Trade liberalization and wage inequality: Evidence from Chile

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Trade Liberalization and Wage Inequality: Evidence from Chile

This study analyzes the impacts of further tariff reductions resulting from the proliferation of regional trade agreements on wage inequality between skilled and unskilled workers in Chile in the 2000s. We match panel data on industry-level effective tariff rates and other industry variables calculated from plant-level microdata to pooled individual cross-section data from national household surveys at the industry level. Based on this unique data set, we estimate the impacts of effective tariffs on workers' wages directly in one stage. We find that a reduction in effective tariffs on final goods leads to an increase in industry wage and skill premiums. Moreover, the impact on the industry skill premiums is larger for skilled workers employed in large-sized firms. Therefore, the findings indicate that increased import competition due to reductions in output tariffs leads to skill upgrading within industries, thereby increasing demand for skilled workers. The results are robust to the possible endogeneity of effective tariffs and the inclusion of industry-level productivity.

Keywords: regional trade agreements; effective tariffs; industry wage premiums; industry skill premiums; within-industry skill upgrading

JEL classification codes: F16; J31; O15; O54

1. Introduction

Over the past four decades, developing countries have implemented far-reaching trade liberalization and increasingly integrated them into the global economy, which undoubtedly has affected income distribution through several channels (Goldberg and Pavcnik 2007; Murakami 2018; Pavcnik 2017). The distributional aspect of globalization is particularly relevant for Latin American countries (LACs) not only because the region has the highest level of income inequality in the world but also the region's inequality is often associated with poor economic growth performance due to political instability, including distributional conflicts, and various constraints on human capital accumulation (Bértola and Ocampo 2012). Interestingly, LACs experienced some improvement in income distribution in the 2000s after a sharp increase in income inequality in the 1980s and 1990s. Messina and Silva (forthcoming) analyzed the factors underlying the recent evolution of inequality in LACs, revealing that trade liberalization is continuously one of the important factors.

Chile, considered as one of the most successful LACs in terms of economic growth and far-reaching economic reforms, is a particularly interesting case for analyzing the relation between trade liberalization and wage inequality. In addition to continued unilateral liberalization, as typically evidenced by the application of a uniform tariff of 10% to all products except for automobiles and a few agricultural products in 1979, Chile has actively pursued regional trade agreements (RTAs) since the early 1990s (Ffrench-Davis 2010; Zechner 2002). As a result of the enforcement of the RTAs, effective tariffs levied in each industrial sector have diverged from the uniform most-favored-nation (MFN) rates due to the preferential margins granted by the RTA scheme. This further trade liberalization, measured by effective tariffs, became especially evident in the 2000s, when free trade agreements (FTAs) with major trading partners, which have faster and comprehensive tariff elimination, including FTAs with the European Union (2003), the United States of America (USA) (2004), the Republic of Korea (2004), China (2006), and Japan (2007), came into effect.[1] Indeed, effective tariffs in some industries have been nearly equal to 0% since the mid-2000s.

Some studies have tried to analyze the impacts of trade liberalization on wage inequality in Chile based on time-series data and mainly focused on the period of unilateral liberalization in the 1970s and 1980s. However, the findings are still inconclusive and controversial. Beyer, Rojas, and Vergara (1999) find that trade openness (the ratio of exports plus imports to GDP) and a reduction in relative prices of labor-intensive goods widened the wage inequality between skilled and unskilled workers. Similarly, in line with the prediction of the Heckscher–Ohlin-Samuelson

(HOS) model, Murakami (2014) also finds that tariff reductions widened wage inequality.[2] By contrast, Gallego (2012) finds that technological progress in developed countries widen wage inequality, while trade-related variables are largely insignificant. Although those studies used relatively long-term time-series data that are sourced from household surveys covering only the metropolitan area, they do not analyze the impacts of tariff reductions through RTAs in the 2000s.

Therefore, this study aims to analyze the impacts of further tariff reductions resulting from the proliferation of RTAs on wage inequality in Chile in the 2000s. This study is the first, to the best of my knowledge, to analyze the impacts of trade liberalization on wage inequality in Chile in the 2000s using panel data on industry-level effective tariff rates and matching them to individual-level microdata from nationally representative household surveys. Tariffs have an advantage as a measure of trade liberalization because they are the most direct measures and distinguished from other indirect measures, such as trade openness, which are not necessarily consequences of trade policy changes (Rodriguez and Rodrik 2001). However, since Chile has maintained uniform MFN tariff rates, as long as they are utilized, only time-series analysis using country-level data is allowed. This study overcomes this limitation by using effective tariff rates.

Several studies have analyzed the relationships between trade liberalization and wage inequality using industry-level tariffs in other LACs, including Attanasio, Goldberg, and Pavcnik (2004) for Colombia; Feliciano (2001) for Mexico; Galiani and Porto (2010) for Argentina; Goldberg and Pavcnik (2005) for Colombia; Pavcnik et al. (2004) for Brazil; and Paz (2014) for Colombia. However, those studies ignored the possibility that other possible channels might also affect wage inequality. Note that survey articles on the distributional aspects of globalization in developing countries such as Goldberg and Pavcnik (2007), Murakami (2018), and Pavcnik (2017) revealed that there are several channels, some of which are not captured by tariffs on final goods (i.e., output tariffs). They pointed out that improved access to better foreign technologies, which is usually measured by tariffs on intermediate goods (i.e., input tariffs) or more directly by the usage of foreign technologies, as well as shifting some segments of production processes to third countries (i.e., within-industry offshoring), which is usually measured by foreign direct investment (FDI), are particularly important. Thus, this study constructs industry-level panel data on the variables representing those channels, including FDI and payments to foreign technologies by the author's own calculations from plant-level microdata, and confirms that our findings are robust to the inclusion of those variables.

The novel contribution of this study is as follows. This study shows that, based on the unique matched data set, increased import competition due to the reductions in output tariffs leads to skill upgrading within industries, thereby increasing industry skill premiums in Chile in the 2000s. Although several studies find that improved access to foreign inputs that embody advanced technologies (Giovannetti and Menezes-Filho 2006 for Brazil) and export market entry (Bustos 2011 for Argentina) cause the increase in demand for skilled workers within industries, empirical studies that identify import competition as the major channel for the increase are rare in developing countries. Moreover, although studies analyzing Chile in previous periods, including Beyer, Rojas, and Vergara (1999), also found that trade liberalization increased wage inequality between skilled and unskilled workers, the mechanism this study identifies is quite different.

The rest of this article is organized as follows. Section 2 reviews the theoretical frameworks of globalization and wage inequality, as well as the empirical findings.

Section 3 presents the empirical specifications. Section 4 explains the data employed in the analysis and presents descriptive statistics. Section 5 presents the estimation results and discusses the mechanism driving the results. Section 6 performs robustness checks, and the final section concludes the paper.

2. Theoretical frameworks and literature review

This section reviews theoretical frameworks that predict the impacts of trade liberalization on wage inequality, summarizing the empirical findings in developing countries, particularly in LACs. Specifically, this study is interested in the impacts of trade liberalization through the characteristics of industries with which workers are affiliated. The wage differentials, attributable to workers' industry affiliations after controlling for other observable workers' characteristics, including educational attainments, are referred to as industry wage premiums (Galiani and Porto 2010; Goldberg and Pavcnik 2007; Pavcnik et al. 2004). Further, industry wage premiums for skilled workers (i.e., industry wage premiums that only skilled workers employed in the industry receive in addition to the base industry wage premium) are referred to as industry skill premiums (Galiani and Porto 2010; Pavcnik et al. 2004). This section reviews the theories and empirical findings regarding the impacts of trade liberalization on industry wage premiums and industry skill premiums.

Note that the standard HOS model predicts the impacts of tariffs on economy-wide returns rather than industry-specific returns. Thus, the most standard theory that predicts the association between industry tariffs and industry wages can be the specific factors model (Attanasio, Goldberg, and Pavcnik 2004; Galiani and Porto 2010). The model assumes specific factors to be immobile across industries in the short to medium run. Thus, if the model assumes the imperfect mobility of workers employed in each industry because of the need for industry-specific skills or labor market rigidities, it predicts that workers employed in industries with larger tariff reductions will experience a larger decrease in their wages (Attanasio, Goldberg, and Pavcnik 2004; Pavcnik et al. 2004). Therefore, the model predicts a positive association between tariffs and industry wage premiums. Furthermore, if the model additionally assumes that unskilled workers are especially immobile across industries, it predicts that tariff reductions lead to a proportional decrease in the industry wage premiums for unskilled workers (i.e., an increase in industry skill premiums), thereby increasing wage inequality between skilled and unskilled workers (Pavcnik et al. 2004; Galiani and Porto 2010).

Empirical studies using household data have reported mixed results. On the one hand, some studies find the expected positive association between tariffs and industry wage premiums (e.g., Attanasio, Goldberg, and Pavcnik 2004 for Colombia; Dutta 2007 for India; Galiani and Porto 2010 for Argentina; Goldberg and Pavcnik 2005 for Colombia; Paz 2014 for Colombia). On the other hand, other studies find no significant association (Feliciano 2001 for Mexico;[3] Pavcnik et al. 2004 for Brazil). Moreover, others unexpectedly find a negative association (Kumar and Mishra 2008 for India). Additionally, a few studies have analyzed the association between tariffs and industry skill premiums. While Galiani and Porto (2010) expectedly find the negative association between tariffs and industry skill premiums in Argentina, Pavcnik et al. (2004) find no significant association in Brazil.[4]

By contrast, an increasing body of literature based on models of international trade with heterogeneous firms pioneered by Melitz (2003) emphasizes that trade liberalization reallocates market shares towards more productive large firms, thereby improving aggregate productivity in a given industry.[5] Since the original model by Melitz (2003) does not predict distributional aspects of trade liberalization, subsequent studies have developed theoretical models that incorporate the wage inequality issue into the framework of heterogeneous firms (see Bernard et al. 2012 for the review). One strand of studies assumes that labor markets are competitive, but workforce composition is different across firms. For example, models by Bustos (2011) and Yeaple (2005) predict that since trade liberalization induces productive firms to adopt higher technologies and use skilled workers with higher wages more intensively, it increases average wage in a given industry. Therefore, those models also predict that such trade-induced reallocations towards more productive firms increase the relative demand for skilled workers in a given industry, thereby increasing industry skill premiums. Other strands of studies predict the distributional aspect by introducing labor market imperfections into Melitz's (2003) model. For example, by introducing a fair wage model, Egger and Kreickemeier (2012) predict that trade liberalization will increase within-firm wage inequality between skilled and unskilled workers, indicating an increase in industry skill premiums.[6]

Empirically, however, only a few studies using firm-level data (e.g., Amiti and Davis 2012 for India; and Krishna, Poole, and Senses 2012 for Brazil) find that workers employed in industries with tariff reductions experienced an increase in their wages in developing countries. Moreover, they find that the negative association between tariffs and wages is limited to workers employed in exporting firms. Similarly, although a few studies (e.g., Bustos 2011 for Argentina; Linarello 2018 for Chile; Namini and López 2013 also for Chile) find that trading partners' tariff reductions increased within-firm wage inequality between skilled and unskilled workers, there is little evidence on the expected association between a country's own tariff reductions and within-firm wage inequality. For example, Amiti and Cameron (2012) for Indonesia, Bustos (2011) for Argentina, Caselli (2014) for Mexico, and Harrison and Hanson (1999) for Mexico find no significant association between output tariffs and within-firm wage inequality. Moreover, some (Amiti and Cameron 2012; Caselli 2014) find an unexpected positive association between input tariffs and within-firm wage inequality.[7] Indeed, a few empirical studies using firm-level panel data have reported that within-firm wage inequality is negatively associated with output tariffs (Furuta 2016 for India) or input tariffs (Giovannetti and Menezes-Filho 2006 for Brazil) in developing countries.

In summary, there are two opposite theoretical predictions regarding tariffs and industry wage premiums: the specific factors model predicts a positive association, while heterogeneous firm trade models predict a negative association. Empirically, many studies have supported the former prediction in LACs. However, there is little supportive evidence for the latter. By contrast, both models can predict that tariffs reductions increase industry skill premiums. Although a few empirical studies using household data have provided supportive evidence for LACs, studies using firm-level data have failed to provide such evidence for LACs. Additionally, the latter studies have revealed that output and input tariffs have different effects on wage inequality.

3. Empirical specifications

3.1. Trade liberalization and industry wage premiums

The specifications of this study closely follow those proposed by Galiani and Porto (2010). The approach is to pool individual wages over time and regress them on a vector of individual characteristics (including skill levels) and a vector of industry-level characteristics (including industry tariffs) directly in one stage, which Galiani and Porto (2006) call “stronger identification strategy.” Alternatively, we can estimate industry wage premiums from the wage equation separately for each year in the first stage. We then pool the industry wage premiums over time and regress them on a vector of industry-level characteristics in the second stage. Examples of the two-stage estimation strategy are Attanasio, Goldberg, and Pavcnik (2004), Feliciano (2001), Dutta (2007), Goldberg and Pavcnik (2005), Kumar and Mishra (2008), Paz (2014), and Pavcnik et al. (2004). However, the two-stage estimation strategy does not allow for the inclusion of interaction terms between industry and individual characteristics in the second-stage estimation. Indeed, this aspect is crucial for this study because the heterogeneous firm literature reveals that the impacts of trade liberalization on wages can be different among the size of firms where the workers are employed (Bustos 2011). Moreover, the two-stage estimation strategy is likely to suffer from low statistical significance due to the limited sample size.[8] For those reasons, this study employs the one-stage estimation strategy. However, to double-check the robustness of our results, we present the estimation results that employ the two-stage estimation strategy in subsection 6.4 and the Appendix tables.

Although previous studies, including Amiti and Cameron (2012) and Giovannetti and Menezes-Filho (2006), find that input tariffs are the major channel affecting wage skill premiums, Galiani and Porto (2010) and the above-mentioned empirical studies employing the two-stage estimation strategy ignored the role of input tariffs. Thus, we also estimate the specification that includes input tariffs. Additionally, based on the findings of the literature, we also estimate the specification that includes the industry-level share of foreign-owned capital (i.e., a measure for within-industry offshoring) and payments to licenses and foreign technical assistance (i.e., a direct measure for the usage of foreign technologies).

According to workers' educational attainments, we define three skill categories. Low-skilled workers are those with primary education or less, medium-skilled workers are secondary education graduates and dropouts, and high-skilled workers are college and non-college higher education graduates and dropouts. Therefore, the empirical specification for estimating the impacts of trade liberalization on industry wage premiums is as follows:

$$\ln(w_{ijt}) = \mathbf{X}'_{it}\boldsymbol{\beta}_1 + \mathbf{S}'_{it}\boldsymbol{\beta}_2 + \beta_3 \ln(\mathit{output\,tariff}_{jt}) + \beta_4 \ln(\mathit{input\,tariff}_{jt}) + \mathbf{Z}'_{jt-1}\boldsymbol{\beta}_5 + I_j + Y_t + \varepsilon_{ijt}, \quad (1)$$

where i, j, and t index individual, industry, and time, respectively; w is hourly wage (deflated by the national consumer price index [December 2008 = 1]); vector $\boldsymbol{X}$ represents control variables at the individual level, which includes years of potential labor market experience (age–years of schooling–6), its squared term, demographic dummies (a dummy each for the head of the household and married workers), informal dummy (a dummy for workers working without any contract), large-sized firm dummy (a dummy for workers working at firms with more than 200 people),[9] and region dummies; vector $\boldsymbol{S}$ includes dummies for two types of skilled workers (a dummy for medium-skilled workers [*M-skilled*] and a dummy for high-skilled workers [*H-skilled*]); *output tariff* represents effective tariff rates on final goods; *input tariff* represents effective tariff rates on intermediate inputs; vector $\boldsymbol{Z}$ represents other industry characteristics lagged by one year to address potential endogeneity, which includes the share of foreign-owned capital (*FDI*) and the ratio of expenditure on licenses and foreign technical assistance (*foreign technology*);[10] $\boldsymbol{I}$ is a vector of industry effects; $\boldsymbol{Y}$ is a vector of year effects; and ε is the error term.

Since previous studies find that the returns to skills captured by the vector $\boldsymbol{\beta}_2$ decreased substantially in the 2000s (Murakami and Nomura 2020; Parro and Reyes 2017), this study allows the returns to skills to vary across periods; thus, interaction terms between the skill dummies and year effects are included. Additionally, following

Galiani and Porto (2010), the returns to years of potential labor market experience and its squared term are also allowed to vary across periods; hence, their interactions with year effects are also included. Finally, following the estimation strategy of Bustos (2011), who finds that trade liberalization induces only productive large-sized productive firms to upgrade the workers' skills, this study also estimates the specification that includes an interaction term between *output tariff* and the large-sized firm dummy in addition to the *FDI* and *foreign technology*. Models by Impullitti and Licandro (2010) and Navas and Licandro (2011) also predict that cost-reducing innovations induced by import competition depend positively on the firm size.

To address potential heteroscedasticity and serial correlation at the industry level in the error term, this study estimates robust-standard errors clustered at the three-digit industry level. Sample weights are also used for all estimations in this study. We assume that the effects of common shocks or changes across all industries, such as labor-reform, exchange rates, and other macroeconomic shocks, can be captured by year effects. Meanwhile, time-invariant industry characteristics, which are likely to correlate with both effective tariffs and workers' wages, can be captured by the industry effects.

3.2. Trade liberalization and industry skill premiums

As explained in Section 2, in addition to the base industry wage premiums, skilled workers are likely to receive additional wage premiums according to their industry affiliation. Thus, we estimate the impacts of trade liberalization on industry skill premiums by adding interaction terms between the effective tariffs (*output tariff* and *input tariff*) and the skill dummies ***S***, as well as interaction terms between industry characteristics ***Z***, consisting of *FDI* and *foreign technology*, and the skill dummies ***S***, to equation (1). The empirical specification is as follows:

$$\ln(w_{ijt}) = \mathbf{X}'_{it}\boldsymbol{\beta}_1 + \mathbf{S}'_{it}\boldsymbol{\beta}_2 + \beta_3 \ln(output\ tariff_{jt}) + \beta_4 \ln(input\ tariff_{jt}) + \ln(output\ tariff_{jt}) * \mathbf{S}'_{it}\boldsymbol{\beta}_5 + \ln(input\ tariff_{jt}) * \mathbf{S}'_{it}\boldsymbol{\beta}_6 + \mathbf{Z}'_{jt-1}\boldsymbol{\beta}_7 + \mathbf{Z}_{jt-1} * \mathbf{S}'_{it}\boldsymbol{\beta}_8 + I_j + Y_t + \varepsilon_{ijt} \quad (2)$$

where variables are the same as in equation (1). Following Bustos (2011), we also estimate the specification that includes the interaction terms between the output tariffs, interacted with the skill dummies, and large-sized firm dummy. Other variables and estimation strategies are the same as equation (1).

4. Data and descriptive statistics

4.1. Individual-level data

The data on wages and individual characteristics are sourced from *Encuesta de Caracterización Socioeconómica Nacional* (Socio-economic Characterization Survey, CASEN) for 2000, 2003, 2006, and 2009.[11] CASEN is a nationally representative cross-sectional household survey conducted every two or three years by the Ministry of Social Development and Family of Chile (formerly the Ministry of Social Development and the Ministry of Planning and Cooperation). CASEN provides detailed information on demographic characteristics, education, health, housing, employment, and various sources of income. Further, a favorable feature of this survey for this study is that the surveys report a worker's industry affiliation at the four-digit level of international standard industrial classification (ISIC). Thus, this study pools the individual data from the surveys and matches them with panel data on industry characteristics at the ISIC classification. Since effective tariff rates are provided at the three-digit level, we aggregate the worker's industry affiliation at the three-digit level. This study limits the sample to male workers who are employed full-time (more than 40 hours per week) in manufacturing sectors and are aged between 15 to 64 years, excluding self-employed workers and military personnel.

Tables 1 and 2 respectively report the average log hourly wages by skill and industry. Table 3 reports low-skilled labor intensity by industry, measured by the share of total labor hours worked by low-skilled workers in efficiency units. Following Bustos (2011), we calculate each skill group's labor hours in efficiency units in year *t* by the group's total labor hours in year *t* weighted by the corresponding wage premiums in the initial year 2000. Interestingly, we find that industries with initially lower wages and a higher share of low-skilled workers, including food manufacturing (ISIC 311) and wood and wood product (ISIC 331), experienced a larger increase in wages and a decrease in low-skilled labor intensity.

[Insert Tables 1 to 3 near here]

4.2. Industry-level data

Although this study uses effective tariff rates as the measure of trade liberalization, there are some difficulties in calculating them. This difficulty is because effective tariff rates are not necessarily immediately equal to 0 on all products after the enforcement of RTAs due to the exceptions to tariff reductions and eliminations.[12] However, some attempts have certainly been made. Bergoeing, Hernando, and Repetto (2006) calculated the country-level effective tariffs in Chile for the period from 1980 to 2001. Becerra (2006) calculated them at the industry-level for the period from 2000 to 2005. Thus, subsequent studies such as Cavallo (2008) and Álvarez and Fuentes (2018) used these calculations for their empirical analysis. Regarding the period after 2006, the frequently used database of the World Integrated Trade Solution (WITS) also provides reliable data.[13] Thus, following the estimation strategy of those empirical studies, this study sources the data for the output tariffs from Becerra (2006) for the years 2000 and 2003, and the WITS database for the years 2006 and 2009. The effective tariffs from both sources are weighted by their corresponding import values. We also need to note that Becerra (2006) do not classify all industries by the three-digit level of ISIC (revision 2); some sectors are classified according to the two-digit level, and others are classified according to the aggregated three-digit level (i.e., some three-digit level sectors are aggregated into one sector). Thus, although this study maintains the three-digit level classification for all periods under analysis, we consider effective tariff rates of such aggregated sectors as identical at the three-digit level.[14]

Following Amiti and Cameron (2012), we construct the input tariffs by weighting the output tariffs by the industry's input cost shares, as follows:

$$input\ tariff_{jt} = \sum_k \alpha_{jk} \cdot output\ tariff_{kt} \quad (3)$$

where α_{jk} is the share of input of industry *k* purchased by industry *j*. The share of input, based on the total input purchases, including domestic and imported inputs, is calculated by coefficients of the input-output table of Chile in 2003.[15]

Table 4 shows the output tariff rates by industry. We find that the initial tariff rates were highest in food manufacturing (ISIC 311-312), which included products exempted from applying the uniform MFN tariff rates.[16] Textile, apparel, leather, and footwear (ISIC 321-324) also recorded initially higher tariff rates. Together with Tables 2 and 3, we find that those initially protected sectors, especially food manufacturing, were low-skilled-labor-intensive and had lower wages. However, as major FTAs with faster and comprehensive tariff elimination came into effect in the 2000s, the effective tariff rates of those sectors had been substantially reduced.[17] As a result, the import-weighted average rates in manufacturing sectors decreased from 6.9% in 2000, which is slightly below the MFN tariff rates (9%), to 3.3% in 2003, 2.4% in 2006, and 1.9% in 2009, which are substantially below the MFN tariff rates (6%) in those years.

The other two industry characteristics (*FDI* and *foreign technology*) are calculated from plant-level data from *Encuesta Nacional Industrial Anual* (Annual Survey of Manufacturing Industries, ENIA).[18] The survey, conducted by the National Institute of Statistics (INE) of Chile, covers all manufacturing plants with more than 10 employees and provides plant-level detailed information on sales, employment, wages, input material and service expenditures, and fixed assets (see the Appendix). Following the FDI studies (e.g., Javorcik 2004), we measure the industry-level FDI by the share of foreign-owned capital averaged over all plants, weighted by each plant's share in sectoral production. Since the share of foreign capital has significant regional variation in Chile, the sectoral production is calculated at the region-industry level. Similarly, we measure industry-level foreign technology by the ratio of expenditure on licenses and foreign technical assistance to total sales averaged over all plants, weighted by each plant's share in the industry sales.

[Insert Table 4 near here]

5. Estimation results

5.1. Trade liberalization and industry wage premiums

Table 5 reports the baseline estimation results of equation (1). We find that, in all specifications, the coefficient of output tariffs is negative and significant, indicating that a reduction in output tariffs is associated with increasing industry wage premiums. The coefficient of foreign technology is positive and significant, as expected. In contrast, the coefficients of input tariffs and FDI are insignificant, and their inclusion does not affect the sign, magnitude, and significance of output tariffs. Therefore, the finding is closely related to the predictions of heterogeneous firm trade models, especially the models by Bustos (2011) and Yeaple (2005). Trade liberalization induces productive firms to use skilled workers with higher wages intensively and reallocate market shares towards such productive firms in a given industry, thereby increasing industry wage premiums. Although the findings are consistent with Kumar and Mishra (2008) for India, they are in contrast with previous studies analyzing other LACs, such as Attanasio, Goldberg, and Pavcnik (2004) for Colombia; Galiani and Porto (2010) for Argentina; Goldberg and Pavcnik (2005) for Colombia; and Paz (2014) for Colombia, who found a positive association between tariffs and industry wage premiums and, thus, supported the prediction of specific factors model, as discussed in Section 2. Thus, this study provides new evidence for the impacts of trade liberalization on industry wage. We also find that the coefficients of the interaction terms between skilled workers dummies and year effects, especially the 2009 year effect, are negative, confirming a decrease in economy-wide returns to skilled workers in the 2000s, as Murakami and Nomura (2020) and Parro and Reyes (2017) also find.

A possible concern with the findings is the potential endogeneity of effective tariffs to wages. Thus, to ameliorate the endogeneity problem, many control variables such as the time-varying returns to skills and labor market experience, the detailed individual characteristics, the lagged industry characteristics, the industry effects, and the year effects are included in our specification. However, unobservable time-varying industry characteristics may still be correlated to both workers' wages and effective tariffs. For example, industries with lobbying power for protection are considered to have higher tariffs. Moreover, workers employed in such industries are likely to receive higher wages because those industries can extract some industry rents associated with protection (Galiani and Porto 2010). This political-economic factor is especially crucial for this study because effective tariff rates, which are our measure of trade liberalization instead of nominal MFN tariff rates, are determined by the exceptions to tariff reductions and eliminations in RTAs, as well as the choice of partners with which Chile has RTAs. Thus, this process is likely to allow for much political lobbying. Therefore, the omission of such time-varying political characteristics results in underestimating the coefficient of output tariffs in absolute values.

To address this concern, following Attanasio, Goldberg, and Pavcnik (2004), Kumar and Mishra (2008), and Pavcnik et al. (2004), we apply an instrumental variables strategy and estimate the equations by two-stage least squares (2SLS). An ideal instrument should be highly correlated with effective tariffs but uncorrelated to the industry-specific time-varying unobservable component of wages. Despite the difficulty of finding such an ideal instrument, this study argues that the MFN tariff rate each year, interacted with initial applied tariff levels (in 2000), is an appropriate instrument. This argument is supported by the observation that the MFN tariff rate each year is flat across industries in Chile; thus, it is exogenously determined. Moreover, since the reduction in the uniform MFN tariff rates by one percent in January each year from 11% was predetermined by Law No. 19.589 of 14 November 1998 (WTO 2009), there was no room for political lobbying. Furthermore, the initial tariff levels are closely related to the cross-industry patterns of the subsequent tariff levels. Note that Attanasio, Goldberg, and Pavcnik (2004), Goldberg and Pavcnik (2005), and Pavcnik et al. (2004) used the exchange rate and coffee price in each year, interacted with initial tariff levels, as the instruments. However, theoretical and empirical justifications that the exchange rate and major export commodities are linked to tariff levels are weak. Since both applied tariffs and MFN tariffs show a decreasing trend, our proposed instrument is obviously more appropriate in Chile. Note that we do not include input tariffs in the estimation using the instruments because the variable is already insignificant.

Columns 5 to 7 in Table 6 presents the estimation results using instrumental variables. The Durbin-Wu-Hausman test strongly rejects the null hypothesis of exogeneity of output tariffs. Given that the Kleibergen–Paap rank F statistics are larger than the Stock-Yogo weak ID test critical value, we reject the null hypothesis that the instrument is weak. Interestingly, if we estimate the residual from the first-stage regression, which captures the endogenous components of effective tariffs (e.g., lobbying power for protection), we find the expected positive relationship between the residual and effective tariff rate (see Figure 1). Indeed, the most protected industry, food manufacturing (ISIC 311/ 312), exhibited the largest endogenous components of effective tariffs in 2000. Thus, we find that the coefficient of output tariffs was substantially underestimated in absolute value in the estimation without using the instrument: the estimation shows that a 1% reduction in output tariffs leads to a 0.134% increase in industry wage premiums (Column [1] of Table 5), while the estimation using the instrument shows that it leads to a 0.484% increase in industry wage premiums (Column [5] of Table 5). We again confirm that the inclusion of FDI and foreign technology does not affect the sign, magnitude, and significance of output tariffs. Therefore, we find that the impacts of output tariffs on industry wage premiums are more important and practically large if we appropriately address the endogeneity of effective tariffs.

[Insert Table 5 near here]

[Insert Figure 1 near here]

5.2. Trade liberalization and industry skill premiums

Table 6 reports the baseline estimation results of equation (2), including the estimation results using the instruments. Regarding the interaction terms, we use the original instrument interacted with the explanatory variables in question (e.g., we use the original instrument interacted with skilled dummies as the instrument for the output tariffs interacted with skilled dummies).[19] Note that we do not repeat the estimation results of the coefficients of skilled dummies (including their interactions with year effects) in the subsequent tables. We find the higher the skill category, the larger (in absolute value) coefficient of output tariffs; moreover, the coefficient of output tariffs is significant only for the interaction with medium-and high-skilled workers. Since the coefficient of output tariffs using 2SLS is larger, as discussed in subsection 5.1, it is also significant for low-skilled workers. However, the result that workers with higher skill categories receive additional industry wage premiums is unchanged. For example, Column 5 of Table 6 shows that a 1% reduction in output tariffs leads to a 0.298% increase in industry wage premiums for low-skilled workers; it leads to a 0.503% increase for high-skilled workers. Therefore, we find that reductions in output tariffs lead to an increase in industry skill premiums and, thus, wage inequality between high- and low-skilled workers in a given industry. The finding is consistent with Galiani and Porto (2010) for Argentina. Interestingly, this study also finds that the coefficient of output tariffs is significantly larger (in absolute value) for medium- and high-skilled workers employed in large-sized firms.[20] Therefore, together with the findings on the impacts on industry wage premiums, the findings are consistent with the predictions of heterogeneous firm trade models, especially Bustos (2011). Trade-induced skill upgrading in large-sized productive firms increases the demand for skilled workers in a given industry, thereby increasing industry skill premiums. However, while Bustos

(2011) and Giovannetti and Menezes-Filho (2006) associate the within-industry skill upgrading with export market entry and improved access to foreign inputs that embody advanced technologies respectively, this study finds that import competition in final goods is the actual cause, thus highlighting a major difference with prior studies. Furthermore, the findings of this study concur with empirical studies that find that increased competition, measured by the reductions in trade costs, leads to the improvement in firm-level product quality (Fernandes and Paunov 2013) and industry-level productivity (Blyde and Iberti 2012) in Chile. Additionally, RTAs, especially with developed countries, including the USA and EU, require compliance with sanitary, phytosanitary, and environmental standards, which is also likely to promote the adoption of advanced technologies.[21]

We also find that the coefficient of FDI is positive and significant only for the interaction with high-skilled workers, indicating that an increase in FDI leads to increasing industry skill premiums, as predicted by the model of Feenstra and Hanson (1997). The finding is consistent with recent empirical studies analyzing LACs, including Herzer et al. (2014), Murakami and Hamaguchi (forthcoming), and Suanes (2016). By contrast, the coefficients of input tariffs and foreign technology, including their interactions with skilled dummies, are insignificant, thus suggesting that foreign technologies may not be skill-biased in this period in Chile. Importantly, we confirm that the inclusion of input tariffs, FDI, and foreign technology, including their interactions with skilled dummies, does not affect the sign, magnitude, and significance of output tariffs.

[Insert Table 6 near here]

5.3. Mechanism

The findings in subsections 5.1 and 5.2 imply that within-industry skill upgrading due to increased import competition is the main channel that accounts for the increase in demand for skilled workers and industry skill premiums. To clarify this mechanism further, following Berman, Bound, and Griliches (1994), Bustos (2011), and Giovannetti and Menezes-Filho (2006), we decompose the change in the aggregate employment share of medium-and high-skilled workers from 2000 to 2009 into the following two terms:

$$\Delta\left(\frac{L^s}{L}\right) = \sum_j \Delta\left(\frac{L_j}{L}\right)\left(\frac{\overline{L_j^s}}{L_j}\right) + \sum_j\left(\frac{\overline{L_j}}{L}\right)\Delta\left(\frac{L_j^s}{L_j}\right), \tag{4}$$

where *i* and *s* index industry and skilled workers defined as the sum of medium- and high-skilled workers, respectively; L is the total labor hours in efficiency units; bar over a term denotes the mean over time (2000 and 2009); and Δ before a term denotes a change over time (from 2000 to 2009). Thus, the first term on the right-hand side of equation (4) represents the change in aggregate skill intensity attributable to the shifts in the employment share across industries (between-industry effect). Meanwhile, the second term represents the change in aggregate skill intensity attributable to the changes in skill intensity within each industry (within-industry effect).

Table 7 reports the result of decomposing the aggregate increase in skill intensity into between- and within-industry effects. Expectedly, among the total increase in skill intensity (0.047), most of the increase (0.042) occurs within industries. Interestingly, the within-industry skill upgrading mainly occurs in the food manufacturing (ISIC 311, 0.020) and wood and wood product (ISIC 331, 0.006) industries, which had the highest low-skilled labor intensity in 2000 and experienced the largest tariff reductions from 2000 to 2009. Indeed, we find a positive relationship between effective tariff reductions and within-industry skill upgrading from 2000 to 2009 (see Figure 2). By contrast, there is no evidence of the labor reallocation across industries predicted by the specific factors model. If skilled workers are mobile across industries, the share of skilled workers should have been negatively correlated with the tariff reductions from 2000 to 2009. However, we do not find this relationship.

Therefore, the decomposition results strongly support the mentioned mechanism. The revealed mechanism is consistent with what Wood (1995) termed as “defensive innovation,” which Thoenig and Verdier (2003) theoretically demonstrated: firms in industries facing increased import competition introduce new skill-biased technologies to innovate their products and production processes while economizing on unskilled workers. The mechanism is also closely related to the model by Feenstra and Hanson (1997), which predicts that offshoring from developed countries causes a relative expansion of skill-intensive activities in each industry in developing countries because offshored tasks from the former to the latter are skilled labor-intensive relative to the existing production activities operating in the latter. Thus, the model also predicts skill upgrading and increased demand for skilled workers within industries, though the supposed driving force is offshoring rather than import competition.

[Insert Table 7 near here]

[Insert Figure 2 near here]

6. Robustness checks

6.1. Controlling for industry-level productivity

In the estimation presented in Section 5, we have analyzed the impacts of increased import competition and improved access to better foreign technologies on the within-industry skill upgrading. Such skill upgrading and technological changes can be reflected in industry-level productivity improvements. However, industry-level productivity is not entirely determined by such channels: some parts are, at least, determined by domestic technological capabilities. Importantly, since the industry-level domestic technological capabilities are also considered to be correlated with workers' wages, its exclusion causes omitted variables bias. Moreover, the industry-level productivity attributable to the domestic technological capabilities is likely to be negatively correlated with industry-level tariffs due to the political-economic factor discussed in Section 5: industries with low technological capabilities (thus low productivity) are likely to pressure the government for higher tariffs to maintain the protection from foreign competitions. As discussed in Section 5, this factor is especially crucial for this study because effective tariff rates are likely to allow much room for political lobbying.

Figure 3 shows the relationship between the productivity and effective tariff rate at the three-digit ISIC level in 2000. We estimate the plant-level Levinsohn–Petrin total factor productivity (TFP) (Levinsohn and Petrin 2003) using the data from ENIA (for details, see the Appendix). We calculate the industry-level weighted average of TFP using each plant's share in the industry sales as the weights. Interestingly, we find the expected negative relationships between effective tariffs and TFP at the industry-level; that is, low productivity industries tend to have higher effective tariffs. Thus, since industry-level productivity is considered to be positively correlated with workers' wages, the omission of productivity results in the overestimation of the coefficient of output tariffs in absolute values.

Therefore, following Paz (2014), we estimate equations (1) and (2) by adding industry-level TFP. Tables 8 and 9 report the estimation results. As expected, we find that the coefficient of TFP is positive (though it is weakly significant). Thus, the coefficient of output tariffs was indeed slightly overestimated in absolute value in the previous estimation without the inclusion of TFP: the previous estimation shows that a 1% reduction in output tariffs leads to a 0.134% increase in industry wage premium (Column [1] of Table 5), while the re-estimation with the inclusion of TFP shows that it leads to a 0.131% increase in industry wage premium (Column [1] of Table 8). However, the inclusion of TFP does not affect the baseline results: reductions in output tariffs lead to an increase in average industry wage premiums; however, considering the differential impacts of reductions in output tariffs on different skill groups, they lead to an increase in industry wage premiums for only medium-and high-skilled workers, and the effect is significantly larger for those employed in large-sized firms.

[Insert Tables 8 and 9 near here]

[Insert Figure 3 near here]

6.2. Alternative skill definition

As explained in Section 3, we estimated the equations using the skill categories based on workers' educational attainments. However, the workers' skills can also be defined according to their actual occupation. The household survey CASEN reports a worker's occupation at the four-digit level of the International Standard Classification of Occupations (ISCO). In the alternative skill definition, we define two skill categories: unskilled workers have elementary occupations (ISCO 9), and skilled workers have other occupational categories.[22] Similar to the case of the skill categories based on the workers' educational attainments, the terms between the skill dummies and year effects are also included

Table 10 reports the estimation results. The effects of output tariffs are robust to the alternative skill definition. A reduction in output tariffs leads to an increase in industry skill premiums. Moreover, the impact is larger in skilled workers employed in large-sized firms.

[Insert Table 10 near here]

6.3. Different analysis period

The estimation results may be affected by the inclusion of 2009, the year the global financial crisis hit the Chilean economy. In general, external shocks, including financial crises, disproportionately hurt unskilled workers because they tend to be replaced by skilled workers, given the falling aggregate labor demand during the recession periods (Gasparini and Cruces 2010; Nissanke and Thorbecke 2010). Therefore, considering that the effective tariffs were the lowest in 2009 among the analysis period, the effect of output tariffs on industry skill premiums can be overestimated in absolute values. Thus, as a further robustness check, we estimate the equations (1) and (2), excluding 2009.

Tables 11 and 12 report the estimation results. We find that this change in the analysis period generates similar results. Moreover, the effects of output tariffs on industry wage and skill premiums are even larger after excluding 2009.

[Insert Tables 11 and 12 near here]

6.4. Alternative estimation strategy

Since the alternative estimation strategy (i.e., two-stage estimation strategy) has also been employed in the literature, as discussed in Section 3, we also present the estimation results employing this estimation strategy as a final robustness check. In the first stage, following Attanasio, Goldberg, and Pavcnik (2004), Dutta (2007), Goldberg and Pavcnik (2005), Kumar and Mishra (2008), Paz (2014), and Pavcnik et al. (2004), we express industry wage premiums (i.e., the coefficients of industry dummies) as deviations from the employment-share-weighted average wage premiums rather than the deviations from a particular base category. We calculate the exact standard errors for the normalized industry wage premiums using the Haisken-Denew and Schmidt's (1997) two-step restricted least squares procedure.[23] In the second stage, we estimate the equation using weighted least squares, with the inverse of the standard error of the wage premium from the first stage as the weight. Following the one-stage estimation strategy, we also estimate the second-stage equation using the MFN tariff rate each year, interacted with the initial applied tariff levels, as the instrumental variable. The methodologies are applied to industry skill premiums (the coefficients of interaction terms between the industry dummies and a dummy for high-skilled workers).

Tables A2 and A3 report the second-stage estimation results for industry wage premiums and industry skill premiums, respectively. In both, we again find a robust negative coefficient for the output tariff. The absolute value of the coefficient of the 2SLS is larger, as expected. By contrast, the coefficients of input tariff, FDI, and foreign technology are insignificant.

7. Concluding remarks

This study analyzed the impacts of further tariff reductions resulting from the proliferation of RTAs on the wage inequality in Chile in the 2000s. For this purpose, we used data on effective tariff rates instead of uniform MFN rates as the trade liberalization measure. Furthermore, to control for other possible channels through which globalization would affect wage inequality, we constructed industry-level panel data on the variables representing those channels, including FDI and payments to foreign technologies based on the author's own calculations from plant-level microdata. Further, matching the panel data to pooled individual cross-section data from nationally representative household surveys at the industry level, this study estimated the impacts of trade liberalization on workers' wages directly in one stage. To the best of my knowledge, this is the first study to analyze the impacts of effective tariffs on wage inequality in Chile using detailed household and plant-level data.

Based on this unique matched data set, we found that the reductions in output tariffs increased the average wage in a given industry after controlling for other observable workers' characteristics. Moreover, when we consider the differential impacts of output tariffs on different skill groups, we found that the reductions significantly increased industry wage premiums for only skilled workers, thereby increasing wage inequality between skilled and unskilled workers in a given industry. Furthermore, the impact of output tariffs on the industry skill premiums is significantly larger for skilled workers employed in large-sized firms. Therefore, the findings are consistent with the predictions of heterogeneous firm trade models, especially Bustos (2011), who predicts that trade-induced skill upgrading in large-sized productive firms will increase the demand for skilled workers in a given industry, thereby increasing industry skill premiums. However, while Bustos (2011) associated this process with export market entry, this study found that import competition in final goods was the actual cause. Moreover, the mechanism that this study identified is quite different from previous studies analyzing trade liberalization and wage inequality in LACs, including Beyer, Rojas, and Vergara (1999) for Chile and Galiani and Porto (2010) for Argentina, whose results accord with the HOS or specific factors model. Therefore, the findings provide new evidence related to trade liberalization and wage inequality in LACs, which forms a novel contribution of this study to the literature.

Moreover, we demonstrated that the effects of output tariffs were unaffected by the inclusion of the industry variables representing other possible channels, such as input tariffs, FDI, and payments to foreign technologies, as well as industry-level productivity, which would affect effective tariffs and industry wages simultaneously. Furthermore, we verified that the effects of output tariffs are robust to the possible endogeneity of the variable, alternative skill definition, different analysis period, and alternative estimation strategy.

The finding that trade liberalization still operated in the direction of increasing wage inequality in Chile in the 2000s may require further research. First, considering the observed decrease in the overall wage inequality in this period, the finding may be puzzling. However, this decrease can be attributed to supply-side factors such as an increase in more educated workers due to the expansion of higher education, as pointed out by Murakami and Nomura (2020). Thus, further research on the economic factors explaining the evolution of wage inequality in this period, considering both demand and supply factors, may be required. Second, to reveal the distributional effects of trade liberalization entirely, we require a detailed analysis of the effects on household welfare across different income groups, especially based on the estimation of tariff pass-through on domestic prices (for example, see Casabianca [2016] for Paraguay; Porto [2006] for Argentina; and Finot, LaFleur, and Durán [2011] for Chile). Such an analysis is beyond the scope of this study; however, especially from a policy perspective, it may be an interesting subject for future research.

Notes

1. Most of the RTAs that came into effect during the 1990s fall into a category known as Economic Complementation Agreements (ECAs), which focus on the elimination of tariffs and non-tariff barriers for goods. The representative examples are ECAs with Mexico (1992), Venezuela (1993), Bolivia (1993), Colombia (1994), Ecuador (1995), and Peru (1998). By contrast, FTAs have faster and more comprehensive tariff elimination and include those areas not addressed by ECAs, such as investment, trade in services, competition policy, government procurement, and intellectual property rights. For more details, see Kuwayama (2003).
2. Since unskilled labor-intensive sectors had been heavily protected prior to trade liberalization in Chile, the finding that trade liberalization, which caused larger price reductions in those sectors, increased wage inequality is exactly what the Stolper–Samuelson theorem predicts.
3. Feliciano (2001) finds a positive association between import licenses and industry wage premiums.
4. Using export shares instead of tariffs, Brambilla et al. (2011) find that the variable increased industry skill premiums in 16 LACs.
5. Note that the original model by Melitz (2003) defines trade liberalization as symmetric reductions in trade costs of exporting and importing. Modifying the seminal model by Melitz (2003), models by Demidova and Rodríguez-Clare (2009, 2013) and Felbermayr, Jung, and Larch (2013) predict that even unilateral liberalization (i.e., unilateral reductions in import cost in a small economy) will also induce the productivity improvements in a given industry.
6. Other studies in this strand also introduce the fair wage model (Egger and Kreickemeier 2009; Amiti and Davis 2012) or search and matching frictions (Helpman, Itskhoki, and Redding 2010), thereby predicting that trade liberalization will increase between-firm wage inequality (i.e., wage inequality between otherwise similar workers across heterogeneous firms). However, since their models assume only one type of workers, they cannot predict within-firm wage inequality between skilled and unskilled workers.
7. Amiti and Cameron (2012) argue that the finding is not surprising because reductions in input tariffs induced firms to switch from producing high-skilled intensive intermediate inputs to importing them, thereby reducing relative demand for skilled workers.
8. Although classified according to the three-digit ISIC level, the number of industries is only 29.
9. Both the theoretical and empirical literature find a firm size-productivity premium (Berlingieri, Calligaris, and Criscuolo 2018; Chang and van Marrewijk 2013; Fernandes

2007) and firm size-wage premium (Berlingieri, Calligaris, and Criscuolo 2018; Helpman, Itskhoki, and Redding 2010).

10. Due to the data availability, the variables are lagged by two years in 2009. Due to the classification change of industry affiliation from ISIC revision 2 to 3 in 2008, ENIA for 2007 provides the last available data classified at ISIC revision 2.
11. We sourced the data from http://observatorio.ministeriodesarrollosocial.gob.cl/casen-multidimensional/casen/basedatos.php (accessed on June 6, 2018).
12. For the list of the exceptions to tariff reductions in RTAs, see Annex 1-A of Schuschny et al. (2007: 101).
13. Although many RTAs had already come into force, the effective tariff rates until 2003 that WITS provides are almost homogenous and identical to MFN tariff rates. Thus, the data in this period, apparently, do not reflect the realities and are not reliable.
14. For example, since Becerra (2006) aggregate ISIC 381, 383, and 385 into one sector, we consider effective tariff rates of those sectors as identical in 2000 and 2003.
15. Thus, we assume that the share of input is constant over the analysis period. We sourced the data from https://si3.bcentral.cl/estadisticas/Principal1/Excel/CCNN/cdr/excel.html (accessed on January 27, 2019).
16. The exceptions for some agricultural products (WTO definition) are a 12.5% on poultry products and a price band system (bound at 31.5%) applied to wheat and wheat flour, various dairy products, oilseeds and oleaginous fruit, vegetable fats and oils, and cane or beet sugar (WTO 2009).
17. For example, under the FTA with the USA, the tariff rates on poultry products had been progressively reduced to 6% (WTO, 2009).
18. We sourced the data from http://historico.ine.cl/canales/chile_estadistico/estadisticas_economicas/industria/series_estadisticas/series_estadisticas_enia.php (accessed on April 14, 2016).
19. Thus, equation (2) has more than three endogenous variables. Since the Stock-Yogo critical values are available up to a maximum of two endogenous regressors (see Table 5.2 in Stock and Yogo 2005, 101), we cannot provide the value in Tables 6, 9, 10, and 12.
20. However, the coefficient of large-sized firm dummy becomes insignificant when the interaction terms between the dummy and tariff variables are included, which shows that workers employed in industries with no tariff reduction do not receive significant firm size-wage premiums. Thus, the finding indicates that skill upgrading mainly occurs in large-sized firms operating in industries with larger tariff reductions. Since the large-sized firms of our sample correspond to roughly the top 40 percentile of the size

distribution, the finding supports Bustos (2011), who finds that (trading partners') tariff reductions induce firms above the median size to upgrade the workers' skills.

21. For example, see Iizuka, Roje, and Vera (2016), who discuss the impacts of RTAs on the environmental regulations for salmon aquaculture in Chile.
22. Although this study limits the sample to employed workers in manufacturing sectors, as explained in Section 4, legislators and managers (ISCO 1) and skilled agricultural and fishery workers (ISCO 6) are still included. Thus, we drop them in the estimation based on the occupational classification.
23. Regarding the procedures for this calculation, see the Murakami (2013) annex for more details.

References

Álvarez, R., and R. Fuentes. 2018. Minimum wage and productivity: Evidence from Chilean manufacturing plants. *Economic Development and Cultural Change* 67, no. 1: 193–223.

Amiti, M., and L. Cameron. 2012. Trade liberalization and the wage skill premium: Evidence from Indonesia. *Journal of International Economics* 87: 277–87.

Amiti, M., and D.R. Davis. 2012. Trade, firms, and wages: Theory and evidence. *Review of Economic Studies* 79: 1–36.

Attanasio, O., P.K. Goldberg, and N. Pavcnik. 2004. Trade reforms and wage inequality in Colombia. *Journal of Development Economics* 74, no. 2: 331–66.

Bértola, L., and J.A. Ocampo. 2012. *The economic development of Latin America since independence*. Oxford, UK: Oxford University Press.

Brambilla, I., R. Dix-Carneiro, D. Lederman, and G. Porto. 2011. Skills, exports, and the wages of seven million Latin American workers. *World Bank Economic Review* 26, no. 1: 34–60.

Becerra, G. 2006. Arancel efectivo de las importaciones chilenas 2000-2005. Economic Statistics Series 50, Central Bank of Chile.

Bergoeing, R., A. Hernando, and A. Repetto. 2006. Market reforms and efficiency gains in Chile. Working Paper 372, Central Bank of Chile.

Berlingieri, G., S. Calligaris, and C. Criscuolo. 2018. The productivity-wage premium: Does size still matter in a service economy? *AEA Papers and Proceedings* 108: 328–33.

Berman, E., J. Bound, and Z. Griliches. 1994. Changes in the demand for skilled labor within U.S. manufacturing: Evidence from the annual survey of manufactures. *Quarterly Journal of Economics* 104: 367–97.

Bernard, A. B., J. B. Jensen, S. J. Redding, and P. K. Schott. 2012. The empirics of firm heterogeneity and international trade. *Annual Review of Economics* 4, no. 1: 283–313.

Beyer, H., P. Rojas, and R. Vergara. 1999. Trade liberalization and wage inequality. *Journal of Development Economics* 59, no. 1: 103–23.

Blyde, J., and G. Iberti. 2012. Trade costs, resource reallocation and productivity in developing countries. *Review of International Economics* 20, no. 5: 909–23.

Bustos, P. 2011. The impact of trade liberalization on skill upgrading. Evidence from Argentina. Economics Working Paper 1189, Department of Economics and Business, Universitat Pompeu Fabra.

Casabianca, E.J. 2016. Distributional effects of multilateral and preferential trade liberalisation: The case of Paraguay. *Journal of International Trade & Economic Development* 25, no. 1: 80–112.

Caselli, M. 2014. Trade, skill-biased technical change and wages in Mexican manufacturing. *Applied Economics* 46, no. 3: 336–48.

Cavallo, E. A. 2008. Output volatility and openness to trade: A reassessment. *Economía* 9, no. 1: 105–52.

Chang, H.H., and C. Van Marrewijk. 2013. Firm heterogeneity and development: Evidence from Latin American countries. *Journal of International Trade & Economic Development* 22, no. 1: 11–52.

Demidova, S., and A. Rodriguez-Clare. 2009. Trade policy under firm-level heterogeneity in a small economy. *Journal of International Economics* 78: 100–12.

Demidova, S., and A. Rodriguez-Clare. 2013. The simple analytics of the Melitz model in a small economy. *Journal of International Economics* 90: 266–72.

Dutta, P.V. 2007. Trade protection and industry wages in India. *Industrial and Labor Relations Review* 60, no. 2: 268–86.

Egger, H., and U. Kreickemeier. 2009. Firm heterogeneity and the labor market effects on trade liberalization. *International Economic Review* 50, no. 1: 187–216.

Egger, H., and U. Kreickemeier. 2012. Fairness, trade, and inequality. *Journal of International Economics* 86: 184–96.

Feenstra, R.C., and G.H. Hanson. 1997. Foreign direct investment and relative wages: Evidence from Mexico's maquiladoras. *Journal of International Economics* 42, no. 3: 371–93.

Felbermayr, G., B. Jung, and M. Larch. 2013. Optimal tariffs, retaliation, and the welfare loss from tariff wars in the Melitz model. *Journal of International Economics* 89: 13–25.

Feliciano, Z.M. 2001. Workers and trade liberalization: The impact of trade reforms in Mexico on wages and employment. *ILR Review* 55, no. 1: 95–115.

Fernandes, A.M. 2007. Trade policy, trade volumes and plant-level productivity in Colombian manufacturing industries. *Journal of International Economics* 71: 52–71.

Fernandes, A. M., and C. Paunov. 2013. Does trade stimulate product quality upgrading? *Canadian Journal of Economics* 46, no. 4: 1232–1264.

Ffrench-Davis, R. 2010. *Economic Reforms in Chile: From Dictatorship to Democracy*, New York: Palgrave Macmillan.

Finot, A., M. LaFleur, and J. Dúran. 2011. Analysis of the effects of trade opening on household welfare: An application to Chile, 1999–2006. In *Trade, poverty and complementary policies in Latin America*, ed. J. Dúran, M. Lafleur, and A. Pellandra, 249–73, Santiago, Chile: Economic Commission for Latin America and the Caribbean (ECLAC).

Furuta, M. 2016. Trade liberalization and wage inequality in the Indian manufacturing sector. MPRA Paper 73709, Munich Personal RePEc Archive.

Galiani, S., and G. Porto. 2010. Trends in tariff reforms and trends in the structure of wages. *Review of Economics and Statistics* 92, no. 3: 482–94.

Gallego, F.A. 2012. Skill premium in Chile: Studying skill upgrading in the South. *World Development* 40, no. 3: 594–609.

Gasparini, L., and G. Cruces. 2010. A distribution in motion: The case of Argentina. In *Declining inequality in Latin America: A decade of progress?* ed. L. F. López-Calva and N. Lustig, 100–133. Washington, DC: United Nations Development Programme (UNDP) and Brookings Institution Press.

Giovannetti, B., and Menezes-Filho. N. 2006. Trade liberalization and the demand for skilled labor in Brazil. *Economía* 7, no. 1: 1–28.

Goldberg, P.K., and N. Pavcnik. 2005. Trade, wages, and the political economy of trade protection: evidence from the Colombian trade reforms. *Journal of International Economics* 66: 75–105.

Goldberg, P.K., and N. Pavcnik. 2007. Distributional effects of globalization in developing countries. *Journal of Economic Literature* 45, no. 1: 39–82.

Haisken-DeNew, J.P., and C.M. Schmidt. 1997. Inter-Industry and Inter-Region Wage Differentials: Mechanics and Interpretation. *Review of Economics and Statistics* 79, no. 3: 516–21.

Harrison, A., and G. Hanson. 1999. Who gains from trade reform? Some remaining puzzles. *Journal of Development Economics* 59: 125–54.

Helpman, E., O. Itskhoki, and S. Redding. 2010. Inequality and unemployment in a global economy. *Econometrica* 78, no. 4: 1239–83.

Herzer, D., P. Hühne, and P. Nunnenkamp. 2014. FDI and income inequality: Evidence from Latin American economies. *Review of Development Economics* 18, no. 4: 778–93.

Iizuka M., P. Roje, and V. Vera. 2016. The Development of Salmon Aquaculture in Chile into an Internationally Competitive Industry: 1985–2007. In *Chile's Salmon Industry*, ed. A. Hosono, M. Iizuka, and J. Katz, 75–108, Tokyo: Springer.

Impullitti, G., and O. Licandro. 2018. Trade, firm selection and innovation: The competition channel. *The Economic Journal* 128, no. 608: 189–229.

Javorcik, B.S. 2004. Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review* 94, no. 3: 605–27.

Krishna, P., J.P. Poole, and M.Z. Senses. 2012. Trade, labor market frictions, and residual wage inequality across worker groups. *American Economic Review: Papers & Proceedings* 102, no. 3: 417–23.

Kumar, U., and P. Mishra. 2008. Trade liberalization and wage inequality: Evidence from India. *Review of Development Economics* 12, no. 2: 291–311.

Kuwayama, M. 2003. The comprehensiveness of Chilean free trade agreements. In *Whither free trade agreements?: Proliferation, evaluation and multilateralization,* ed. J. Okamoto, 175–215, Chiba, Japan: Institute of Developing Economies, Japan External Trade Organization.

Linarello, A. 2018. Direct and indirect effects of trade liberalization: Evidence from Chile. *Journal of Development Economics* 134: 160–75.

Levinsohn, J., and A. Petrin. 2003. Estimating production functions using inputs to control for unobservables. *Review of Economic Studies* 70, no. 2: 317–41.

Melitz, M.J. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica* 71, no. 6: 1695–725.

Messina, J., and J. Silva. Forthcoming. Twenty years of wage inequality in Latin America. *World Bank Economic Review*.

Murakami, Y. 2013. Trade policy and wage inequality in Chile since the 1990s. Project Document 518, The United Nations Economic Commission for Latin America and the Caribbean (ECLAC).

Murakami, Y. 2014. Trade liberalization and skill premium in Chile. *México y la Cuenca del Pacífico*, no. 6: 77–101.

Murakami, Y. 2018. Globalization and income inequality in Latin America: A review of theoretical developments and recent evidence. RIEB Discussion Paper Series DP2018-16, Research Institute for Economics & Business Administration, Kobe University.

Murakami, Y., and N. Hamaguchi. Forthcoming. Peripherality, inequality, and economic development in Latin American countries. *Oxford Development Studies*.

Murakami, Y., and T. Nomura. 2020. Expanding higher education and wage inequality in Chile. *Journal of Economic Studies* 47, no. 4: 877–889.

Namini, J.E., and R. Lopez. 2013. Factor price overshooting with trade liberalization: Theory and evidence. *Scottish Journal of Political Economy* 60, no. 2: 139–81.

Navas, A., and O. Licandro. 2011. Trade liberalization, competition and growth. *The B.E. Journal of Macroeconomics* 11, no. 1: 1–26.

Nissanke, M., and E. Thorbecke. 2010. Globalization, poverty, and inequality in Latin America: Findings from case studies. *World Development* 38, no. 6: 797–802.

Parro, F., and L. Reyes. 2017. The rise and fall of income inequality in Chile, *Latin American Economic Review* 26, no. 3: 1–31.

Pavcnik, N. 2002. Trade liberalization, exit, and productivity improvement: Evidence from Chilean plants, *Review of Economic Studies* 69, no. 1: 245–76.

Pavcnik, N. 2017. The impact of trade on inequality in developing countries. Discussion paper series DP12331, Centre for Economic Policy Research.

Pavcnik, N., A. Blom, P.K. Goldberg, and N. Schady. 2004. Trade liberalization and industry wage structure: Evidence from Brazil. *World Bank Economic Review* 18, no. 3: 319–44.

Paz, L.S. 2014. Trade liberalization and the inter-industry wage premia: the missing role of productivity. *Applied Economics* 46, no. 4: 408–19.

Porto, G.G. 2006. Using survey data to assess the distributional effects of trade policy. *Journal of International Economics* 70: 140–60.

Rodriguez, F., and D. Rodrik. 2001. Trade policy and economic growth: A skeptic's guide to the cross-national evidence. *NBER Macroeconomics Annual, 2000* 15: 261–325.

Schuschny, A. R., J. E. Durán, and C. J. de Miguel. 2007. El modelo GTAP y las preferencias arancelarias en América Latina y el Caribe: reconciliando su año base con la evolución reciente de la agenda de liberalización regional. Serie Manuales 53, Economic Commission for Latin America and the Caribbean (ECLAC).

Stock, J. H., and M. Yogo. 2005. Testing for weak instruments in linear IV regression. In *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg*, ed. D. W. K. Andrews and J. H. Stock, 80–108, Cambridge: Cambridge University Press.

Suanes, M. 2016. Foreign direct investment and income inequality in Latin America: a sectoral analysis. *CEPAL Review* 118: 45–61.

Thoenig, M., and T. Verdier. 2003. A theory of defensive skill-biased innovation and globalization. *American Economic Review* 93, no. 3: 709–28.

Wood, A. 1995. How trade hurt unskilled workers. *Journal of Economic perspectives* 9, no. 3: 57-80.

World Trade Organization (WTO). 2009. Trade Policy Review, Report by the Secretariat: Chile. https://www.wto.org/english/tratop_e/tpr_e/tp320_e.htm

Yeaple, S.R. 2005. A simple model of firm heterogeneity, international trade, and wages. *Journal of International Economics* 65: 1–20.

Zechner, C. 2002. *Expanding NAFTA: Economic effects on Chile of free trade with the United States*. Hamburg: Lit.

Appendix

For the estimation of the plant-level TFP, we construct an unbalanced panel data for the 1995–2007 period. We estimate the production function separately for each three-digit industry. Note that, based on Becerra's (2006) classification for effective tariff rates, we aggregate some industries with small observations at the three-digit level into one sector. Table A.1 reports the estimation results. The details of the variables employed are described below.

The output is measured by real gross production. The deflator is the wholesale price index (originally, *índice de precios al por mayor*) [June 1992 = 1] in industrial sectors. The data for the 1995–1999 period are sourced from Central Bank of Chile,[1] while those for the 2000–2007 period are sourced from INE.[2]

Skilled and unskilled labor is measured by the total annual working hours of workers in the following occupational categories: skilled labor consists of owners, managers, specialized production workers, administrative personnel, and commissioned employees; unskilled labor consists of workers directly or indirectly involved in the production process and services workers.

Materials are the sum of the real domestic and imported materials. The deflators are the wholesale price index [June 1992 = 1] of domestic and imported intermediate inputs, respectively. For the 1995–1999 period, we calculate them based on the weighted average of the wholesale price index, whose basket and weights are given by INE. For the 2000–2007 period, we source them directly from INE.

The energy inputs are the sum of the real net purchased value of electricity, other combustibles, and water. The deflator is the implicit deflator of electricity, gas,

[1] https://si3.bcentral.cl/Siete/secure/cuadros/home.aspx, accessed on February 8, 2018
[2] http://www.ine.cl/estadisticas/precios/ipm, accessed on February 8, 2018

and water sectors [1992 = 1], sourced from the Statistical Yearbook for Latin America and the Caribbean of Economic Commission for Latin America and the Caribbean (ECLAC).[3]

Service is measured by the sum of real expenditure on services such as advertising and promotion, commission payments, communications, insurance, legal and technical consulting, license and foreign technical assistance, maintenance and repair payments, rental and leasing payments, transport and storage, and other services. Payments to subcontracts are also included in this category. The deflator is the implicit deflator of service sectors [1992 = 1], sourced from the Statistical Yearbook for Latin America and the Caribbean of ECLAC.

Capital is proxied by the real values of tangible fixed assets, consisting of building, land, machinery and equipment, and vehicles. The deflators are the wholesale price index [June 1992 = 1] of domestic capital goods. For the 1995–1999 period, we calculate them based on the weighted average of the wholesale price index, whose basket and weights are given by INE. For the 2000–2007 period, we source them directly from INE.

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[3] http://interwp.cepal.org/anuario_estadistico/anuario_2015/en/index.asp, accessed on February 8, 2018

Table A.1 Estimation results of the production function

	Dependent variable: log of output						
ISIC	311, 312	313, 314	321	322	323, 324	331	332
Log of skilled labor	0.013**	0.034	0.096***	0.091***	0.088***	0.081***	0.061***
	(0.006)	(0.033)	(0.019)	(0.016)	(0.021)	(0.022)	(0.022)
Log of unskilled labor	0.111***	0.022	0.099***	0.089***	0.042**	0.147***	0.041**
	(0.006)	(0.023)	(0.017)	(0.013)	(0.018)	(0.023)	(0.017)
Log of capital	0.109***	0.112***	0.064***	0.043**	0.057***	0.076***	0.080***
	(0.030)	(0.040)	(0.018)	(0.022)	(0.015)	(0.028)	(0.027)
Log of services	0.095***	0.127**	0.212***	0.181***	0.145***	0.190***	0.182***
	(0.029)	(0.060)	(0.019)	(0.029)	(0.027)	(0.044)	(0.034)
Log of materials	0.551***	0.538***	0.373***	0.521***	0.607***	0.452***	0.593***
	(0.056)	(0.079)	(0.035)	(0.045)	(0.021)	(0.034)	(0.043)
Log of electricity	0.401***	-0.046	-0.027	0.188***	0.167***	0.381***	0.117***
	(0.057)	(0.050)	(0.017)	(0.023)	(0.023)	(0.054)	(0.036)
Observations	14,398	1,493	2,089	1,531	1,142	2,442	818

	Dependent variable: log of output						
ISIC	341	342	351	352	353, 354, 355	356	361, 362
Log of skilled labor	0.106***	0.091***	0.057	0.140***	0.062*	0.098***	0.102***
	(0.020)	(0.022)	(0.048)	(0.026)	(0.035)	(0.018)	(0.032)
Log of unskilled labor	0.015	0.048***	0.040	0.084***	0.067***	0.060***	0.238***
	(0.022)	(0.015)	(0.031)	(0.021)	(0.023)	(0.013)	(0.041)
Log of capital	0.032	0.011	0.148***	0.025	0.019	0.061***	0.097***
	(0.029)	(0.021)	(0.041)	(0.022)	(0.029)	(0.021)	(0.033)
Log of services	0.189***	0.139***	0.198***	0.151***	0.088**	0.132***	0.121**
	(0.047)	(0.030)	(0.041)	(0.031)	(0.037)	(0.025)	(0.052)
Log of materials	0.468***	0.513***	0.454***	0.468***	0.648***	0.480***	0.450***
	(0.064)	(0.053)	(0.060)	(0.033)	(0.032)	(0.044)	(0.049)
Log of electricity	0.398***	-0.081	0.310***	0.089***	0.406***	0.137***	0.057
	(0.063)	(0.028)	(0.043)	(0.025)	(0.025)	(0.028)	(0.047)
Observations	875	1,682	524	1,374	645	2,126	437

	Dependent variable: log of output					
ISIC	369	371, 372	381, 383, 385	382	384	390
Log of skilled labor	0.049**	0.020	0.135***	0.126***	0.161***	0.114***
	(0.024)	(0.035)	(0.013)	(0.021)	(0.028)	(0.040)
Log of unskilled labor	0.041**	0.042	0.112***	0.089***	0.083***	0.183***
	(0.020)	(0.026)	(0.010)	(0.014)	(0.020)	(0.042)
Log of capital	0.005	0.032	0.057***	0.036	0.057	0.073**
	(0.018)	(0.044)	(0.015)	(0.025)	(0.043)	(0.032)
Log of services	0.204***	0.249***	0.145***	0.202***	0.251***	0.198***
	(0.024)	(0.056)	(0.016)	(0.031)	(0.060)	(0.065)
Log of materials	0.570***	0.432***	0.479***	0.396***	0.300**	0.307***
	(0.038)	(0.065)	(0.033)	(0.043)	(0.127)	(0.049)
Log of electricity	0.067*	1.193***	0.079***	0.289***	-0.058	0.527***
	(0.035)	(0.077)	(0.020)	(0.034)	(0.051)	(0.038)
Observations	1,077	989	6,345	1,665	758	439

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent standard errors.

Table A-2. Estimation results of the impacts of trade liberalization on industry wage premiums employing the two-stage estimation strategy

	(1)	(2)	(3)	(4)	(5)
Log output tariff	-0.158**	-0.159**	-0.160**	-0.679***	-0.672***
	(0.063)	(0.059)	(0.070)	(0.198)	(0.188)
Log input tariff		0.007			
		(0.074)			
FDI			0.028		0.102
			(0.171)		(0.176)
Foreign technology			5.487		6.236
			(6.408)		(7.456)
Constant	-0.432***	-0.415	-0.451**	-1.763***	-1.778***
	(0.151)	(0.269)	(0.192)	(0.488)	(0.481)
Two-stage least squares	No	No	No	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap rank F statistic				11.53	10.64
Stock-Yogo weak ID test critical value at 10%				16.38	16.38
Durbin-Wu-Hausman test				3.87*	3.68*
Observations	116	116	116	116	116
R-squared	0.275	0.275	0.282	0.309	0.315

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level.

Table A-3. Estimation results of the impacts of trade liberalization on industry skill premiums employing the two-stage estimation strategy

	(1)	(2)	(3)	(4)	(5)
Log output tariff	-0.314**	-0.337***	-0.322**	-1.140**	-1.217**
	(0.116)	(0.120)	(0.119)	(0.453)	(0.495)
Log input tariff		0.098			
		(0.238)			
FDI			0.241		0.379
			(0.242)		(0.317)
Foreign technology			-17.869		-20.252
			(14.290)		(21.527)
Constant	-0.732**	-0.503	-0.787**	-2.859**	-3.117**
	(0.300)	(0.667)	(0.335)	(1.159)	(1.298)
Two-stage least squares	No	No	No	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap rank F statistic				13.60	12.28
Stock-Yogo weak ID test critical value at 10%				16.38	16.38
Durbin-Wu-Hausman test				2.46	2.63
Observations	110	110	110	110	110
R-squared	0.153	0.155	0.167	0.170	0.186

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. The missing observations are due to industries where high-skilled workers do not exist in the sample.

Table 1. Average log hourly wages by skill

	2000	2003	2006	2009
Low-skilled	6.70	6.75	6.85	7.02
Medium-skilled	6.98	7.00	7.07	7.23
High-skilled	7.97	7.80	7.82	7.86
Weighted average	7.13	7.10	7.17	7.31

Note: Average wages are weighted by sample weights.

Source: Author's calculations based on data from CASEN (2000, 2003, 2006, and 2009).

Table 2. Average log hourly wages by industry

ISIC code (Rev.2)	2000	2003	2006	2009
311	6.87	6.88	7.03	7.19
312	7.50	7.18	7.43	7.35
313	7.13	7.15	7.28	7.38
314	7.56	8.08	8.56	7.80
321	7.18	7.11	7.15	7.32
322	7.10	7.10	7.21	7.14
323	7.15	6.75	7.05	6.71
324	6.87	7.00	7.06	7.32
331	6.76	6.80	6.91	7.04
332	6.84	6.79	7.00	7.07
341	7.33	7.24	7.34	7.39
342	7.08	7.40	7.44	7.54
351	7.12	7.27	7.50	7.81
352	7.87	7.62	7.46	7.51
353	7.91	7.97	7.71	8.84
354	6.51	7.59	8.00	8.36
355	7.40	6.97	6.93	7.16
356	7.14	7.03	7.00	7.33
361	7.08	7.03	7.17	7.12
362	6.90	7.22	7.03	7.10
369	7.12	6.96	7.21	7.24
371	7.21	7.40	7.29	7.46
372	7.24	7.63	7.39	7.54
381	7.12	7.08	7.22	7.30
382	7.52	7.49	7.27	7.46
383	7.11	7.25	7.51	7.49
384	7.13	7.14	7.09	7.55
385	7.82	7.53	7.61	7.31
390	8.65	6.77	7.04	7.53
Weighted average	7.13	7.10	7.17	7.31

Note: Average wages are weighted by sample weights.

Source: Author's calculations based on data from CASEN (2000, 2003, 2006, and 2009).

Table 3. Low-skilled labor intensity by industry

ISIC code (Rev.2)	2000	2003	2006	2009
311	0.30	0.25	0.21	0.23
312	0.17	0.11	0.13	0.12
313	0.34	0.26	0.20	0.30
314	0.25	0.06	0.11	0.10
321	0.15	0.11	0.13	0.19
322	0.11	0.14	0.10	0.16
323	0.17	0.10	0.28	0.21
324	0.15	0.16	0.11	0.07
331	0.44	0.39	0.33	0.38
332	0.26	0.22	0.28	0.23
341	0.15	0.11	0.13	0.14
342	0.06	0.06	0.07	0.07
351	0.13	0.14	0.15	0.05
352	0.05	0.07	0.05	0.04
353	0.07	0.03	0.00	0.14
354	0.24	0.00	0.24	0.00
355	0.18	0.25	0.19	0.11
356	0.21	0.12	0.17	0.22
361	0.26	0.30	0.13	0.22
362	0.15	0.22	0.14	0.11
369	0.31	0.33	0.35	0.33
371	0.11	0.08	0.08	0.06
372	0.15	0.38	0.13	0.04
381	0.16	0.13	0.16	0.12
382	0.10	0.06	0.09	0.05
383	0.08	0.12	0.10	0.07
384	0.10	0.15	0.10	0.11
385	0.08	0.05	0.04	0.00
390	0.05	0.10	0.11	0.01
Weighted average	0.24	0.20	0.18	0.19

Note: The low-skilled labor intensity is based on the total labor hours worked by each skill group's workers in efficiency units. The labor hours are weighted by sample weights.
Source: Author's calculations based on data from CASEN (2000, 2003, 2006, and 2009).

Table 4. Effective tariff rates on final goods by industry (%)

ISIC code (Rev.2)	2000	2003	2006	2009
311	11.23	4.04	2.70	1.40
312	11.23	4.04	0.97	2.02
313	5.87	3.47	1.81	1.84
314	5.87	3.47	0.39	1.84
321	7.78	4.78	3.15	2.99
322	7.78	4.78	4.81	3.83
323	8.11	4.90	3.98	2.28
324	8.11	4.90	4.25	2.43
331	7.39	2.14	1.40	0.83
332	7.07	3.92	3.22	2.00
341	5.31	1.42	1.06	1.12
342	2.95	1.53	1.14	1.14
351	5.73	2.90	0.99	1.24
352	6.84	3.30	1.27	1.10
353	7.40	3.53	2.74	2.64
354	7.40	3.53	0.37	0.24
355	7.40	3.53	3.46	2.61
356	7.40	3.53	2.60	1.75
361	6.74	3.18	3.18	2.42
362	6.74	3.18	1.97	1.66
369	6.74	3.18	1.50	1.43
371	4.83	2.15	1.49	1.00
372	4.83	2.15	0.97	1.09
381	7.32	3.67	1.67	1.69
382	6.07	2.64	2.35	1.29
383	7.32	3.67	2.15	1.47
384	6.98	3.21	3.44	3.05
385	7.32	3.67	2.29	1.83
390	8.13	5.08	2.13	2.39
Weighted average	6.94	3.31	2.42	1.91

Note: Average effective tariff rates are weighted by their corresponding import values.
Source: Annex 4 of Becerra (2006: 21, 24) and WITS.

Table 5. Baseline estimation results of the impacts of trade liberalization on industry wage premiums

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log output tariff	-0.134***	-0.134***	-0.130***	-0.116**	-0.484***	-0.454***	-0.450***
	(0.040)	(0.044)	(0.043)	(0.044)	(0.089)	(0.078)	(0.079)
Log input tariff		-0.001					
		(0.055)					
FDI			0.124	0.122		0.089	0.086
			(0.081)	(0.080)		(0.072)	(0.071)
Foreign technology			12.731**	12.807**		12.864**	12.938**
			(5.687)	(5.690)		(5.159)	(5.192)
Log output tariff × large-sized firms				-0.030			-0.028
				(0.026)			(0.034)
Large-sized firms	0.161***	0.161***	0.159***	0.055	0.148***	0.147***	0.050
	(0.022)	(0.022)	(0.023)	(0.107)	(0.022)	(0.023)	(0.133)
M-skilled	0.279***	0.280***	0.275***	0.278***	0.266***	0.262***	0.265***
	(0.036)	(0.036)	(0.035)	(0.037)	(0.040)	(0.039)	(0.041)
M-skilled × year2003	-0.023	-0.023	-0.018	-0.021	-0.002	0.001	-0.001
	(0.036)	(0.036)	(0.035)	(0.037)	(0.038)	(0.037)	(0.039)
M-skilled × year2006	-0.029	-0.029	-0.022	-0.027	-0.011	-0.006	-0.010
	(0.036)	(0.036)	(0.035)	(0.036)	(0.042)	(0.041)	(0.041)
M-skilled × year2009	-0.084*	-0.084*	-0.081	-0.089*	-0.042	-0.043	-0.050
	(0.048)	(0.049)	(0.048)	(0.051)	(0.054)	(0.054)	(0.057)
H-skilled	1.153***	1.153***	1.141***	1.149***	1.136***	1.126***	1.133***
	(0.084)	(0.084)	(0.080)	(0.080)	(0.090)	(0.086)	(0.089)
H-skilled × year2003	-0.150	-0.150	-0.140	-0.148	-0.131	-0.124	-0.131
	(0.092)	(0.091)	(0.092)	(0.091)	(0.091)	(0.091)	(0.094)
H-skilled × year2006	-0.237**	-0.237**	-0.219**	-0.231**	-0.236**	-0.220**	-0.231**
	(0.097)	(0.097)	(0.091)	(0.089)	(0.102)	(0.095)	(0.097)
H-skilled × year2009	-0.378***	-0.379***	-0.375***	-0.391***	-0.321***	-0.322***	-0.335***
	(0.086)	(0.086)	(0.083)	(0.080)	(0.094)	(0.090)	(0.093)
Constant	5.824***	5.821***	5.796***	5.833***	4.975***	5.017***	5.032***
	(0.138)	(0.188)	(0.137)	(0.146)	(0.213)	(0.184)	(0.186)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap rank F statistic					67.26	62.37	30.68
Stock-Yogo weak ID test critical value at 10%					16.38	16.38	7.03
Durbin-Wu-Hausman test					15.50***	14.51***	7.83***
Observations	17,032	17,032	17,032	17,032	17,032	17,032	17,032
R-squared	0.426	0.426	0.428	0.429	0.409	0.414	0.413

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included.

Table 6. Baseline estimation results of impacts of trade liberalization on industry skill premiums

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log output tariff	-0.039	-0.045	-0.033	-0.035	-0.298***	-0.257***	-0.269***
	(0.035)	(0.040)	(0.037)	(0.040)	(0.094)	(0.083)	(0.081)
Log output tariff × M-skilled	-0.097**	-0.070	-0.098**	-0.089*	-0.234***	-0.254***	-0.250***
	(0.045)	(0.047)	(0.047)	(0.048)	(0.054)	(0.059)	(0.056)
Log output tariff × H-skilled	-0.186***	-0.220**	-0.167**	-0.134*	-0.205**	-0.218**	-0.209**
	(0.067)	(0.102)	(0.067)	(0.066)	(0.100)	(0.101)	(0.103)
Log input tariff		0.011					
		(0.060)					
Log input tariff × M-skilled		-0.056					
		(0.040)					
Log input tariff × H-skilled		0.075					
		(0.134)					
FDI			-0.017	-0.008		-0.030	-0.022
			(0.109)	(0.111)		(0.095)	(0.096)
FDI × M-skilled			0.049	0.043		0.026	0.020
			(0.096)	(0.099)		(0.102)	(0.104)
FDI × H-skilled			0.466**	0.444**		0.427***	0.404**
			(0.178)	(0.179)		(0.166)	(0.166)
Foreign technology			13.401	13.139		15.285**	15.091**
			(9.415)	(9.520)		(7.038)	(7.110)
Foreign technology × M-skilled			-6.367	-6.110		-8.311	-8.112
			(7.420)	(7.641)		(8.313)	(8.479)
Foreign technology × H-skilled			6.123	6.708		3.623	4.015
			(13.913)	(14.140)		(13.067)	(13.259)
Log output tariff × large-sized firms				-0.005			0.004
				(0.030)			(0.044)
Log output tariff × M-skilled × large-sized firms				-0.013*			-0.011*
				(0.007)			(0.007)
Log output tariff × H-skilled × large-sized firms				-0.037**			-0.035**
				(0.015)			(0.015)
Large-sized firms	0.160***	0.160***	0.158***	0.084	0.148***	0.147***	0.110
	(0.022)	(0.022)	(0.022)	(0.109)	(0.023)	(0.023)	(0.162)
Constant	6.053***	6.073***	6.053***	6.062***	5.434***	5.519***	5.502***
	(0.128)	(0.177)	(0.129)	(0.138)	(0.231)	(0.205)	(0.198)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Durbin-Wu-Hausman test					9.85***	9.44***	7.60***
Observations	17,032	17,032	17,032	17,032	17,032	17,032	17,032
R-squared	0.427	0.427	0.432	0.433	0.410	0.416	0.416

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Skilled dummies and their interactions with year effects, years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included.

Table 7. Decomposition of the change in the employment share of skilled workers by industry

ISIC code (Rev.2)	Between	Within	Overall
311	0.028	0.020	0.048
312	-0.003	0.002	-0.002
313	-0.004	0.003	-0.001
314	-0.001	0.000	-0.001
321	-0.015	-0.001	-0.016
322	-0.005	-0.001	-0.006
323	-0.004	0.000	-0.004
324	-0.009	0.001	-0.008
331	-0.007	0.006	-0.001
332	-0.008	0.001	-0.007
341	0.010	0.000	0.010
342	-0.005	-0.001	-0.006
351	-0.005	0.001	-0.004
352	-0.010	0.000	-0.009
353	-0.001	0.000	-0.001
354	0.001	0.001	0.001
355	-0.002	0.001	-0.001
356	-0.003	0.000	-0.003
361	0.000	0.000	0.000
362	-0.001	0.000	-0.001
369	-0.008	-0.001	-0.008
371	0.012	0.001	0.013
372	0.001	0.001	0.002
381	0.016	0.004	0.020
382	0.022	0.002	0.024
383	-0.003	0.000	-0.003
384	0.004	0.000	0.004
385	-0.001	0.000	-0.001
390	0.007	0.000	0.008
Total	0.005	0.042	0.047

Source: Author’s calculations based on data from CASEN (2000, 2003, 2006, and 2009).

Table 8. Estimation results of the impacts of trade liberalization on industry wage premiums with industry-level TFP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TFP	0.030	0.030	0.032**	0.034**	0.015	0.018	0.019
	(0.019)	(0.019)	(0.015)	(0.015)	(0.023)	(0.016)	(0.016)
Log output tariff	-0.131***	-0.130***	-0.126***	-0.111**	-0.450***	-0.412***	-0.405***
	(0.040)	(0.045)	(0.042)	(0.044)	(0.112)	(0.084)	(0.086)
Log input tariff		-0.004					
		(0.051)					
FDI			0.135	0.133		0.101	0.099
			(0.082)	(0.082)		(0.073)	(0.072)
Foreign technology			13.014**	13.089**		13.388***	13.468***
			(5.739)	(5.759)		(4.660)	(4.669)
Log output tariff × large-sized firms				-0.033			-0.031
				(0.026)			(0.035)
Large-sized firms	0.160***	0.160***	0.158***	0.043	0.148***	0.148***	0.039
	(0.022)	(0.022)	(0.023)	(0.109)	(0.022)	(0.023)	(0.138)
Constant	5.767***	5.759***	5.732***	5.771***	5.026***	5.077***	5.096***
	(0.130)	(0.174)	(0.132)	(0.141)	(0.240)	(0.183)	(0.187)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap rank F statistic					33.97	33.99	17.14
Stock-Yogo weak ID test critical value at 10%					16.38	16.38	7.03
Durbin-Wu-Hausman test					10.33***	10.39***	5.51***
Observations	17,015	17,015	17,015	17,015	17,015	17,015	17,015
R-squared	0.426	0.426	0.429	0.429	0.412	0.417	0.417

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Skilled dummies and their interactions with year effects, years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included. The smaller number of observations than the baseline estimation is due to the missing samples of ISIC 353 in ENIA 2005.

Table 9. Estimation results of the impacts of trade liberalization on industry skill premiums with industry-level TFP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TFP	0.032*	0.032*	0.031**	0.032**	0.016	0.016	0.016
	(0.018)	(0.018)	(0.015)	(0.015)	(0.023)	(0.016)	(0.017)
Log output tariff	-0.033	-0.040	-0.027	-0.028	-0.262**	-0.222**	-0.232***
	(0.035)	(0.042)	(0.038)	(0.041)	(0.114)	(0.091)	(0.089)
Log output tariff × M-skilled	-0.098**	-0.070	-0.099**	-0.089*	-0.232***	-0.251***	-0.246***
	(0.044)	(0.046)	(0.047)	(0.047)	(0.053)	(0.057)	(0.055)
Log output tariff × H-skilled	-0.193***	-0.222**	-0.176**	-0.142**	-0.204**	-0.217**	-0.207**
	(0.065)	(0.103)	(0.064)	(0.063)	(0.097)	(0.098)	(0.099)
Log input tariff		0.012					
		(0.057)					
Log input tariff × M-skilled		-0.058					
		(0.040)					
Log input tariff × H-skilled		0.064					
		(0.136)					
FDI			-0.002	0.007		-0.020	-0.012
			(0.109)	(0.111)		(0.096)	(0.097)
FDI × M-skilled			0.044	0.036		0.027	0.021
			(0.096)	(0.099)		(0.101)	(0.104)
FDI × H-skilled			0.464**	0.442**		0.434***	0.412**
			(0.178)	(0.180)		(0.167)	(0.168)
Foreign technology			13.718	13.420		15.603**	15.401**
			(9.196)	(9.336)		(6.910)	(6.969)
Foreign technology × M-skilled			-6.228	-5.953		-8.063	-7.861
			(7.405)	(7.639)		(8.275)	(8.449)
Foreign technology × H-skilled			6.004	6.542		4.051	4.402
			(13.830)	(14.045)		(13.131)	(13.309)
Log output tariff × large-sized firms				-0.007			0.001
				(0.030)			(0.045)
Log output tariff × M-skilled × large-sized firms				-0.014**			-0.012*
				(0.007)			(0.007)
Log output tariff × H-skilled × large-sized firms				-0.037**			-0.034**
				(0.015)			(0.016)
Large-sized firms	0.160***	0.160***	0.158***	0.075	0.149***	0.147***	0.099
	(0.022)	(0.022)	(0.023)	(0.111)	(0.023)	(0.023)	(0.166)
Constant	5.998***	6.019***	5.995***	6.004***	5.486***	5.568***	5.554***
	(0.126)	(0.173)	(0.128)	(0.137)	(0.251)	(0.206)	(0.201)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Durbin-Wu-Hausman test					7.96***	8.42***	6.76***
Observations	17,015	17,015	17,015	17,015	17,015	17,015	17,015
R-squared	0.427	0.427	0.433	0.434	0.413	0.420	0.420

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Skilled dummies and their interactions with year effects, years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included. The smaller number of observations than the baseline estimation is due to the missing samples of ISIC 353 in ENIA 2005.

Table 10. Estimation results of the impacts of trade liberalization on industry skill premiums using alternative skill categories

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log output tariff	-0.053	-0.070	-0.039	-0.040	-0.364***	-0.319***	-0.328***
	(0.053)	(0.059)	(0.050)	(0.047)	(0.082)	(0.079)	(0.077)
Log output tariff × skilled	-0.097	-0.070	-0.109*	-0.092*	-0.224***	-0.243***	-0.235***
	(0.057)	(0.064)	(0.059)	(0.053)	(0.043)	(0.052)	(0.055)
Log input tariff		0.021					
		(0.092)					
Log input tariff × skilled		-0.057					
		(0.064)					
FDI			0.071	0.108		0.017	0.048
			(0.116)	(0.116)		(0.127)	(0.127)
FDI × skilled			0.035	-0.005		0.046	0.010
			(0.154)	(0.154)		(0.137)	(0.138)
Foreign technology			18.302***	18.004***		17.519***	17.254***
			(5.135)	(5.506)		(5.449)	(5.999)
Foreign technology × skilled			-6.590	-5.996		-5.392	-4.855
			(5.734)	(6.465)		(6.325)	(6.981)
Log output tariff × large-sized firms				0.008			0.011
				(0.031)			(0.042)
Log output tariff × skilled × large-sized firms				-0.038***			-0.035***
				(0.011)			(0.012)
Large-sized firms	-0.007	-0.110	-0.025	-0.018	-0.336***	-0.378***	-0.392***
	(0.147)	(0.186)	(0.148)	(0.138)	(0.098)	(0.125)	(0.136)
Constant	5.871***	5.897***	5.863***	5.896***	5.135***	5.215***	5.225***
	(0.147)	(0.237)	(0.137)	(0.145)	(0.211)	(0.207)	(0.214)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Durbin-Wu-Hausman test					14.31***	12.98***	13.23***
Observations	16,218	16,218	16,218	16,218	16,218	16,218	16,218
R-squared	0.416	0.416	0.419	0.420	0.389	0.394	0.393

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Skilled dummies and their interactions with year effects, years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included. The smaller number of observations than the baseline estimation is due to the elimination of observations whose occupational classification is ISCO 1 and 6, as explained in footnote 22.

Table 11. Estimation results of the impacts of trade liberalization on industry wage premiums using different analysis period (2000–2006)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log output tariff	-0.155***	-0.147**	-0.153***	-0.145***	-0.379***	-0.352***	-0.346***
	(0.044)	(0.058)	(0.045)	(0.047)	(0.090)	(0.080)	(0.081)
Log input tariff		-0.020					
		(0.068)					
FDI			0.082	0.082		0.061	0.059
			(0.084)	(0.084)		(0.078)	(0.078)
Foreign technology			17.665**	17.731**		18.148***	18.279***
			(7.006)	(6.993)		(6.116)	(6.091)
Log output tariff × large-sized firms				-0.017			-0.029
				(0.026)			(0.035)
Large-sized firms	0.150***	0.150***	0.149***	0.093	0.141***	0.142***	0.045
	(0.029)	(0.029)	(0.029)	(0.106)	(0.028)	(0.028)	(0.130)
Constant	5.746***	5.706***	5.720***	5.741***	5.207***	5.246***	5.265***
	(0.145)	(0.185)	(0.144)	(0.155)	(0.213)	(0.186)	(0.189)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap rank F statistic					61.09	61.65	33.33
Stock-Yogo weak ID test critical value at 10%					16.38	16.38	7.03
Durbin-Wu-Hausman test					10.22***	8.52***	4.16**
Observations	13,698	13,698	13,698	13,698	13,698	13,698	13,698
R-squared	0.431	0.431	0.434	0.434	0.424	0.429	0.429

Note: **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Skilled dummies and their interactions with year effects, years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included.

Table 12. Estimation results of the impacts of trade liberalization on industry skill premiums using different analysis period (2000–2006)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log output tariff	-0.037	-0.047	-0.029	-0.036	-0.170*	-0.139	-0.146
	(0.043)	(0.065)	(0.045)	(0.048)	(0.096)	(0.091)	(0.089)
Log output tariff × M-skilled	-0.130***	-0.070	-0.133***	-0.124**	-0.271***	-0.285***	-0.280***
	(0.043)	(0.051)	(0.045)	(0.047)	(0.045)	(0.052)	(0.049)
Log output tariff × H-skilled	-0.214***	-0.258*	-0.197***	-0.175**	-0.224***	-0.223***	-0.211***
	(0.064)	(0.143)	(0.062)	(0.064)	(0.064)	(0.071)	(0.071)
Log input tariff		0.012					
		(0.087)					
Log input tariff × M-skilled		-0.114					
		(0.070)					
Log input tariff × H-skilled		0.086					
		(0.190)					
FDI			-0.056	-0.049		-0.066	-0.060
			(0.108)	(0.109)		(0.101)	(0.102)
FDI × M-skilled			0.059	0.053		0.043	0.038
			(0.105)	(0.107)		(0.107)	(0.110)
FDI × H-skilled			0.475**	0.460**		0.451**	0.436**
			(0.200)	(0.200)		(0.193)	(0.194)
Foreign technology			16.246	15.834		17.793**	17.555**
			(9.731)	(9.722)		(8.264)	(8.249)
Foreign technology × M-skilled			-4.902	-4.414		-6.045	-5.701
			(6.938)	(7.198)		(8.069)	(8.315)
Foreign technology × H-skilled			9.649	10.471		8.477	9.109
			(13.806)	(13.741)		(13.459)	(13.426)
Log output tariff × large-sized firms				0.009			0.000
				(0.031)			(0.046)
Log output tariff × M-skilled × large-sized firms				-0.015			-0.013
				(0.010)			(0.009)
Log output tariff × H-skilled × large-sized firms				-0.029			-0.028
				(0.021)			(0.022)
Large-sized firms	0.150***	0.150***	0.149***	0.127	0.142***	0.142***	0.095
	(0.029)	(0.029)	(0.029)	(0.109)	(0.028)	(0.028)	(0.154)
Constant	6.033***	6.047***	6.050***	6.045***	5.725***	5.800***	5.797***
	(0.144)	(0.175)	(0.146)	(0.156)	(0.225)	(0.210)	(0.206)
Two-stage least squares	No	No	No	No	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Durbin-Wu-Hausman test					19.08***	16.40***	13.15***
Observations	13,698	13,698	13,698	13,698	13,698	13,698	13,698
R-squared	0.432	0.432	0.438	0.439	0.425	0.432	0.432

Note: **, and * indicate significance at 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust-standard errors clustered at the three-digit industry level. Skilled dummies and their interactions with year effects, years of potential labor market experience and its squared term, including their interactions with year effects, demographic dummies, informal dummy, and region dummies are also included.

Figure Captions

Figure 1. Residual from the first-stage regression and effective tariff rate in 2000

Figure 2. Effective tariff reductions and skill upgrading within the industry from 2000 to 2009

Figure 3. TFP and effective tariff rate in 2000

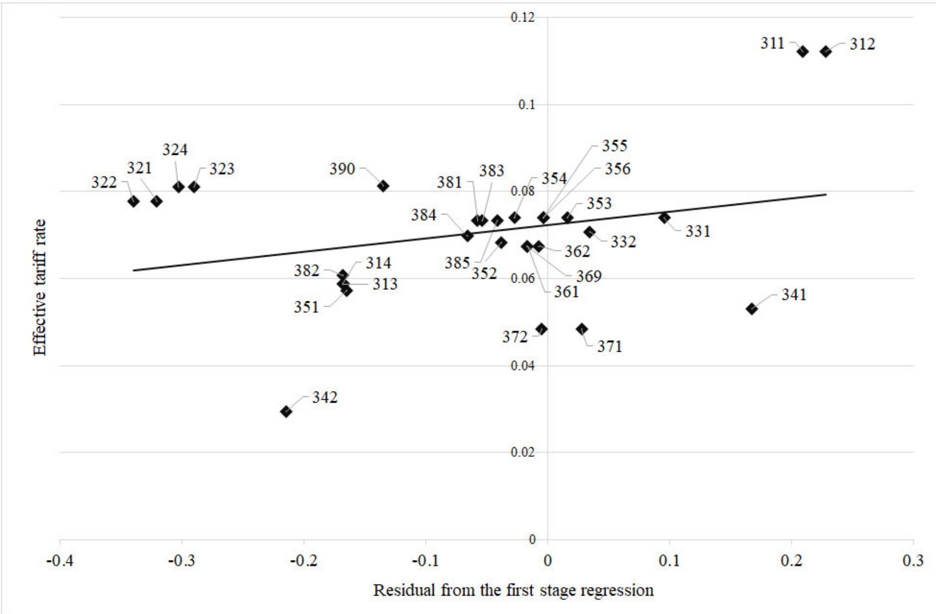

Figure 1. Residual from the first-stage regression and effective tariff rate in 2000

Source: Author's elaboration.

Note: The numbers show three-digit international standard industrial classification (ISIC Rev.2) codes.

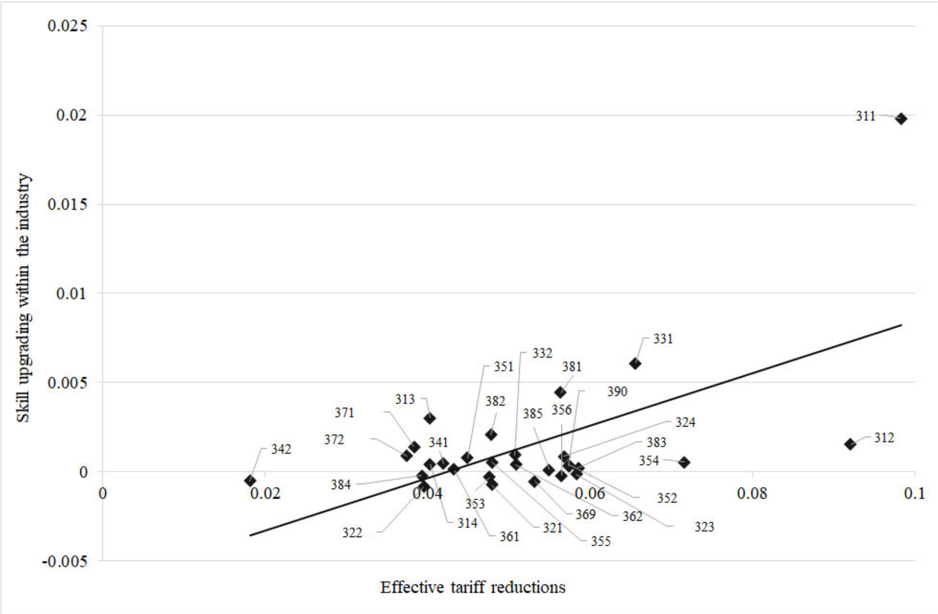

Figure 2. Effective tariff reductions and skill upgrading within the industry from 2000 to 2009
Source: Author's elaboration.
Note: The numbers show three-digit international standard industrial classification (ISIC Rev.2) codes.

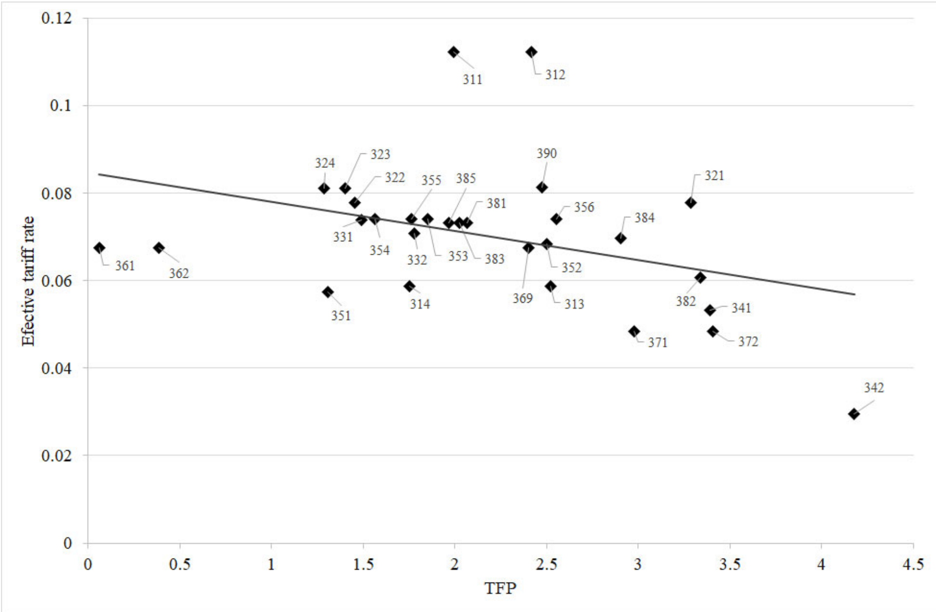

Figure 3. TFP and effective tariff rate in 2000
Source: Author’s elaboration.
Note: The numbers show three-digit international standard industrial classification (ISIC Rev.2) codes.