it covers trade among 63 countries. The data on geographic features is from Rand McNally (1993), which is a world Atlas, and the data on country populations is from the Penn World Table. The main result of this paper is that trade leads to an increase in income. Specifically, they find that an increase of one percentage point in the ratio of trade to GDP leads to an increase in income per person by one half of a percent. They conclude that this is caused by the accumulation of physical and human capital as well as improved productivity for given levels of capital. In addition, they find that these results are not limited to international trade. They also find that within country trade increases income. They find that increasing a country's size and area by 1 percent, and thus increasing its capacity for within country trade, increases income per person by one tenth of a percent or more.

McCaig (2011) looks at the welfare impacts of the U.S-Vietnam Bilateral Trade Agreement. He finds that the decrease in tariffs that industries in Vietnam faced led to a decrease in poverty. In December of 2001 the U.S and Vietnam signed a trade agreement that would see the U.S drop the tariffs that it charges Vietnam from its column 2 tariff rate to its MFN tariff rate. McCaig looks at how the size of the tariff cuts in the various provinces of Vietnam, based on the distributions of industries in those provinces, affected the headcount poverty rate between 2002 and 2004. The tariff data used in this paper is from the U.S International Trade Commission. The data on the poverty rate was obtained from the Vietnam Living Standards Survey for 1998 and the Vietnam Household Living Standards Survey for 2002 and 2004 and the data to construct the provincial tariff rates was from the 1999 census. He used the employment data in the 1999 census to construct the provincial tariff rate based U.S industry tariffs. McCaig finds that the provinces that experienced a larger cut in tariffs saw a larger decrease in the poverty rate.

Next, Baier and Bergstrand (2004) try to answer the question of what economic factors lead to the creation of free trade agreements. They look at 54 countries and the 1431 potential free trade pairings of those countries in 1996. They get their data from the appendices of the books by Lawrence (1996), Frankel (1997), and from FTA's that have been notified to the GATT. They find that the potential of welfare gains and the probability of a FTA is more likely based on 5 factors. First the countries are geographically closer together. Second an FTA is more likely the farther the countries are from the rest of the world. Third, the larger and more similar the GDP's of the countries are the more likely an FTA is to be signed. Fourth, an FTA is more likely the

greater the difference in the ratio of the capital-labor endowments. Finally, the smaller the ratio of the capital-labor endowment of the countries relative to the rest of the world.

Lastly, I will discuss two papers that talk about the effects of trade agreements that involve Chile. The first paper is by Jean et al. (2014) that looks at the EU-Chile Free Trade Agreement. The second paper by Brown et al. (2000) looks at what would happen if Chile became a member of NAFTA.

Jean et al. (2014) uses a computable general equilibrium model to provide a detailed ex-post evaluation of the EU-Chile Free Trade Agreement. They find that real income increased by 0.23% in Chile but that this only measures the direct impact of the trade agreement. As well they find 30 products, at the 6-digit tariff line, accounted for 80% of the gains in trade. Finally, they found that the EU saw a decrease in its share of the Chilean market, which they attribute to a decrease in the EU's weight in global trade and other trade agreements that Chile signed coming into effect, but if the free trade agreement had not been signed that the decrease would have been much larger.

Brown et al. (2000) use an applied general equilibrium model to look at the impact of Chile joining NAFTA along with other South American countries, Argentina, Brazil, and Colombia. They find that the benefits to Chile and other South American countries would be positive but would generally be less than 1 percent of their GNP. However, they find that if Chile joining NAFTA leads to an increase in international investment in Chile it could have relatively large and positive welfare impacts in Chile. Specifically, they find that a 5 percent increase in capital stock in Chile would lead to a gain in welfare of more than 5% of Chile's GNP. Finally, they find that the risk to the United States is relatively small and that no U.S

industry would suffer a large decrease in output because of Chile joining NAFTA. Of the 29 different industries that they reported no industry had a decrease in production of more than 0.05 percent and the overall impact on output was 0.00 percent. Thus, the likelihood of any industry in the United States having a large decrease in output as a result of Chile joining NAFTA is low.

IV Data

For this paper I used 2 different data sets. The first dataset that is used is from the World Trade Organization Trade Analysis Online (WTO TAO). This dataset contains the tariff rates charged by the United States. The second data set that was used in this paper was the Industrial Statistics Database at the 4 digit ISIC level otherwise referred to as INDSTAT4. This dataset contains the level of employment and the value added in the manufacturing sector of the Chilean economy over the timeframe of this study.

The WTO TAO data contains the tariff rates charged to imports entering the United States based on codes using the Harmonized Commodity Description and Coding System (HS). The WTO TAO database had tariff data from 1996 to 2018 but the tariff data for 1996 was not as detailed as the data for 1997 onwards so 1996 was excluded from the sample period. As well there was a revision to the HS codes in 2012 and so to minimize the number of concordances any years after 2011 were not included in the sample period. Thus, I used the tariff data from 1997 to 2011. This tariff data was reported at the 8 digit level of aggregation except in 2005 which was reported at the 10 digit level of aggregation. I only used the ad valorem tariff rates in this paper. Any specific duty rates were dropped from the data set. This may be a source of potential measurement error. The reason for this is that I had to convert the tariff codes from the initial dataset to a lower level of aggregation to match the data for employment and value added. This

means that some of the tariff codes that I am reporting in the final data set would in reality contain the specific duty rates that I dropped in the data set. Thus, some of the ad valorem duty rates that are reported at the 6 digit level of aggregation would have contained HS codes at the 8 digit level of aggregation that would have had a specific duty rate. If the specific duty rates of these 8 digit codes, that were dropped, represent a systematically different cost to the importers of Chilean products than the ad valorem duty rates that were included in the aggregation of the 6 digit HS codes then the reported 6 digit HS code may be different from the actual duty rate of that 6 digit HS code.

First, I downloaded the WTO TAO data on tariff rates for the United States from 1997-2011. Next, I dropped all observations that did not either apply to the MFN rate or the USCFTA. For the years of 2000 and 2006 to 2011 there were some tariff codes that had a quota and thus different tariff rates for the same code. For these codes I used the lowest tariff rate that was charged and dropped the rest. The reason for using the lowest tariff rate is that imports that are entering the United States are most likely under the quota and therefore the lowest tariff rate is most likely to represent the tariff rate that Chilean producers actually face. However, this may bias the estimate if the actual rate that importers face is actually higher than what was used in the dataset and thus the tariff cut is larger than measured. This could lead to an overestimation of the impact of the tariff cut.

If a tariff code did not have a value for the USCFTA then I set that value equal to the MFN rate. This created a variable that represented the tariff rates that an MFN nation would have to pay and a second variable that represented the tariff rate that Chile had to pay. Since the

USCFTA only came into effect in 2004 the values of these two variables were the same for 1997 to 2003.

To convert the HS codes in 2005 that were reported at the 10 digit level of aggregation to the 8 digit level of aggregation I dropped the last two digits of all the tariff codes in 2005 so that they would then be at the 8 digit level of aggregation. Next, I took the simple average of all the tariff rates for any duplicate tariff codes at the 8 digit level of aggregation. This may be a source of measurement error in my results if export distributions are systematically different from the weight of a simple average.

In 1996, 2002, and 2007 there were revisions made to the HS codes. So, I had to convert all the codes from 2002 onwards to tariff codes that used the HS96 revision. To convert the HS02 and HS07 codes to HS96 codes I used a concordance table. The concordance tables that were used to convert the 2002 and 2007 HS systems were at the 6 digit level of aggregation. Thus, I repeated the process that I used to convert the 2005 tariff codes to the 8 digit level to the whole data set to convert it to the 6 digit level. Next, I converted all the HS codes to the 1996 HS codes and put all three time periods into 1 data set. Then I converted the HS96 tariff codes to the ISIC Version 3 codes, these are the codes that were used in the INDSTAT4 dataset. Lastly, I dropped any tariff codes that were not included in the HS96 to ISIC conversion table and I dropped any tariff codes that did not have a ad valorem tariff for the MFN³.

The INDSTAT4 dataset contains manufacturing data for over 130 countries, including data on establishments, employees, wages and salaries, output, value added, gross fixed capital formation, and female employees. In this paper I used the data from employees and value added

³ Some tariff codes that had a value of 0 for the USCFTA had a non-zero specific duty rate for a MFN. Any of these tariff codes were dropped from the dataset.

for the main results of my paper and I used the data on output as a robustness check. The INDSTAT4 database has data for Chile from 1995 to 2012, with the exception of 2009 which was omitted. Although the INDSTAT4 data can be reported up to the 4 digit level of aggregation the data for Chile was reported at the 3 digit level of aggregation.

However, the conversion table that was used to convert the HS96 codes to ISIC codes was at the 4 digit level of aggregation, so I had to convert the 4 digit tariff data to 3 digit codes using the same process that was used previously to convert the HS codes to a lower level of aggregation. I then merged the WTO TAO data with the INDSTAT4 data. In the WTO TAO data I had a total of 80 industries at the 3 digit level of aggregation for the ISIC codes. In all 80 industries there was data on the tariff rates for all years in the sample period. However, the INDSTAT4 data only included data for 58 industries of which only 45 had data for all or most years, i.e. not missing more than 2 years worth of data, in the sample period. All 45 of these industries in the INDSTAT4 data set corresponded to one of the 80 industries in the tariff data. The data on the remaining 35 industries was dropped and the final data set included data on the level of employment, value added in Chile and the tariff rates charged by the United States for 45 industries from 1997 to 2008, 2010, and 2011.

V Empirical Strategy

In this paper I relate the tariff cuts that occurred because of the USCFTA to any potential changes that occurred in the levels of employment and value added after the USCFTA came into effect. To do this I run multiple regressions of the form

$$(1) \ln Y_{it} = \delta_i + \gamma_t + \beta X_{it} + \mu_{it}$$

Where $\ln Y_{it}$ is the logarithm of the dependent variable, either employment or value added, for industry i in year t . δ_i is an industry fixed effect and γ_t is a year fixed effect. X_{it} is the independent variable. I used two different independent variables in this paper. The first independent variable is a measure of the intensity of the tariff cut, this is a measure of the difference between the MFN rate and the tariff rate that Chile would face. Since the US Chile FTA did not lead to an increase in any tariffs this value is either 0 or positive. For the intensity independent variable, it represents the size a tariff gap for industry i in year t . The second independent variable that is used in this paper is an above median identifier variable. This is a dummy variable that gives a value of one if the value of the tariff cut is greater than the median value of all the tariff cuts between 2004 and 2011 and 0 otherwise. Thus, the median identifier variable represents whether industry i received a tariff cut that was larger than the median tariff cut in the whole sample after 2004. Finally, μ_{it} represents the error term.

I chose to include the above median tariff cut independent variable in the results because originally, I wanted to create a dummy variable that was 0 if an industry did not include a tariff cut and 1 otherwise. This would be used to measure the impact of an industry going from not receiving a tariff cut to receiving a tariff cut. However, of the 45 industries that are reported only one industry did not receive a tariff cut. Thus, I chose instead to use the above median identifier variable instead as it was the most viable alternative to the originally planned dummy variable.

The empirical strategy in this paper is a difference in difference strategy. Essentially, I look to take the difference between the tariff rate Chile faces and the tariff rate that an MFN nation faces. Then take the difference between the levels of employment and value added before and after the signing of the US Chile FTA. In theory, I could then take the difference of the two

differences to get my result. In practice, I augment this basic strategy with a full set of industry and year fixed effects.

I also run three alternate regressions to test if potential outlier situations are driving the results. First the level of employment and value added in Chile is quite a bit lower in 2010 and 2011 compared to 2008. It is believed that this may be caused by the residual impacts from the 2008 financial crisis. So, I ran each regression again excluding 2010 and 2011 from the regression. Second, it is also hypothesized that the termination of the Agreement on Textiles and Clothing in 2005 may have had a significant negative impact on the Chilean textile and apparel industries since this would have led to an increase in Chinese exports in the world market. Thus, I ran a regression where I excluded the textile and apparel industries⁴. Finally, in the third alternate regression I run I exclude both the years 2010 and 2011 and the textile and apparel industries.

Equation 1 is estimated separately for each dependent variable, ln value added and ln employees, for each independent variable, the intensity of the tariff cut and the median identifier of the tariff cut, and for each of the four datasets, the full data set and each of the three datasets with potential outliers excluded. Thus, I have a total of 16 estimates of the impact of the USCFTA on employment and value added.

⁴ ISIC codes 170 to 189

VI Summary Statistics

i Tariff Cuts

The US Chile FTA came into effect on the 1st of January 2004. As shown in figure 1.1 this led to a sharp tariff cut. The average tariff cut for industries in my sample was a 3.031 percentage point cut in 2004 relative to the MFN rate and then stayed relatively constant with a marginally upward sloping trend. As shown in table 1.2 the industry in my sample, at the 3 digit level of aggregation using the ISIC codes, while the largest tariff cut was a 10.892 percentage point cut, for manufacture of dairy products, there was one industry, aircraft and spacecraft manufacturing, that did not see a cut in its tariff rate⁵. Overall the largest tariff cuts occurred in the dairy, textile and apparel industries. As can be seen in figure 1.2 the distribution of the tariff cuts are skewed to the left with the average tariff cut being 3.031% but the median tariff cut is 2.237%.

ii Employment

According to figure 1.3 the total level of employment in industries in the sample has seen high levels of volatility decreasing by about 15% from 1997 to 2001 then increasing by about 20% from 2001 to 2008 before dropping by about 25% relative to 1997 levels of employment. Only 43 industries were included in figure 1.3 since there were two industries that were missing values for 2010 and 2011⁶. As shown in table 1.3 the industry in the sample that employs the most people in Chile as of 2004 was the production, processing and preservation of meat, fish, fruit, vegetables, oils and fats. This industry employed 67444 people.

⁵ The MFN tariff rate for this industry was already 0%.

⁶ ISIC codes 241 and 333. Manufacture of basic chemicals and watches and clocks respectively.

iii Value Added

As shown in figure 1.4 total value added for industries included in the sample saw a moderate upward trend until 2004 where there was a large increase until 2008 when there was a sharp decrease to levels below 2004. It was the steep decline in both value added and employment after 2008 that led to the decision to run the robustness checks excluding the years of 2010 and 2011. Only 43 industries were included in figure 1.4 since there were two industries that were missing values for 2010 and 2011. As shown in table 1.4 the industry that had the highest value added in Chile as of 2004 was the manufacture of basic precious and non-ferrous metals. This industry had a value added of 7.44 trillion Chilean pesos.

VII Regression Results

i Benchmark Results

Table 1.5 presents the main results of this paper. Column 1 shows the results for the full sample. Column 2 excludes the years 2010 and 2011. Column 3 excludes textiles and apparel and column 4 excludes both 2010 and 2011 and textiles and apparel. Since the regression was run on the logarithm of the dependent variable and not the actual values reported the values in the table can be interpreted as a percent change. Specifically, I find that for the full sample a 1 percentage point increase in the size of a tariff cut leads to a 0.021 percent decrease in employment and a 0.022 percent decrease in value added. Both of these results are not significant at the 10% level of significance and thus no definitive conclusions can be drawn from the intensity measure. Furthermore, when I omitted the years 2010 and 2011 from the sample, column 2, the estimated effect using the intensity measurement for both employment and value added remained negative and statistically insignificant at the 10% level of significance. For

column 3, in which I omitted any industries that were involved in the production of textiles and apparel, the estimated effect using the intensity measurement for employment became closer to 0 but positive and for value added also became marginally positive. Both of these measurements remain statistically insignificant at the 10 percent level of significance. Finally, in column 4 I omit both the years 2010 and 2011 and textiles and apparel. My estimate in column 4 for was negative and statistically insignificant at the 10 percent level of significance for employment while my estimate for value added was positive and statistically insignificant at the 10 percent level of significance.

The identifier variable is a dummy variable that is 1 if the tariff cut is above the median value of the tariff cut and 0 otherwise. Thus, I found that the effect of an industry moving from a below median tariff cut level to an above median tariff cut level was a 0.138 percent decrease in employment and a 0.183 percent decrease in value added for the full sample. Both of these results were not significant at the 10 percent level of significance and thus no definitive conclusions can be drawn from the identifier variable. In column 2 and 3 the estimates for the employment and value added median identifier variable remain negative and statistically insignificant at the 10 percent level of significance. In column 4 the estimate of the coefficient of the median identifier variable for employment remained negative but for value added the estimate was positive, however both estimates were statistically insignificant at the 10% level of significance.

Overall none of the 16 estimates have been significantly different from 0 at the 10% level of significance. I do not find any evidence that the tariff cuts in the USCFTA have had any influence on the level of employment or value added at the industry level from 2004 to 2011.

ii Robustness check

I performed a robustness check of my results using output as the independent variable. As can be seen in figure 1.5 the behaviour of output is similar to the behaviour of value added. There is a moderate increase until 2004 where the level of output rapidly increased until 2008 afterwards there was a sharp decrease after 2008. The results of this regression can be found in table 1.6. For the full sample I found that a 1 percentage point increase in the size of the tariff cut led to a 0.027 percent decrease in output. This was not significantly different from 0 at the 10% level of significance. Furthermore, an industry going from a below median tariff cut to an above median tariff cut led to a 0.093 percent decrease in output. This was also not significant at the 10% level of significance. When I omitted 2010 and 2011 the estimated coefficients of both the intensity and median identifier variable remained negative and statistically insignificant. When textiles and apparel were omitted the intensity estimate became slightly positive and the median identifier estimate remained negative. Both are statistically insignificant at the 10 percent level of significance. When both 2010 and 2011 and textiles and apparel were omitted the intensity estimate became more positive while the median identifier estimate remained negative. Both are not statistically significant at the 10% level of significance. Overall the results of this robustness check support the results that I did not find any impact of the tariff cuts as a result of the USCFTA on employment or production in Chile from 2004 to 2011.

Overall these results are contrary to the results that were expected. It was expected that there would be a statistically significant increase in both Chilean employment and value added. There are a couple reasons for why the results in this paper may have differed from the expected

results. What is believed to be the most likely explanation is that the average tariff cut that Chilean industries received because of this trade agreement was low. The average tariff cut was only 3.031 percent and the largest tariff cut was 10.892 percent. It seems likely that this decrease in tariffs was not large enough to stimulate an increase in demand for Chilean goods that would have led to a statistically significant increase in the employment and value added in Chilean industries. Furthermore, Chile signed free trade agreements with other large economies that also represented a large portion of its international trade, China, Japan and the European Union, around the same time that it signed its agreement with the US. It seems quite likely that the distribution of tariff cuts, across Chilean industries, for these three economies could be correlated to the tariff cuts that Chile received under the USCFTA. The omitted variables of the tariff cuts in the other three economies may be biasing my results downward.

VIII Conclusion

In this paper I look at the impact that the ad valorem tariff cuts that Chilean industries faced, when exporting to the U.S, had on employment and value added in Chile. I found that a 1 percentage point decrease in the ad valorem tariffs led to a 0.021 percent and 0.022 percentage decrease in employment and value added respectively. Both of these results were not significant at the 10% level of significance. Furthermore, none of the results differed significantly from 0 when I excluded 2010 and 2011, textiles and apparel, or both 2010 and 2011 and textiles and apparel from the sample. Lastly, I ran the same regressions for output as a robustness check and none of the results differed significantly from 0. Overall, I find no evidence that the cuts in the ad valorem tariff rate that Chilean exporters faced had any impact on employment or value added in Chile.

Finally, here are 4 different ways to expand on the research that I have completed in this paper. First, I only included cuts in the ad valorem duty rate. One could include the cuts in the specific duty rate in addition to see if that significantly changes the results of this paper. Second, the time period that this paper looked at may have been too small to measure the full impact of the USCFTA. Thus, one could expand the time period that is examined. Third, Chile has signed trade agreements with numerous other countries, in particular two other large economies China and the E.U. One could include those tariff cuts to measure the impact of the tariff cuts from three large economies. Finally, the U.S has signed two other trade agreements with South American countries, Colombia and Peru. One could look at the impact that those agreements had on employment and value added in those countries.

References

- Baier, Scott L., and Jeffrey H. Bergstrand. "The growth of world trade: tariffs, transport costs, and income similarity." *Journal of International Economics*, vol. 53, no. 1, 2001, pp 1-27
- Baier, Scott L., and Jeffrey H. Bergstrand. "Economic Determinants of Free Trade Agreements." *Journal of International Economics*, vol. 64, no. 1, 2004, pp. 29-63.
- Baier, Scott L., and Jeffrey H. Bergstrand. "Do Free Trade Agreements Actually Increase Members' International Trade?" *Journal of International Economics*, vol. 71, no.1, 2007, pp. 72-95.
- Brown, Drusilla K., Deardorff, Alan V., and Robert M Stern. "Computational Analysis of the Accession of Chile to the NAFTA and Western Hemisphere Integration." *World Economy*, vol. 23, no. 2, 2000, pp 145-174.
- Office of the United States Trade Representative. "Chile." Office of the United States Trade Representative,
ustr.gov/sites/default/files/uploads/reports/2010/NTE/2010_NTE_Chile_final.pdf.
Assessed 9 Apr. 2019.
- Frankel, Jeffrey. *Regional Trading Blocs in the World Economic System*. Washington D.C, Institute for International Economics, 1997.
- Frankel, Jeffery A., and David Romer. "Does Trade Cause Growth?" *American Economic Association*, vol. 89, no. 3, 199, pp. .379-399.
- Jean, Sébastien. Mulder, Nanno. and María Priscila Ramos. "A general equilibrium, ex-post evaluation of the EU–Chile Free Trade Agreement." *Economic Modelling*, vol. 41, no. 1, 2014, pp. 33-45.
- Lawrence, R.Z. *Regionalism, Multilateralism, and Deeper Integration*. Washington D.C, Brookings Institute, 1996.
- McCaig, Brian. "Exporting out of Poverty: Provincial Poverty in Vietnam and U.S Market Access." *Journal of International Economics*, vol. 85, no. 1, 2011, pp. 102-113.

Rand McNally. *Quick Reference World Atlas*. Chicago, Rand McNally, 1993.

Rose, Andrew K. "Do We Really Know That the WTO Increases Trade?" *The American Economic Review*, vol. 94, no. 1, 2004, pp. 98-114.

Tomez, Michael, Goldstein, Judith L., and Douglas Rivers. "Do Free Trade Agreements Actually Increase Members' International Trade? Comment." *The American Economic Review*, vol. 97, no. 5, 2007, pp. 2005-2018.

World Integrated Trade Solution Trade Stats. The World Bank, 2018, wits.worldbank.org. Accessed 9, Apr. 2019.

Appendix A: Figures

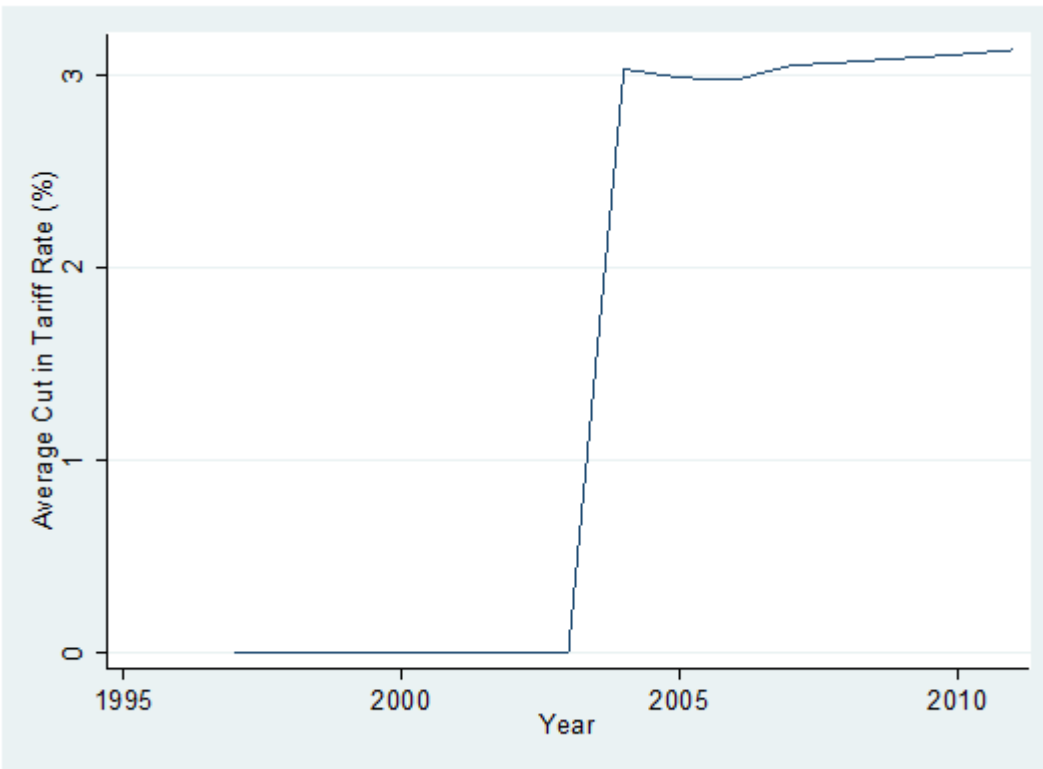


Figure 1.1 Line graph of the average difference between the tariff rate that a MFN nation faced and the tariff rate that Chile faced between 1997 to 2011 for the 45 industries that are included in the sample.

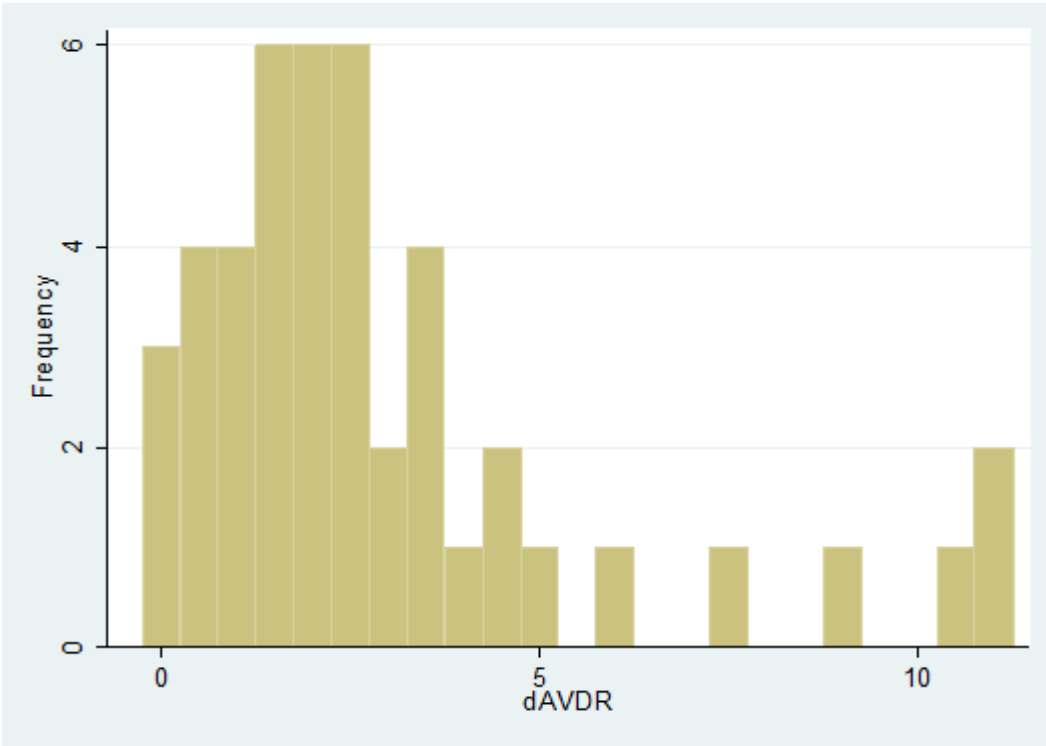


Figure 1.2 Histogram of the values of the tariff cuts in 2004 for the 45 industries included in the sample.



Figure 1.3 Value for the total employment in 43 industries that had observations for all years (1997-2011)

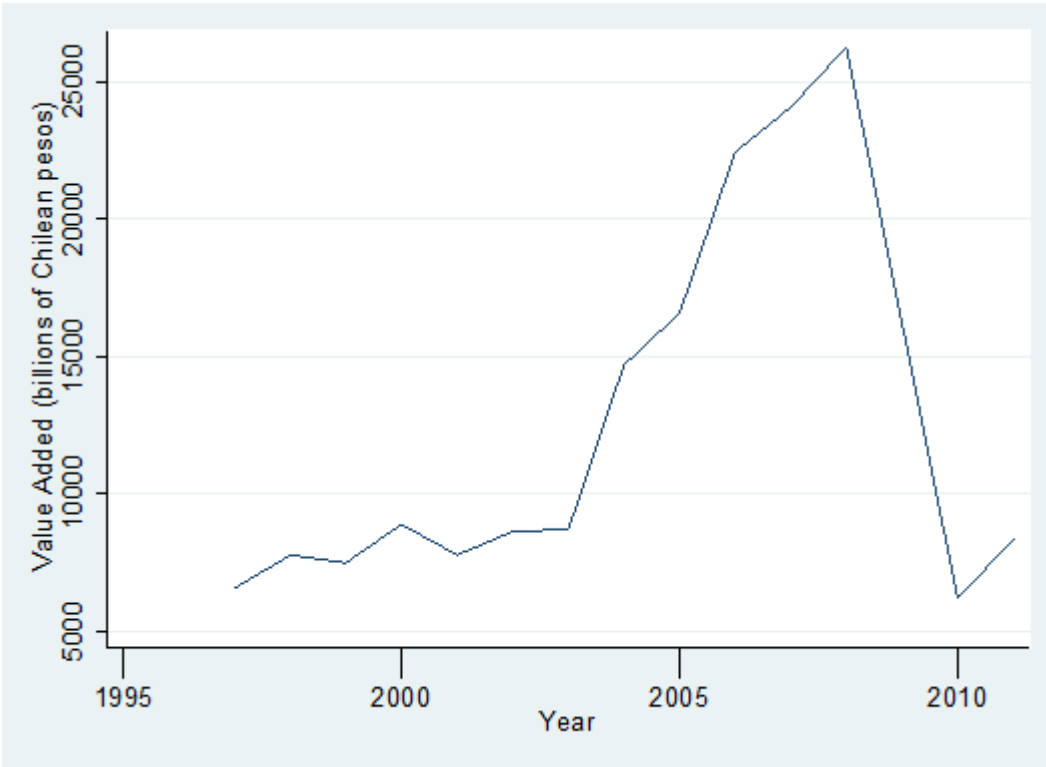


Figure 1.4 Value for the total value added in 43 industries that had observations for all years (1997-2011)

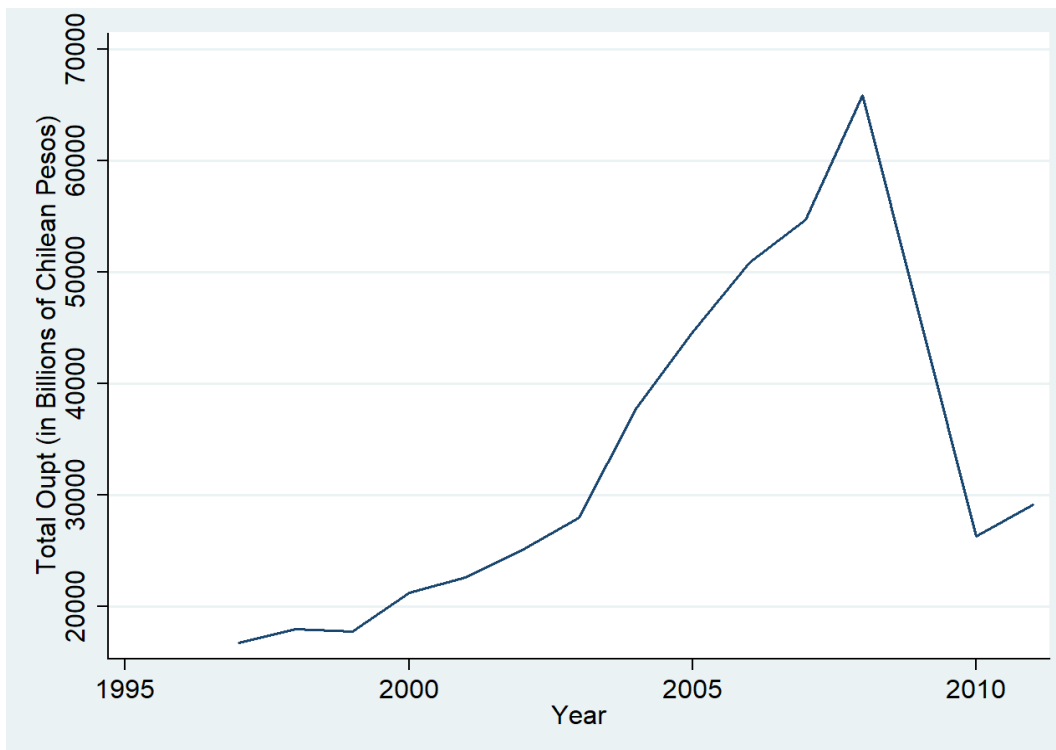


Figure 1.5 Value for the total output in 43 industries that had observations for all years (1997-2011)

Appendix B: Tables

	Industries	Mean	Standard Deviation
Difference in the Tariff Rates	45	3.031	2.807
Identifier for the Difference in the Tariff Rates	45	0.489	0.510

Table 1.1 Summary Statistics This table shows the summary statistics of 2 independent variables that were used in this paper in 2004, the year that the USCFTA took place. The difference in the tariff rates variable is the difference between the MFN tariff rate and the USCFTA tariff rate in percent. The identifier variable is a dummy variable for the median difference between the MFN and US Chile FTA rate for the years of 2004 to 2011. If the value of the difference in the tariff rates is greater than the median value of the tariff cuts, then the value is 1. If the difference is less than or equal to the value of the median cut in tariffs, then the identifier is 0.

Five Lowest	ISIC	Description	Five Highest	ISIC	Description
0	353	Manufacture of aircraft and spacecraft	10.892	152	Manufacture of dairy products
0.121	221	Publishing	10.754	181	Manufacture of Wearing apparel except fur
0.222	222	Printing and service activities related to printing	10.598	173	Manufactured of knitted and crocheted fabrics and articles
0.320	201	Saw milling and planing of wood	9.184	171	Spinning weaving and finishing of textiles
0.387	351	Building and repairing of ships and boats	7.464	192	Manufacture of footwear

Table 1.2 This table lists the five industries that experienced the 5 largest and smallest tariff cuts in percentage points as well as a brief description of the industry. Tariff cuts are listed in percentage points

Five Lowest	ISIC	Description	Five Highest	ISIC	Description
54	333	Manufacture of clocks and watches	67444	151	Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats
114	321	Manufacture of electronic valves and tubes and other electronic components	35842	154	Manufacture of other food products
322	313	Manufacture of insulated wire and cable	24338	272	Manufacture of basic precious and non-ferrous metals
374	319	Manufacture of other electrical equipment n.e.c.	23620	201	Sawmilling and planing of wood
612	332	Manufacture of optical instruments and photographic equipment	20639	242	Manufacture of other chemical products

Table 1.3 This table list the five industries had the highest and lowest level of employment in 2004. Employees is listed in number of employees.

Five Lowest	ISIC	Description	Five Highest	ISIC	Description
2.68	333	Manufacture of clocks and watches	7441.62	272	Manufacture of basic precious and non-ferrous metals
3.99	321	Manufacture of electronic valves and tubes and other electronic components	2097.99	241	Manufacture of basic chemicals
5.46	313	Manufacture of insulated wire and cable	1154.90	151	Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats
5.89	319	Manufacture of other electrical equipment n.e.c.	851.25	155	Manufacture of beverages
8.41	332	Manufacture of optical instruments and photographic equipment	720.68	154	Manufacture of other food product

Table 1.4 This table lists the five industries had the highest and lowest level of value added in 2004. Value added is listed in billions of Chilean pesos

	Full Sample (1)	2010 and 2011 omitted (2)	Textiles Apparel omitted (3)	and Both 2010 and 2011 and textiles and apparel omitted (4)
Employment intensity	-0.021 (0.222)	-0.016 (0.196)	0.000 (0.998)	-0.008 (0.600)
Employment identifier	-0.0138 (0.195)	-0.075 (0.395)	-0.100 (0.400)	-0.049 (0.626)
Value Added intensity	-0.022 (0.247)	-0.161 (0.283)	0.006 (0.795)	0.010 (0.554)
Value Added identifier	-0.183 (0.220)	-0.054 (0.592)	-0.140 (0.391)	-0.005 (0.959)

Table 1.5 Regression results. This shows the estimates for beta for employment and Value added in the 45 industries studied. For both employment and value added there are intensity and identifier variables of the tariff cuts and for each variable there were 4 different regressions run for a total of 16 different regressions. The 4 different regressions that were run for each variable were a full sample regression, a regression that omitted the years 2010 and 2011, a regression that omitted textiles and apparel (ISIC codes between 170 and 189), and a regression that omitted both 2010 and 2011 and textiles and apparel. The p values for each estimate are reported in brackets below the value of the estimate.

	Full Sample	2010 and 2011 omitted	Textiles and Apparel omitted	Both 2010 and 2011 and textiles and apparel omitted
Output intensity	-0.027 (0.196)	-0.021 (0.160)	0.000 (0.994)	0.005 (0.772)
Output identifier	-.093 (0.471)	-0.074 (0.424)	-0.139 (0.337)	-0.025 (0.797)

Table 1.6 Robustness check regression results. This shows the estimates for beta for in the 45 industries studied. There is an intensity and identifier variable for the tariff cuts and there were 4 different regressions run for a total of 8 different regressions. The 4 different regressions that were run for each variable were a full sample regression, a regression that omitted the years 2010 and 2011, a regression that omitted textiles and apparel (ISIC codes between 170 and 189), and a regression that omitted both 2010 and 2011 and textiles and apparel. The p values for each estimate are reported in brackets below the value of the estimate.