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Rana Hasan and Lan Chen

Rana Hasan is a Fellow in the Research Program at the East-West Center, Honolulu, Hawaii.

Lan Chen is a graduate student at the University of Hawaii at Manoa, Honolulu, Hawaii.

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Trade and Workers: Evidence from the Philippines[*]

Rana Hasan[†]
East-West Center
and
Lan Chen[‡]
University of Hawaii

Abstract: We combine labor force survey data with trade and production data to examine the impact of trade on wages and employment in the Philippines' manufacturing sector. Our main findings are as follows. First, in contrast to findings typically reported for Latin American countries, our data indicate that wage inequality in the Philippines' manufacturing sector has declined over the period in which trade liberalization has been undertaken. This is despite the fact that reductions in tariff rates were largest in less skill intensive manufacturing industries. There has also been an absence of any secular rise in returns to higher education. Second, tariff reductions have been associated with declines in industry wage premiums in capital-intensive industries. Moreover, these declines appear to have been largest for skilled workers. Finally, tariff reductions have had an insignificant effect on both employment as well as the average hours of work of full-time employees across industries. These findings are consistent with a scenario where workers in capital-intensive industries, especially the more skilled ones, earned rents prior to trade liberalization; liberalization may have worked to erode these.

JEL Codes: F16, J31
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[†] Until July 25, 2003: 1601 East-West Road, Honolulu, Hawaii 96848, USA. Email: hasanr@ewc.hawaii.edu
From July 26, 2003: 6 ADB Avenue, Mandaluyong City, Metro Manila 0401, Philippines. Email: rhasan@adb.org
[‡] Department of Economics, 2424 Maile Way, Honolulu, Hawaii 96822. Email: lanc@hawaii.edu

1. Introduction

Over the last two decades scores of developing countries have moved to liberalize their trade regimes. How have these episodes of liberalization affected workers? In view of the importance of this question for public policy there have been a number of recent papers that examine various dimensions of this issue. Prominent examples include the work of Currie and Harrison (1997), Ravenga (1997), Hanson and Harrison (1999), Robbins and Gindling (1999), Feliciano (2001), and Goldberg and Pavcnik (2001). By and large, much of this work has been based on the experience of various Latin American countries with a few contributions considering cases from Africa. Recent evidence from liberalizing Asian countries is much more limited.[1] This gap in the regional coverage of the existing literature is particularly glaring given Asia's abundance of labor (in both absolute as well as relative terms). In this paper we take some steps towards filling this gap by analyzing trade-labor linkages in the Philippines, a country which embarked on a program of trade liberalization since the mid-1980s and for which fairly good data are available.

We focus on examining the impact of trade on relative industry wages and employment in the manufacturing sector over 1988 to 1997. As in the work of Gaston and Trefler (1994) for the US and Feliciano (2001) and Goldberg and Pavcnik (2001) mentioned above, we estimate industry wage premiums using labor force survey data. These are subsequently related to measures of trade policy, trade flows, and industry characteristics. Since the wage premiums are based on earnings functions that include controls for various observable worker characteristics including age, sex, and educational attainment, they represent the portion of wages that are purged of workers' observable characteristics and accrue to workers' industry of employment. Working with industry wage premiums can therefore alleviate aggregation biases that may result from working with average industry or plant level wages.

[1] Exceptions include the work of Suryahadi (1999 and 2003) for Indonesia and Kambhapati, Krishna, and Mitra (1997) for India. The former examines the links between trade and premium to skills/education while the latter focus on the effects of liberalization on employment in five import competing industries.

For example, suppose that import competing industries employ a larger share of skilled and thus higher paid workers as data for the Philippines indicate is the case. Import competing industries would then have higher average wages. Ignoring the composition of worker characteristics across industries may lead a researcher to take the positive correlation between imports and average wages as evidence that import competition is beneficial for wages (working through the effect of import competition on innovation and productivity, for instance).

The panel nature of our estimated industry wage premiums and access to production data at the industry level allows us to address another potential complication in estimating the impact of trade on relative wages. As Gaston and Trefler (1994) point out, policymakers may set trade policy with consideration to the composition of workers across industries (for example, average education, average age, average level of skills, etc.). Since worker composition may also affect wage premiums – US data suggest that industries with larger shares of skilled workers tend to have higher wage premiums, something we find with Philippines data, too – ignoring the endogeneity of protection will lead OLS estimates of the impact of protection on wage premiums to be inconsistent. To alleviate endogeneity concerns we introduce industry characteristics and alternatively, industry fixed effects as controls in estimation. The latter are particularly useful since our data on industry characteristics is quite limited. For example, information on unionization is not available by manufacturing sector industries. If unionization varies across and industries and has important effects on how labor markets adjust to trade liberalization – as Gaston and Trefler (1995) find to be the case for the US – our analysis would miss out these effects. To the extent that unionization and the structure of bargaining between workers and firms is slow to change, introducing industry fixed effects can be useful for alleviating omitted variable bias.

We also examine other dimensions of trade-labor linkages. Much of the recent work on trade and wages has focused on the effects of trade on economy-wide returns to education. While an analysis of the role of trade in driving changes in returns to education is beyond the scope of this paper (Chu, Hasan, and Lee (work in progress) focus on this issue), our earnings function estimates shed light on the behavior of returns to education over the period of trade reform in the Philippines. Finally, we use our industry level information on employment as well as average hours worked to assess how trade has impacted employment in terms of both employee counts as well as hours of work across manufacturing industries.

The remainder of our paper is organized as follows. Section 2 discusses some conceptual issues related to trade and labor market linkages and also provides a description of the trade policy framework in the Philippines. Section 3 describes our data and presents summary statistics and trends pertaining to trade and relevant worker characteristics. Section 4 describes our results and Section 5 concludes.

2. Trade and Labor Linkages

2.1 Conceptual Issues

One of the most convenient starting points for thinking about trade and labor linkages is the Heckscher-Ohlin (HO) model of trade. In its simplest version, where trade takes place between two countries of the world endowed with two factors of production in different proportions, the model predicts that a reduction in trade barriers will raise the demand for and returns to the abundant factor in each of the two regions. If the two factors are skilled and unskilled labor, trade liberalization in the unskilled abundant country should lead to a decrease in wage inequality between skilled and unskilled

labor as the demand for unskilled workers increases. The opposite should take place in the skill abundant country.

The HO model's assumption of perfect factor mobility implies that returns to factors are equal across sectors. Since in reality factors may take considerable time to reallocate across sectors, the HO model is often thought to describe the long-run effects of trade. For the short to medium run, a better guide to the labor market effects of trade may be provided by the specific factors model. In Mayer (1974), for example, trade liberalization focused on one sector will depress wages in that sector if labor is immobile. This happens as increased imports in the liberalized sector shift the industry demand for labor downward. The inability of workers to move to other sectors breaks the link between their wages and those elsewhere. As Goldberg and Pavcnik (2001) point out, the widely held belief that trade hurts workers is consistent with the specific factors model.

Allowing for imperfections in product and factor markets introduces a far richer variety of possibilities than the general equilibrium HO and specific factors models allow, however. If domestic firms have monopoly power, for example, trade liberalization may have a "pro-competitive effect" on workers as import competition makes the product demand curve more elastic and forces firms to reduce markups. Under certain conditions, the reduction in markups will lead to an increase in the demand for labor, a proposition for which Kambhapati, Krishna, and Mitra (1997) present evidence using plant level data for five import-competing industries from India. Firms may also react to import competition by investing in improvements in productivity. The latter would raise the demand for labor, ceteris paribus. Currie and Harrison (1997) find evidence that firms in some sectors in Morocco did respond to trade liberalization in this manner.

How changes in labor demand impact workers depends also on the nature of competition in labor markets. When they are competitive, industry elasticities of labor demand and supply determine

the extent of movement in employment and wages. On the other hand, labor market imperfections introduce yet another layer of complexity. When workers have bargaining power, for example, it is quite likely that they will use this to share in the rents created by protection. Trade liberalization may then be expected to hurt workers as rents overall decline. But the actual responses will depend on specific circumstances. Workers may choose to maintain employment and accept lower wages. But the opposite may also take place as when lay-off rules benefit senior workers so that senior workers push for higher wages at the expense of unemployment of junior workers (Grossman 1984).

As the foregoing discussion indicates, there are a number of factors that influence trade-labor linkages. Empirical evidence is ultimately needed to determine which channels are, or at least appear to be, the more relevant ones.

2.2 Trade liberalization in the Philippines[2]

Like many other developing countries, the Philippines pursued protectionist policies from the 1950s to the 1970s. Although there were some attempts at liberalizing trade in the 1960s and 1970s, it was only in the early 1980s that a serious effort at liberalization was initiated. Two key aspects of the liberalization package were a Tariff Reform Program (TRP) that entailed compression of the tariff rate structure from a 0% to 100% range to a 10% to 50% range from 1981 to 1985 and an Import Liberalization Program (ILP) for lifting quantitative restrictions on imports. The latter was abandoned, however, in 1983 due to a balance-of-payment crisis. It was resumed once the Aquino government came to power in 1986 where it achieved far more success. While 34% of the total number of Philippines Standard Commodity Classification lines were regulated in 1985 – only two percentage points less than that in 1980, this was down to 12% by 1988 (Medalla, 1990).

[2] A detailed discussion of trade policy reforms in the Philippines may be found in Manasan and Querubin (1997).

In 1991 the government enacted a second tariff reform program (the so-called TRP II) whereby tariff rates would be further compressed to a 10% to 30% range. However, there were a number of exceptions granted so that about 10% of commodity lines in 1995 were still subject to tariff rates below 10% or between 30% and 50%. There was also a liberalization of quantitative restrictions in 1992 for a variety of imported agricultural and manufacturing goods. In a number of cases, the tariff rates on the liberalized goods were set fairly high with a built-in five-year phase down of these tariff rates. The tariffication process saw some reversal, however, with the re-imposition of quantitative restrictions in 1993 on various items, largely concentrated among agricultural goods. The result was that while only 164 commodities were subject to quantitative restriction by the end of 1992, the number had increased to 257 by 1993.

A third wave of trade reforms took place in the mid-1990s (TRP III). Measures included a reduction of tariff rates on a variety of manufacturing items including capital equipment and machinery, textiles, garments, and chemical inputs among others. There was also some reduction of tariffs on "non-sensitive" agricultural goods. Overall, the TRP III was aimed at developing a 4-tier tariff schedule: 10% or 3% for raw materials and capital equipment depending on whether these were available locally or not; 20% for intermediate goods; and 30% for finished goods. There was also a liberalization of all import restrictions as a result of the need to comply with WTO commitments; some products were however allowed to have tariff rates above the ceiling of 30%.[3]

The result of the various trade liberalization measures has made the Philippines a far more open economy, especially insofar as the manufacturing sector is concerned. Calculations by Manasan and Querubin (1997) and Manasan and Pineda (1999) reveal that effective rates of protection were reduced overall by half (29.4% in 1990 versus 14.4% in 2000). Even larger declines in protection took place in

[3] Recent reform measures have declared the intension of reducing tariffs across all sectors to 5% by 2004, with the exception of sensitive agricultural commodities (e.g., rice corn, sugar, selected vegetables, poultry, livestock, and meat products, etc., World Bank 2000).

manufacturing (31% in 1990 versus 14.5% in 2000). Greater openness is also seen in expanding trade flows. While total exports had grown at an annual average rate of 4% in the 1980s, they grew at about 16% in 1990-98. The result of this export boom has been to double the Philippines' export share in world markets from around 0.3% in 1985 to 0.6% in 1998. Manufacturing has been the main contributor to this export boom (World Bank, 2000).

3 Data and Trends

Our analysis of trade-labor linkages makes use of three data sets: trade related data which allows us to quantify the patterns of protection and trade flows across industries; production data which allows us control for industry specific characteristics, namely the capital-labor ratio; and finally the Philippines Labor Force Survey (LFS) data which provides information on workers.

Our trade related data consists of a measure of average tariff rates and trade flows (imports and exports) for roughly 28 three-digit ISIC manufacturing industries and comes from the Trade and Production database developed by Nicita and Olarreaga (2001).[4] The original source of the tariff data is the TRAINS database maintained by UNCTAD. Because tariffs are reported in terms of the six digit HS classification, Nicita and Olarreaga use a one-to-one concordance table to arrive at tariff rates in terms of the three-digit ISIC classification.[5] They report the tariff as MFN simple averages at the 3-digit level of the ISIC. Table 1 reports the average tariff rates for the available years.[6] The table

[4] While average tariff rates are imperfect measures of protection, we are forced to rely on these because of the lack of availability of other measures, such as effective rates of protection, at sufficiently high levels of disaggregation.
[5] UNCTAD calculates the simple averages using as the denominator only the actual number of dutiable lines
[6] One drawback of our tariff data is that we are missing tariff rates for 1991 and 1997. As noted below, our industry wage premiums are based on LFS data from 1988, 1991, 1994, and 1997. Thus we need to obtain tariff rates for 1991 and 1997 in some way. Using the available tariff information from 1988 to 1998, we use simple interpolation to get tariff estimates for these two years. Interpolation for 1991 should not entail much error. As Table 1 shows, tariff rates between 1990 and 1992 were fairly similar. Moreover, the literature on trade policy in the Philippines does not give us any reason to believe that there was a spike in tariff rates between these years. The situation for 1997 is a little different since tariffs had changed between 1995 and 1998 and interpolation may not capture the actual year-by-year changes well. We derive comfort, however, from the fact that actual tariff rates declined between 1994 and 1997 for the more aggregated industry groups

confirms two aspects of the trends in protection described in the previous sub-section: the broad based reduction in protection in manufacturing over the 1990s plus the tendency for tariff rates to increase just after the "tariffication" of quantitative restrictions in 1992.

Interestingly, the data also indicate a tendency for protection to be higher in industries generally thought to be more labor intensive, a pattern which is similar to that found in a number of other developing countries (Harrison and Hanson, 1999). Thus in 1988 tariff rates in industries such as electrical and non-electrical machinery, transportation equipment, and chemicals were often more than 20 percentage points lower than those in industries such as apparel and footwear. Given this initial pattern of protection, the move to harmonize tariff rates at lower levels meant that previously protected labor intensive industries saw large declines in protection (Figure 1). At the same time, while absolute differences in tariff rates across industries came down by 1998, the relative structure of protection appears not to have changed too much (Figure 2).[7]

We also use trade flow data to examine how imports and exports are related to industry wage premiums and employment.[8] Among other things, this allows us to indirectly assess the impact of non-tariff barriers since these are likely to impact trade volumes. Table 2 describes three statistics based on our trade flow data by industry for the two end-points of the period under analysis: exports as a share of total exports, imports as a share of total imports, and finally net exports as a proportion of total industry trade, or the net trade ratio, $([X_i - M_i]/ [X_i + M_i])$.[9] The pattern of net trade ratios tends to conform to expectations: industries generally considered to be labor intensive are the ones with relatively high values of net trade ratio (for example, apparel and footwear). However, the comparison

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reported in Manasan and Querubin and that our tariff rates for 1994 (actual) and 1997 (interpolated) are qualitatively similar.

[7] Spearman correlations between tariff rates in 1988 and 1998 were as high as 0.91.

[8] The trade flow data reported by Nicita and Olareagga are based on the COMTRADE database. Because the COMTRADE data are presented in terms of the SITC rev. 2 classification, Nicita and Olarreaga use concordance filters developed by the OECD to convert them into ISIC classification.

[9] When a group of products is imported but not exported, the value of the net trade ratio is -1. On the other hand, when a group of products is exported but not imported, the net trade ratio is 1.

of export and import shares over time also shows that there has been a remarkable expansion of trade in non-traditional exports. Thus, while apparel – the industry with the highest net trade ratio – had a virtually unchanged export share in 1988 and 1997, electrical machinery – an industry with a negative net trade ratio - has seen a larger than four fold increase in its export share over time so that by 1997 almost half of all manufacturing exports were accounted for by this industry.[10]

The production related variables contained in Nicita and Olarreaaga (2001) are drawn from UNIDO's International Yearbook of Industrial Statistics and include at the three digit ISIC level, total output, total employment, and gross fixed capital formation. Data on output are used in conjunction with trade data to compute export and import ratios while the gross fixed capital series are used to construct measures of the capital stock in each industry. [11] Dividing capital stocks by total employees gives us a measure of the capital-intensity of each industry, a variable we use in our analysis below.

Our labor force survey (LFS) data cover four years: 1988, 1991, 1994, and 1997. The LFS data provide demographic and work ("job" or "business") related details including age, gender, highest grade achieved, salary/wages and net receipts from employment and hours worked.[12] The reference period of work related information is the quarter running from July 1 to September 30 and is available for a respondent's "primary" job as well as a "secondary" job if applicable.

For our analysis we restrict our attention to individuals who were 15 years or older, worked in the reference quarter, and whose primary job entailed wage or salaried work of at least 35 hours per week on average over the quarter. We divide total wage and salary earnings on the primary job for the quarter by the total number of hours worked on the primary job in order to arrive at individual's hourly

[10] The rapid increase in these exports can be traced to an increase in investments by multi-national corporations in the sector, especially semi-conductors, and the rapid increase in world trade in this sector (World Bank, 2000).

[11] We first express the capital formation series in 1997 US dollars. We then sum the current plus four previous year's real investment expenditures to arrive at a measure of capital stock. We allow for 10 percent depreciation in the capital stock each year.

[12] While the LFS is a quarterly survey, only the survey for the third quarter asks information on wages. The sample size of these LFS surveys is quite large and can cover about 100,000 individuals per year.

wage rate.[13, 14] Deflating these hourly earnings by the national CPI gives us real wages in 1997 pesos. Table 3 presents summary statistics of the sample of these wage and salary workers.[15] Real wages in the sample have grown by around 1.2% per annum over the 9 year period covered. The average age of workers has been around 33-34 year with around 61-62% being male. The average years of education, which increased from 10.06 years in 1988 to 10.50 years in 1997, is fairly high by developing country standards. The increase in years of education is reflected in a decrease in the percentage of workers with "only primary education or less" and an increase in the percentage of workers with a "high school degree" or more. Around 17 to 19 percent of wage and salary workers in the sample belong to the manufacturing sector.

Table 4 presents summary statistics for the manufacturing sample and the non-tradeables sample (construction, utilities, and services) separately. It also presents some measures of dispersion for real wages. Importantly, wage inequality, which tends to be lower in the manufacturing sector, has declined in the manufacturing sector in terms of a number of measures of dispersion. Wage inequality has also declined in the nontradeable sector, but often only marginally. Consider the difference between the 90^{th} percentile and 10^{th} percentile wages over the 1988 and 1997 period. These decreased by 0.066 log wage points in the manufacturing sector while the corresponding figure in the non-tradeables sector was a decline of 0.005. In similar fashion, while the Gini coefficient on wages declined from 0.358 in 1988 to 0.321 in 1997 in the manufacturing sector, the corresponding figures for the nontradeables sector were a decline from 0.419 to 0.409.

[13] It may be noted that only about 2.15% of the workers with a wage/salaried primary job also reported a wage/salaried secondary job. For the "full time" workers we deal with, this is naturally much lower, less than 1%.

[14] An examination of the reported earnings and hours worked suggested the need for some data cleaning procedures. We deleted observations which yielded hourly wage rates below one peso and above 500 pesos. In addition, a small number of observations reported normal working hours per day in excess of 24 hours. These observations were also deleted. Finally, individuals reporting between 16 and 24 hours of work were recoded to 16 hours.

[15] The LFS data available to us did not include a consistently defined set of sample weights across years. Thus we could not use sample weights in our analysis.

What appears to be driving these results is the fact that wage growth was almost equally high at the low (10^{th} percentile) and high (90^{th} percentile) ends of the wage distribution in the non-tradeables sector. In the manufacturing sector, however, they were almost twice as high in the low end of the wage distribution as compared to the high end. These statistics reveal a pattern of wage adjustments over a period of liberalization that are very much at odds with those typically found for previous studies from Latin American countries. For example, Feliciano (2001) reports increasing inequality in the tradeables sector in Mexico driven by rapid growth of the highest wage earners and declines in wage growth of the lowest wage earners.

Next, we turn to examining the sample worker characteristics across industries within manufacturing by matching the industry-level trade data with workers' industry of employment. Table 5 presents various summary statistics by level of protection in 1988. Industries with the lowest tariff rates (33 percentile or less of the tariff distribution) on average paid the highest wages, had the highest share of educated workers but accounted for the lowest share of employment[16]. In contrast, sample industries with tariff rates in the highest $1/3^{rd}$ of the distribution on average paid the lowest wages, employed the largest share of females, and had the lowest share of workers with more than a high school education. Thus, protection as captured by average tariff rates, tended to be lower for relatively skill intensive industries. If trade liberalization was aimed at reducing both average tariff levels and the variance in tariff rates across industries, relatively less-skilled intensive industries would be subject to the largest declines in protection. Columns 3-6 of Table 5 which present sample worker characteristics by the degree of reduction in average tariff rates between 1988 and 1997 shows that is this precisely what happened. Thus, industries in the upper third of the tariff reduction distribution had

[16] This is the case regardless of whether we define employment on the basis of the LFS surveys or use instead the figures on employment reported in the industrial production database.

on average in 1988, the lowest wage rates and the lowest share of workers with more than a high school degree (and largest share of females).

4. Econometric Analysis

The fact that relatively less-skill intensive industries faced large declines in tariffs suggests that all else being the same, trade liberalization should have affected less skilled workers more adversely than others. Our econometric analysis below sheds light on whether this was the case.[17]

We examine the impact of trade liberalization on relative industry wages using a two-step procedure as in Gaston and Trefler (1994), Feliciano (2001), and Goldberg and Pavcnik (2001). In the first stage, we estimate a commonly used variant of the Mincerian earnings equation for each year of data separately:

$$\log(w_{ijt}) = \alpha + \beta_t \cdot X_{ijt} + \gamma_{jt} \sum_j Ind_{ijt} + \varepsilon_{it} \qquad (1)$$

where i, j and t index individuals, industry of employment, and time, w represents real hourly wages, and X represents a vector of individual characteristics which include age, age squared, five education dummies, and dummies for male, marriage status, and household head. Also included in X are a dummy for whether a worker deems his/her job to be "permanent" (i.e., work that had lasted or expected to last for 1 year or longer) so as to capture some element of job informality and region dummies to control for region specific factors influencing wages, including variations in cost of living.

Industry dummies (*Ind*) are included to capture industry wage premiums. In order to facilitate interpretation in the subsequent analysis of industry wage premiums, we do not omit any industry in the estimation of equation 1. The dummy variable "trap" is instead avoided by estimating equation 1

[17] We drop three industries from our econometric analysis because they have less than ten observations in any of our four LFS years (miscellaneous petroleum products; non-ferrous metals; and professional and scientific equipment). The estimated industry wage premiums for these industries could be more susceptible to biases on account of outliers.

by imposing the constraint, $\theta_t \gamma_t = 0$, where θ_t represents the vector of share of employment by industry and γ_t represents the vector of coefficients on the industry dummies (or industry wage premiums). The industry wage premiums so computed have the property that they now represent deviations from the average wage across all industries rather than the usual differential wage with respect to the omitted industry.

In the second stage, the estimated industry wage premiums are pooled across years and combined with trade and industry data in order to estimate the impact of trade on wages:

$$\gamma_{jt} = \pi_1 P_{jt} + \eta_1 T_{jt-1} + \kappa_1 Z_{it} + \delta_1 Y_t + \phi_1 I_j + e_{jt}. \quad (2)$$

P_{jt} represents trade policy and is captured by average tariff rates while T_{jt-1} represents measures of imports and exports (lagged in order to alleviate endogeneity concerns). The latter are included, following Goldberg and Pavcnik (2001), in order to control for factors that may effect both wages and trade policy. Since such factors may well effect trade flows, including measures of these as regressors presents a way to check the robustness of the estimated relationship between trade policy and industry wage premiums. Z_{jt} represents observable industry level characteristics such as the capital-labor ratio. Year dummies Y_t capture macroeconomic shocks that may independently influence wage premiums and RHS variables such as tariff rates. Industry dummies I_j are included to control for unobservable time-invariant industry specific characteristics and thereby explore the relationships in the "within" dimension. In order to account for the fact that our dependent variable has been estimated, we estimate equation 2 using the inverse of the estimated variance of industry wage premiums as weights.

When we want to estimate the impact of trade on employment across industries, we follow a similar approach and estimate the following employment equation:

$$\ln(L_{jt}) = \pi_2 P_{jt} + \eta_2 T_{jt-1} + \kappa_2 Z_{it} + \delta_2 Y_t + \phi_2 I_j + \xi_{jt}, \quad (3)$$

where L_{jt} represents total employment as reported in the production database of Nicita and Olarreaga (2001). Year dummies capture the effects of economy-wide demand and supply shifters while industry dummies control for unobservable industry characteristics as in equation 2 above. To examine whether trade has affected average hours of work instead, we simply substitute total employment with average hours worked over the quarter obtained from LFS data.

4.1 Earnings Function Estimates

Table 6 describes the estimates of earnings functions (equation 1) for the four years for which we have LFS data. As is typically found in studies of this type, age (our proxy for experience) enters positively while its square enters negatively; men earn more than women, although this effect tends to decline over time; heads of households and married individual earn more; and those in jobs expected to last a year or longer earn more.

The estimated coefficients on the education dummies indicate substantial returns to college education. This can be seen in terms of Figure 3, which plots the estimated percentage differential between a given level of education and the omitted educational category.[18] The vertical distance between any two adjacent levels of education also gives us a sense of the marginal value associated with the higher of the two levels of education. For all but the highest level of education, these vary between around 0.10 to 0.25. For the highest level of education, they are much larger (between 0.75 and 0.95). Admittedly, it is possible that unobservable worker characteristics such as natural ability or family background lead our estimates of returns to education to be biased. Thus, for example, a finding of high returns to higher education may reflect the selection of high ability individuals into

[18] The estimated coefficients on the education dummies are converted into the percentage differential in earnings relative to the reference group (those who have not even completed primary education) as: $\left[e^{b_{vt}} - 1\right]$ for the various education levels v.

college thereby overstating the true gains from higher education. However, our interest is not so much in the returns to education themselves. Instead it lies in how the returns to education have evolved over the period of Philippines' reforms. As long as economic reforms did not effect the selection criteria used by individuals in deciding on the level of desired educational attainment it is possible to get a sense of the true evolution of returns to education by comparing the wage differentials associated with the various levels of education over time.

The estimated returns to the various levels of education do not show a clear trend over time. Returns to the highest level of education decline between 1988 and 1991, spike up in 1994 and then decline once again in 1997. For all but the highest level of education, returns first increase mildly between 1988 and 1991 (1994 in the case of the second highest level of education); then they decline.

The absence of a secular increase in returns to education is quite different from what is typically reported for Latin American countries. While the latter studies find large increases in the returns to higher education over the periods in which trade liberalizations were undertaken, we see no trend towards this effect in our data. Indeed, focusing on the longer 1988 and 1997 comparison, we find that the returns to college education have declined relative to every other educational category. Of course, without further analysis it is not possible to say that it was trade per se which led to this. Nevertheless, we highlight this finding because it is one that contrasts with patterns observed elsewhere.

4.2 Industry Wage Premiums and Trade

As noted above, the coefficients on the industry dummies obtained from equation 1 are our estimates of industry wage premiums.[19] The wage premiums are found to be generally low in apparel, footwear,

[19] The correlations of these premiums across the four sample years are typically fairly high – between 0.81 and 0.84 – for 1988, 1994, and 1997. The correlation between premiums in 1991 and each of the other three years is lower – between

food, leather and wood products – all labor-intensive industries. They tend to be high in petroleum refining, industrial chemicals, electrical machinery, and transport equipment – all capital intensive industries. This can formally be seen from Table 7 which presents simple correlations between estimated wage premiums and various industry level characteristics, including capital labor ratios and tariff rates, for 1988. The correlation between wage premiums and the log of the capital by labor ratio is 0.80 or higher.[20] Similarly, industries with a higher share of skilled workers (i.e., with some college education or more) tend to have higher wage premiums. These correlations are consistent with findings for other countries whereby capital/skill intensive industries have the highest wage premiums (see, for example, Dickens and Katz, 1987 for the US and Moll, 1993 for South Africa).

As in the case of the US, wage premiums are inversely correlated with tariff rates so that trade protection is higher in lower wage industries (Gaston and Trefler, 1994 and 1995). But unlike the US, greater export orientation in terms of higher export ratios and net trade ratios are associated with lower wage premiums (significantly so in some cases). Thus as the analysis of Section 3 using industry level data alone indicated, protection seems to have been larger in industries which the Philippines would be thought to have a comparative advantage –i.e., in the less capital/skill intensive industries. The positive correlation between employment levels and tariff rates (last row) may suggest why this was so. Policymakers may have been trying to protect industries with the largest levels of employment.

How did the removal of protection effect workers? The estimates of equation 2, described in Table 8, shed light on this. In a model without industry fixed effects or industry characteristics, the coefficient on tariffs is negative and statistically significant (column 1). The estimated coefficient on tariffs implies that a one-percentage point decline in tariffs is associated with a 0.9 percentage point increase in the industry wage premium. A 20 percentage point decline in tariffs – the difference

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0.38 and 0.55. This is partly driven by a premium for petroleum refining which is relatively low in 1991 as compared to the other years. Excluding this industry from the analysis did change results in any significant way, however.

[20] The correlations for other years are similar and not reported.

between some of the highest and lowest tariff rates across industries – would then be associated with a 18 percentage point gain in the industry wage premium.

Adding regressors which relate to trade flows does not change the relationship between tariffs and industry wage premiums (columns 2 and 3). The estimated coefficients on the import and export terms, introduced with a one-period lag to alleviate endogeneity concerns, are consistent with the bivariate correlations so that more export-oriented industries tend to have lower wage premiums and vice versa (though only one of the estimated coefficients relating to the various import and export terms is significant at the 10 percent level).

The negative relationship between tariffs and wage premiums should not be taken to indicate that trade liberalization will lead to higher wages. After all tariff rates are not set randomly across industries and thus the estimates just presented are potentially biased. Consider, for example, a situation where political economy considerations drive policymakers to consider industry characteristics in setting tariff rates. Policymakers may aim to protect labor-intensive industries and/or industries with large levels of employment as noted above. Since such industries also have low wage premiums, tariffs would enter the wage premium equation with a negative coefficient, but this coefficient would suffer from omitted variable bias.[21] There are two ways of dealing with this bias. We can either include the pertinent industry characteristics as regressors and/or we can include industry fixed effects in estimation if we are not confident that our included industry characteristics are capturing the key (time-invariant) factors that determine trade policy. The latter strategy would be important if, for example, unionization of a sector – something we have no information on - is a slow

[21] Interestingly, the negative effect of tariffs on wage premiums would have been larger – almost two times as large – had we estimated wage premiums based on a first stage regression of log wages on industry dummies alone. Thus as pointed out by Gaston and Trefler, ignoring worker characteristics in an analysis of industrial wages and trade can exaggerate the relationship between trade and labor market outcomes because to some extent workers are sorted across industries on the basis of such observable characteristics as education, age, and occupation. Since trade and trade policy are not uniform across industry, there is potential for some endogeneity between worker characteristics and trade.

to change characteristic of industries and an important determinant of both wage premiums and trade policy.

Introducing industry characteristics makes the coefficient on tariff rates smaller in absolute size; it also makes the coefficient statistically insignificant at the ten percent level. This is shown in columns 4-6 where the log of the capital by labor ratio is included as an additional regressor. The various trade related variables also lose whatever significance they had. Switching to industry fixed effects has an even more dramatic effect (columns 7-9). The coefficient on tariffs becomes positive in every specification so that a lowering of tariff rates is associated with a decline in wage premiums. But the effects have very small t-statistics. Taken together, the estimates of columns 4-9 suggest that the estimates of columns 1-3 suffer from omitted variable bias and that trade liberalization has in fact had little impact on wage premiums across industries.

It is fairly common to find that trade liberalization has had only modest effects on wages (see, for example, the survey by Harrison and Hanson, 1999). The results above appear to be in line with these other studies.[22] At the same time, however, reductions in protection may have more of an impact on wages of certain types of workers or industries even if their effects are limited on average.

First, trade liberalization may have affected wage premiums differently for various types of labor. For example, trade liberalization may have altered production methods thereby affecting the relative demand for skilled and less skilled workers. Indeed, results from trade-labor studies of Latin American countries have typically stressed the role of trade liberalization in raising the relative demand for skilled workers by introducing skill-intensive methods of production. Alternatively, as Feliciano (2001) notes it is possible that the bargaining power of workers varies by skill level. Thus in

[22] Due to the unavailability of information on non-tariff barriers to trade we cannot assess their impact directly. But in view of the fact that non-tariff barriers and changes therein may well be reflected in terms of imports and exports, the insensitivity of wage premiums to our various trade related variables suggests that trade liberalization in general did not impact wage premiums significantly.

Table 9 we present the results of wage premium equations for two groups of workers, skilled workers (those with more than a high school degree) and less skilled workers (those with a high school degree at most).[23] Industry dummies are always included. None of the estimates on tariff rates are significant in either equation. If anything, the fact that all the tariff coefficients for the skilled workers' equation are positive while those for less skilled are essentially zero or even slightly negative is suggestive of the possibility that trade liberalization in the Philippines, unlike that in Latin American countries, put some pressure on skilled workers wages.

Second, the effects of trade liberalization on wage premiums may be influenced by broad industry characteristics such as capital intensity. For example, it is likely workers are better organized/have greater bargaining power in capital-intensive industries. Firms tends to be larger in capital intensive industries and workers are likely to be better organized in large firms. Additionally, unionization is typically less effective the more competitive an industry. Since barriers to entry are likely to be higher in capital intensive industries, especially in a developing country, these may be the ones with a more inelastic product demand curve and hence a more inelastic labor demand curve. The latter enables unions to be more effective in winning wage increases without exacerbating employment losses, thereby encouraging union activity. The reduction of trade protection may therefore adversely affect workers in capital intensive industries since these are the industries in which workers would have been able to enjoy a portion of protection related rents.[24]

To examine whether there is any evidence for workers in capital intensive industries to be affected adversely by declines in trade protection, we interact tariff rates with the log of the capital-labor ratio in estimating the wage premium equations. Table 10 presents the results. The interaction

[23] The two sets of wage premiums are based on separate earnings functions.

[24] Although data on unionization by three (or even two) digit industry is unavailable, Dejillas's (1994) study of trade union behavior in the Philippines and discussion of the membership profile of the FFW, one of the largest trade unions in the Philippines, suggests that workers in more capital-intensive industries may have been more organized in the 1980s.

term is positive and significant at the 10 percent level in columns 1and 2 and marginally so in column 3. This indicates that in the more capital-intensive industries, trade liberalization did lead to declines in wage premiums. At the 75th percentile value of the capital by labor ratio (2.40), for example, a one-percentage point decline in tariffs is associated with a 0.61 percentage point decline in the wage premium in terms of the estimates of column 2 ($d\gamma/d$ *tariffs* = 100* [0.0022 + 0.0016 * 2.40]). The associated F-test is significant at the ten percent level. Estimating wage premiums for skilled and less-skilled workers separately and repeating the analysis reveals that the decline in wage premiums as a result of tariff reductions is stronger among skilled workers. For example, evaluated at the 75th percentile value of the capital by labor ratio, the marginal effect of tariffs on wage premiums is 0.0084 (and significant at the ten percent level) in column 5 versus 0.0063 (and insignificant) in column 7.[25] This suggests that skilled workers in capital intensive industries faced greater downward pressure on their wages as a result of trade liberalization.

4.3 Employment and Trade

We now turn to the relationship between employment and trade. We examine this relationship by regressing employment by industry on tariff rates and various trade flow measures as in equation 3. Without the inclusion of industry effects, tariff reductions are found to be associated with reductions in employment.[26] However, since this result may be driven by the fact that tariff rates have been higher in industries with larger employment (see the relevant correlation in Table 7), we introduce industry effects to check on whether the relationship between tariffs and employment remains positive in the "within" direction. Table 11 describes the results when both industry effects as well as an interaction

[25] A similar pattern emerges when the capital by labor ratio is interacted by imports in levels. Thus, higher imports put downward pressure on wage premiums, especially among the higher skilled.
[26] We do not report the results in order to conserve space.

term between tariff rates and the capital-labor ratio are included in estimation.[27] Although the interaction term between tariff rates and the capital-labor ratio are negative and significant in columns 1-3 (driven by the case of skilled workers as columns 4-6 reveal), the P-values relating to the marginal effect of tariffs indicate that in all cases tariff reductions are found to affect employment only weakly. Moreover, to the extent that there is a marginally significant relationship (columns 5 and 6), tariff reductions in relatively capital intensive industries are associated with slight *increases* in employment of skilled workers.[28] In addition, increases in imports, whether in terms of levels or as proportion of domestic output, are also associated with increases in the employment of skilled workers. These findings therefore suggest that trade did not adversely affect employment.

It is possible that trade effected employment not so much in terms of employee counts but rather in terms of the amount of hours worked. To examine this possibility we draw upon the LFS data and use average hours worked (for those working at least 35 hours a week on average over the reference quarter) in place of employee counts in equation 3. Table 12 describes the results for specifications in which industry fixed effects and an interaction term between tariff rates and the capital-labor ratio are included in estimation.[29] The P-values relating to the marginal effect of tariffs indicate that tariff reductions had no significant impact on average hours worked. This is true for all workers taken together (columns 1-3) as well as for skilled and less skilled workers considered separately (columns 4-6 and 7-9, respectively).[30, 31]

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[27] It may be noted that tariffs have an insignificant effect on employment (for all, skilled, and less skilled workers) in specifications without the interaction term between tariffs and the capital-labor ratio.

[28] The reported P-values are based on the 75th percentile value of the capital-labor ratio.

[29] As with employment, tariffs have an insignificant effect on average hours worked (for all, skilled, and less skilled workers) in specifications without the interaction term between tariffs and the capital-labor ratio.

[30] For less skilled workers reductions, the interaction term between tariffs and the capital by labor ratio is negative and significant indicating that a reduction in tariffs put upward pressure on hours of work in capital intensive industries (columns 7 and 8). As noted however the full effect of tariffs on hours worked (i.e., taking into account the direct tariff term as well as the interaction term) fails to be significant at conventional levels.

5. Concluding Remarks

The analysis of this paper suggests that trade liberalization has had fairly modest effects on both relative industry wages as well as employment. In particular, declines in average tariff rates and increases in imports have tended to leave industry wage premiums and employment unchanged. Nevertheless, not all groups of workers have been unaffected by liberalization. Workers in capital-intensive industries, especially skilled ones, saw their wages come under pressure from tariff reductions and increases in imports. Less-skilled workers in particularly capital-intensive industries on the other hand appeared to have to work longer hours as a result of tariff reductions.

The fact that less skilled workers more generally did not experience negative outcomes from tariff reductions is somewhat surprising because labor/less-skill intensive industries were the ones that started out with the highest tariff rates and where tariff reductions over the period under consideration tended to be the largest. Less skilled workers would be expected to face the brunt of liberalization in terms of the predictions of either the standard Heckscher-Ohlin model (via lower relative prices of labor intensive goods due to tariff reductions) or the specific-factors model (via greater import competition in labor intensive industries).

The fact that if anyone, it was the skilled workers in capital-intensive industries that were affected, suggests that influences other than ones emphasized by traditional trade models may have been at work. For example, it is quite possible that reductions in tariffs of labor-intensive industries did not hurt workers in these industries because firms were able to raise their productivity more easily. After all, the initial gap between best and domestic would likely to be the least in labor-intensive industries. Alternatively, workers in capital-intensive industries may have been better organized –

[31] The estimates of Table 12 also indicate that increases in imports (exports) were associated with greater (less) hours worked for skilled workers. The finding is not very robust however since import and export ratios – measures of trade which are less susceptible to endogeneity concerns - display little meaningful association with hours worked.

something for which there seems to be some (indirect) support. Thus they may have been able to extract better wages from their employers; trade liberalization would have put pressure on this rent related component of wages.

Of course, it remains possible that the average tariff rates we use as our measure of trade policy is more imperfect than we suppose. Although the relationship between (lagged) imports and relative wages and employment are in line with those of tariffs, one focus of future research should be on obtaining other measures of trade policy, including more direct measures of non-tariff barriers. This way, the robustness of our results can be tested. Future research should also consider obtaining data on union activities across industries. Finally, an interesting feature of our earnings functions estimates is that of stable/declining returns to higher education. While it represents another and more broad-based way that skilled workers were hurt during the period under consideration, it remains to be seen whether trade liberalization was a driving force.

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Figure 1. Tariff Rates in 1988 and the Reduction in Tariff Rates between 1988 and 1998

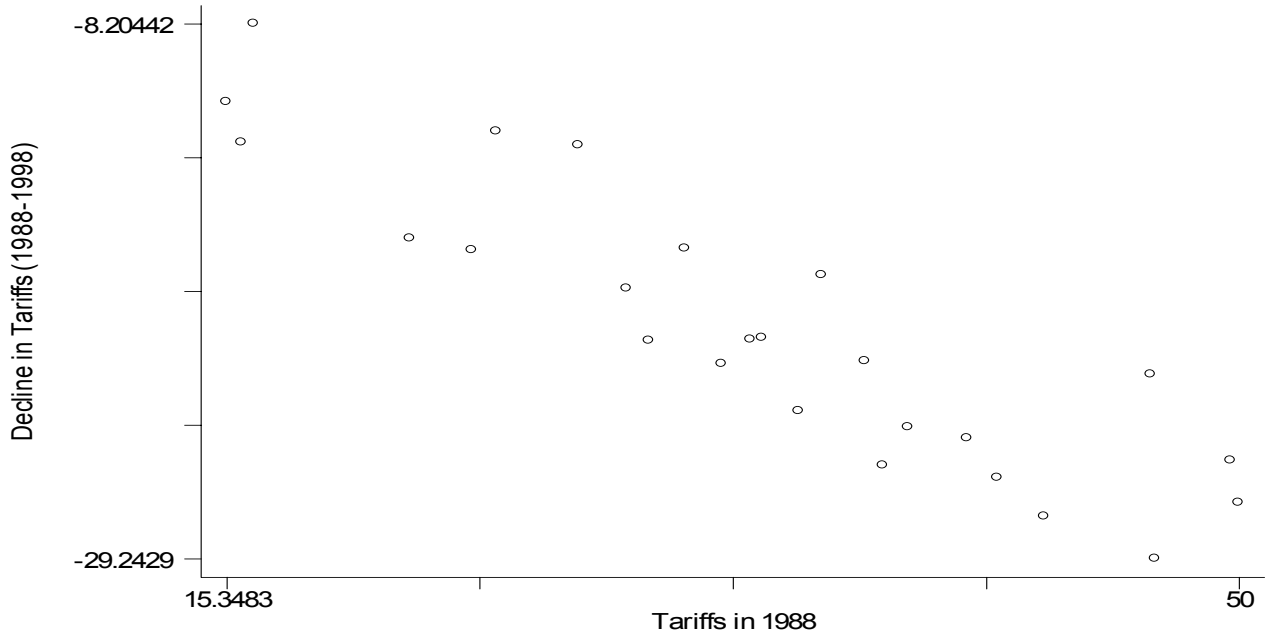

Figure 2. Tariff Rates, Year 1988-1998

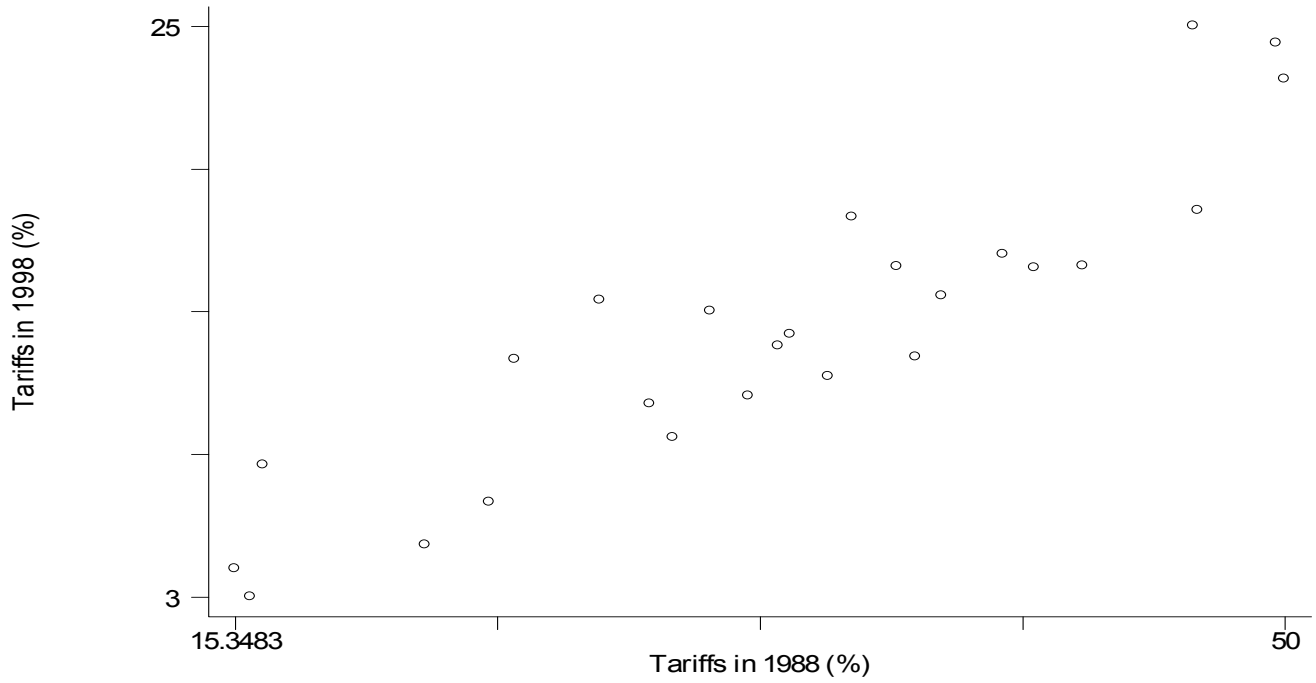

Figure 3. Percentage Differential Returns to Education, 1988 - 1997
(versus some or no primary education)

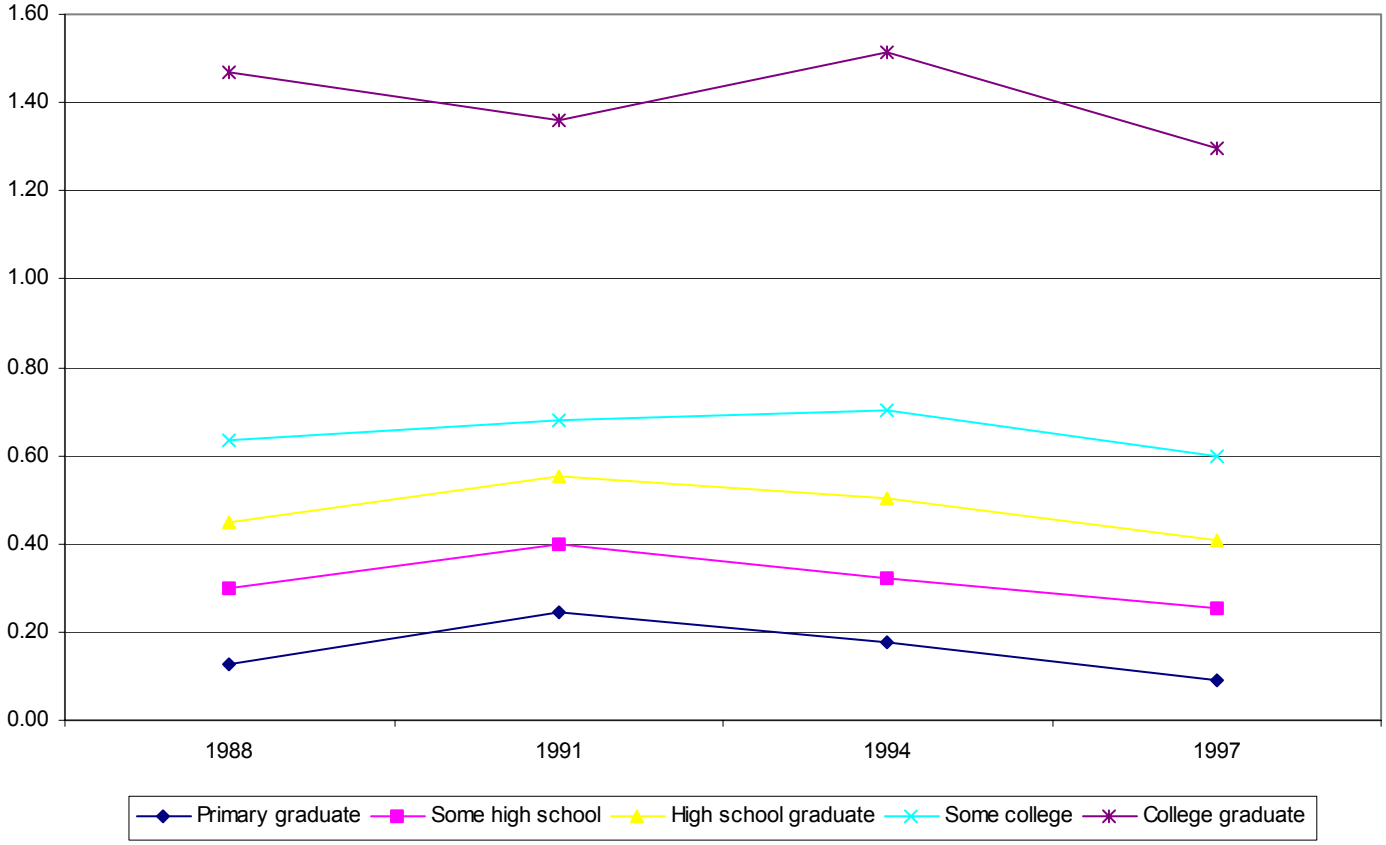

Table 1. Average Tariff Rates in the Philippines, 1988-1998

	Year							
Industry	1988	1989	1990	1992	1993	1994	1995	1998
Food Products	35.74	35.56	25.52	25.54	32.35	30.34	28.37	17.64
Beverages	47.14	47.14	29.05	29.05	43.81	42.14	40.48	17.90
Tobacco	43.33	45.00	27.50	27.50	42.50	42.50	42.50	15.75
Textiles	38.68	38.68	26.07	26.07	29.32	29.29	26.79	14.60
Apparel	49.73	49.73	29.88	29.88	49.16	48.91	30.51	24.34
Leather Products	33.30	33.30	23.26	23.26	32.32	32.21	30.72	12.66
Footwear	47.00	47.00	30.00	30.00	48.00	48.00	48.00	25.00
Wood Products	37.21	37.21	24.89	24.89	27.98	27.77	27.55	15.72
Furniture	50.00	50.00	29.13	29.13	40.00	34.57	29.13	22.96
Paper and products	32.31	32.39	19.75	19.76	22.73	21.41	19.21	10.73
Printing and Publishing	27.41	27.41	20.00	20.00	22.04	21.02	20.00	14.43
Industrial Chemicals	15.35	15.39	11.73	11.71	11.39	11.36	11.34	4.07
Other Chemicals	23.75	23.70	16.19	16.22	17.96	17.81	17.46	6.64
Petroleum Refineries	15.87	15.87	11.88	11.88	7.78	7.74	7.74	3.00
Miscellaneous Petroleum and Coal Products	20.00	20.00	19.13	19.13	17.88	17.88	17.88	7.25
Rubber Products	29.05	29.15	22.93	22.93	24.23	23.77	23.32	10.43
Plastic Products	41.75	41.75	27.06	27.06	33.66	31.52	29.41	15.68
Pottery China Earthenware	40.71	40.71	26.43	26.43	36.07	34.82	33.57	16.21
Glass and products	34.94	35.27	21.20	21.20	25.92	22.94	20.93	11.50
Other Non-metallic Mineral Products	33.69	33.69	23.42	23.42	29.60	26.91	27.03	13.13
Iron and Steel	16.29	16.23	14.34	14.34	15.53	15.00	14.88	8.09
Non-ferrous Metals	20.63	20.66	16.21	16.21	12.92	12.72	15.29	4.48
Metal Products	31.05	31.01	24.77	24.79	27.18	25.86	25.07	14.01
Non-Electrical Machinery	21.65	21.64	12.97	12.97	13.32	12.97	12.56	4.99
Electrical Machinery	29.81	29.81	19.27	19.31	20.06	18.97	17.93	9.15
Transport Equipment	24.59	24.83	17.68	17.63	17.58	17.22	15.30	12.16
Professional and Scientific Equipment	20.03	20.03	17.09	17.09	16.94	16.90	16.86	7.03
Other Manufactured Products	37.83	38.06	25.59	25.59	30.09	27.41	25.83	12.24

Source: Nicita & Olareagga (2001)

Table 2. Net Trade and Export and Import Shares

Industry	1988			1997		
	Net Trade Ratio	Share of Total Export	Share of Total Import	Net Trade Ratio	Share of Total Export	Share of Total Import
Food	0.25	0.25	0.10	-0.09	0.06	0.05
Beverage	-0.76	0.00	0.01	-0.76	0.00	0.00
Tobacco	-0.55	0.01	0.01	-0.63	0.00	0.00
Textiles	-0.25	0.06	0.07	-0.27	0.03	0.04
Apparel	0.97	0.07	0.00	0.93	0.08	0.00
Leather	0.20	0.01	0.00	0.30	0.01	0.00
Footwear	0.82	0.01	0.00	0.51	0.01	0.00
Wood Products	0.98	0.12	0.00	0.17	0.01	0.01
Furniture	0.98	0.03	0.00	0.65	0.01	0.00
Paper and Products	-0.76	0.01	0.03	-0.69	0.00	0.01
Printing and Publishing	-0.94	0.00	0.01	-0.87	0.00	0.00
Industrial Chemicals	-0.62	0.06	0.18	-0.79	0.01	0.07
Other Chemicals	-0.77	0.01	0.05	-0.74	0.01	0.03
Petroleum Refineries	-0.04	0.03	0.02	-0.33	0.01	0.01
Miscellaneous Petroleum and Coal Products	-0.48	0.00	0.00	-0.95	0.00	0.00
Rubber Products	-0.74	0.00	0.01	-0.72	0.00	0.01
Plastic Products	0.41	0.02	0.01	-0.36	0.01	0.01
Pottery China Earthenware	0.75	0.00	0.00	0.28	0.00	0.00
Glass and Products	-0.39	0.00	0.01	-0.62	0.00	0.01
Other Non-Metallic Mineral Products	-0.67	0.00	0.01	-0.90	0.00	0.01
Iron and Steel	-0.78	0.02	0.09	-0.93	0.00	0.04
Non-Ferrous Metals	0.40	0.08	0.02	-0.01	0.02	0.01
Metal Products	-0.51	0.01	0.03	-0.53	0.01	0.03
Non-Electrical Machinery	-0.88	0.01	0.12	-0.15	0.18	0.17
Electrical Machinery	-0.01	0.16	0.12	-0.04	0.47	0.36
Transport Equipment	-0.91	0.00	0.07	-0.66	0.02	0.08
Professional and Scientific Equipment	-0.81	0.00	0.01	-0.27	0.02	0.02
Other Manufactured Products	0.43	0.02	0.01	0.28	0.01	0.01

Table 3. Summary Statistics: Full-Time Workers

Variable	1988	1991	1994	1997
Average Hourly Wages, 1997 Pesos	18.83	20.55	20.98	23.98
(Standard Deviation)	(20.20)	(19.98)	(21.02)	(20.91)
Male (%)	62	61	61	62
Average Age	33.19	33.64	33.95	34.25
(Standard Deviation)	(11.75)	(11.83)	(11.96)	(11.91)
Average Years of Education	10.06	10.20	10.28	10.50
(Standard Deviation)	(4.19)	(4.16)	(4.04)	(4.01)
Education Distribution: (%)				
Below Primary Education	11.33	10.18	9.40	8.84
Primary Graduate	17.48	16.99	15.64	14.09
Some High School	10.99	11.36	11.07	11.06
High School Graduate	23.17	23.32	25.71	25.05
Some College	13.55	13.79	14.83	16.19
College Graduate	23.48	24.35	23.34	24.76
Married (%)	57	58	56	59
Employment by sector (%)				
Agriculture	11.12	9.72	9.06	7.00
Mining	1.07	0.80	0.57	0.79
Manufacture	17.54	19.34	18.92	16.80
Utility	1.16	0.97	0.97	1.17
Construction	7.13	8.43	8.46	10.69
Government	10.78	11.39	11.13	12.29
Services	51.20	49.35	50.90	51.27
Observations	14,647	18,826	19,005	29,611

Table 4. Worker Characteristics by Industry Type

	Non-Tradeables				Manufacturing			
Worker Characteristic	1988	1991	1994	1997	1988	1991	1994	1997
Average hourly wages	19.54	21.26	21.73	25.14	19.92	22.57	22.68	23.36
(Standard Deviation)	(21.22)	(19.91)	(22.27)	(21.66)	(19.28)	(22.97)	(19.41)	(19.06)
Average Age	33.59	34.08	34.43	34.84	31.32	32.05	31.79	31.31
(Standard Deviation)	(11.83)	(11.96)	(12.07)	(12.08)	(10.45)	(10.76)	(10.87)	(10.39)
Male (%)	57	57	58	60	63	60	61	61
Average Years of Education	10.77	10.87	10.84	10.99	9.59	9.81	10.05	9.97
(Standard Deviation)	(4.14)	(4.15)	(4.04)	(4.01)	(3.50)	(3.41)	(3.31)	(3.18)
Education (% of Workers in each sector)								
Below Primary Education	7.87	7.38	7.10	7.16	8.10	6.78	5.59	5.63
Primary Graduate	15.17	14.87	14.09	12.79	19.31	17.47	14.88	13.89
Some High School	10.32	10.91	10.71	10.66	12.96	11.84	11.38	11.50
High School Graduate	22.77	21.64	24.09	22.70	31.34	34.99	37.11	39.75
Some College	14.44	14.67	15.46	17.00	15.34	15.52	17.27	17.10
College Graduate	29.44	30.52	28.55	29.70	12.96	13.40	13.77	12.14
Dispersion of real wages								
Standard deviation of log wages	0.89	0.89	0.84	0.87	0.67	0.66	0.64	0.62
Gini coefficient	0.42	0.40	0.41	0.41	0.36	0.32	0.33	0.32
10th Percentile	3.44	3.79	4.5	4.92	6.53	7.84	8.15	8.65
90th Percentile	34.16	37.21	36.52	48.3	32.93	33.49	35.5	37.5
Observations	10,292	13,204	13,581	22,330	2,569	3,641	3,595	4,976

Table 5. Worker Characteristics in 1988 by Tariffs and Tariff Reductions

	Rank of Tariff in 1988			Rank of Tariff Reduction: 1997-1988		
Worker Characteristic	Lowest	Middle	Highest	Lowest	Middle	Highest
Average hourly wages, in 1997 Pesos	27.33	19.39	17.63	26.98	20	17.56
(Standard Deviation)	(24.35)	(17.64)	(17.78)	(26.71)	(19.97)	(14.91)
Male (%)	70	79	47	80	73	49
Average age	31.66	31.88	30.76	32.91	31.78	30.47
(Standard Deviation)	(9.56)	(11.02)	(10.28)	(10.07)	(10.88)	(10.15)
Average Years of Education	11.48	9.19	9.22	11.02	9.25	9.41
(Standard Deviation)	(3.28)	(3.61)	(3.27)	(3.54)	(3.62)	(3.28)
Education Level(%)						
Below Primary Education	2.66	10.64	8.07	4.93	10.73	7.01
Primary Graduate	7.51	21.81	21.61	10.68	20.85	20.87
Some High School	8.47	15.38	12.70	9.32	15.18	12.35
High School Graduate	29.78	27.19	35.16	27.95	26.82	36.06
Some College	26.88	12.43	13.46	24.66	13.87	13.52
College Graduate	24.7	12.54	9.00	22.47	12.55	10.18
Observations	413	949	1,189	365	988	1,198

Table 6. Estimates of Earnings Function
(Dependent Variable=log(real hourly wage))

Dependent Variable	1988	1991	1994	1997
Age	0.035***	0.016***	0.023***	0.035***
	(5.66)	(3.16)	(5.13)	(8.06)
Age Square	-4.0E-04***	-1.2E-04**	-2.0E-04***	-4.0E-04***
	(5.05)	(1.97)	(3.52)	(6.90)
Primary Graduate	0.120***	0.218***	0.163***	0.089***
	(2.71)	(5.48)	(3.85)	(2.52)
Some High School	0.261***	0.335***	0.278***	0.225***
	(5.43)	(7.86)	(6.29)	(6.18)
High School Graduate	0.370***	0.441***	0.409***	0.343***
	(8.49)	(11.50)	(10.26)	(10.51)
Some College	0.491***	0.520***	0.532***	0.468***
	(10.22)	(12.41)	(12.51)	(13.31)
College Graduate	0.903***	0.859***	0.922***	0.831***
	(18.15)	(19.75)	(20.75)	(22.22)
Male	0.165***	0.096***	0.054***	0.062***
	(5.81)	(4.16)	(2.50)	(3.38)
Head of Household	0.181***	0.181***	0.123***	0.168***
	(5.61)	(6.90)	(4.73)	(8.09)
Married	0.050*	0.030	0.085***	0.053***
	(1.74)	(1.30)	(3.72)	(2.84)
Permanent Job	0.193***	0.208***	0.144***	0.088***
	(5.90)	(7.45)	(5.69)	(4.33)
Constant	1.445***	1.937***	1.884***	1.908***
	(12.65)	(20.61)	(21.36)	(23.85)
R-Square	0.40	0.39	0.40	0.38
Observations	2551	3629	3565	4903

Note: Absolute t-statistics in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7. Correlation Matrix for Selected Variables, 1988

	Wage premium	K/L (log)	Skill/Less Skilled	Tariff rate	Net Trade	Export Ratio	Import Ratio	Employment (log)
Wage premium	1							
Log K/L	0.840	1						
	0.000							
Skill/Less Skilled	0.567	0.671	1					
	0.003	0.000						
Tariff Rate	-0.498	-0.694	-0.685	1				
	0.011	0.000	0.000					
Net Trade	-0.261	-0.466	-0.620	0.618	1			
	0.208	0.019	0.001	0.001				
Export Ratio	-0.360	-0.511	-0.634	0.380	0.772	1		
	0.077	0.009	0.001	0.061	0.000			
Import Ratio	-0.091	0.016	0.203	-0.450	-0.361	-0.029	1	
	0.665	0.940	0.330	0.024	0.077	0.893		
Log Employment	-0.334	-0.312	-0.364	0.350	0.179	0.055	-0.082	1
	0.103	0.129	0.073	0.086	0.392	0.793	0.697	

Table 8. Relative Wages and Trade Protection I
(Dependent Variable=Estimated Industry Wage Differentials)

Independent Variable	1	2	3	4	5	6	7	8	9
Tariff Rate	-0.009***	-0.006**	-0.008***	-0.004	-0.004	-0.002	0.000[A]	0.000[A]	0.000[A]
	(5.51)	(1.97)	(3.59)	(1.42)	(1.43)	(0.80)	(0.04)	(0.24)	(0.27)
Log Lagged Real Import		0.016			-0.006			0.003	
		(1.50)			(0.63)			(0.21)	
Log Lagged Real Export		-0.019*			-0.006			0.015	
		(1.73)			(0.56)			(0.85)	
Lagged Import Ratio			0.020			0.013			-0.023
			(1.04)			(0.92)			(0.68)
Lagged Export Ratio			-0.025			0.033			0.027
			(0.67)			(1.05)			(1.14)
Log K/L				0.048**	0.053***	0.061***			
				(2.40)	(2.81)	(3.16)			
Industry Dummies	No	No	No	No	No	No	Yes	Yes	Yes
R-Square	0.293	0.339	0.303	0.388	0.404	0.415	0.823	0.825	0.825
Observations	100	100	100	100	100	100	100	100	100

Note: All regressions include year dummies. Absolute, robust t-statistics in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. [A] Absolute value of the estimated parameter is zero to the third decimal place.

Table 9. Relative Wages and Trade Protection II
(Dependent Variable=Estimated Industry Wage Differentials)

	Skilled Workers			Less Skilled Workers		
Independent Variable	1	2	3	4	5	6
Tariff Rate	0.003	0.003	0.004	-0.001	0.000 [A]	0.000 [A]
	(0.86)	(0.95)	(0.98)	(0.26)	(0.06)	(0.01)
Log Lagged Real Import		-0.023			0.012	
		(1.16)			(0.61)	
Log Lagged Real Export		0.041*			0.004	
		(1.88)			(0.20)	
Lagged Import Ratio			-0.029			-0.032
			(0.56)			(0.82)
Lagged Export Ratio			0.046*			0.024
			(1.90)			(0.73)
R-Square	0.705	0.719	0.711	0.796	0.798	0.798
Observations	100	100	100	100	100	100

Note: All regressions include year and industry dummies. Absolute, robust t-statistics in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. [A] Absolute value of the estimated parameter is zero to the third decimal place.

Table 10. Relative Wages and Trade Protection with Interaction Effects
(Dependent Variable=Estimated Industry Wage Differentials)

	All Workers			Skilled Workers			Less Skilled Workers		
	1	2	3	4	5	6	7	8	9
Tariff Rate	0.002	0.002	0.003	0.005	0.005	0.005	0.002	0.002	0.002
	(1.09)	(1.20)	(1.25)	(1.38)	(1.60)	(1.52)	(0.73)	(0.71)	(0.82)
Tariff Rate* Log K/L	0.002*	0.002*	0.002	0.002	0.002	0.001	0.002	0.002	0.002
	(1.78)	(1.73)	(1.61)	(1.30)	(1.60)	(1.19)	(1.58)	(1.57)	(1.39)
Log K/L	0.026	0.029	0.033	0.054	0.035	0.060	-0.007	-0.005	-0.001
	(0.77)	(0.77)	(0.92)	(0.89)	(0.53)	(0.98)	(0.17)	(0.12)	(0.03)
Log Lagged Real Import		-0.004			-0.031			-0.000	
		(0.28)			(1.29)			(0.01)	
Log Lagged Real Export		0.018			0.045**			0.004	
		(1.15)			(2.03)			(0.21)	
Lagged Import Ratio			-0.005			-0.014			-0.008
			(0.17)			(0.28)			(0.20)
Lagged Export Ratio			0.024			0.041*			0.016
			(1.09)			(1.68)			(0.49)
P value of F Test	0.11	0.10*	0.10*	0.13	0.07*	0.12	0.19	0.19	0.20
R-squared	0.84	0.84	0.84	0.72	0.74	0.73	0.81	0.81	0.81
Observations	100	100	100	100	100	100	100	100	100

Note: All regressions include year and industry dummies. Absolute, robust t-statistics in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. F test pertains to the null hypothesis that the marginal effect of tariff rates is zero. The marginal effect is evaluated at the 75th percentile value of the capital –labor ratio.

Table 11. Employment and Trade Protection
(Dependent Variable=log(Employment))

	All Workers			Skilled Workers			Less Skilled Workers		
	1	2	3	4	5	6	7	8	9
Tariff Rate	0.009	0.013	0.006	-0.005	0.002	-0.009	0.020	0.022	0.018
	(0.87)	(1.16)	(0.64)	(0.37)	(0.16)	(0.71)	(1.36)	(1.50)	(1.23)
Tariff Rate* Log K/L	-0.008***	-0.011***	-0.008**	-0.008*	-0.012**	-0.007*	-0.006	-0.008	-0.006
	(2.76)	(3.10)	(2.65)	(1.90)	(2.65)	(1.69)	(1.19)	(1.24)	(1.13)
Log K/L	0.268**	0.287**	0.257**	0.292*	0.340**	0.277*	0.230	0.231	0.221
	(2.19)	(2.39)	(2.01)	(1.85)	(2.16)	(1.68)	(1.31)	(1.24)	(1.24)
Log Lagged Real Import		0.127			0.239**			0.053	
		(1.31)			(2.02)			(0.46)	
Log Lagged Real Export		0.137			0.102			0.164	
		(1.23)			(1.03)			(1.19)	
Lagged Import Ratio			0.196			0.363*			0.108
			(1.28)			(1.72)			(0.72)
Lagged Export Ratio			-0.127			-0.147			-0.126
			(1.19)			(0.96)			(1.09)
P value of F Test	0.45	0.36	0.41	0.20	0.12	0.16	0.86	0.90	0.88
R-squared	0.94	0.95	0.95	0.91	0.92	0.92	0.93	0.93	0.93
Observations	100	100	100	100	100	100	100	100	100

Note: All regressions include year and industry dummies. Absolute, robust t-statistics in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. F test pertains to the null hypothesis that the marginal effect of tariff rates is zero. The marginal effect is evaluated at the 75th percentile value of the capital –labor ratio.

Table 12. Effects of Protection on Working Hours, All Workers
(Dependent Variable=log(Average Hours Worked Per Quarter))

	All Workers			Skilled Workers			Less Skilled Workers		
	1	2	3	4	5	6	7	8	9
Tariff Rate	-0.000	-0.000	-0.000	-0.001	-0.000	-0.001	0.000[A]	0.000[A]	0.000[A]
	(0.07)	(0.00)	(0.15)	(0.63)	(0.36)	(0.63)	(0.31)	(0.35)	(0.18)
Tariff Rate* Log K/L	-0.000[A]	-0.000[A]	-0.000[A]	0.000[A]	-0.000[A]	0.000[A]	-0.001*	-0.001*	-0.001
	(1.22)	(1.20)	(1.12)	(0.06)	(0.30)	(0.08)	(1.81)	(1.75)	(1.67)
Log K/L	0.011	0.012	0.010	0.011	0.015	0.011	0.019	0.019	0.018
	(0.88)	(0.93)	(0.82)	(0.79)	(1.06)	(0.74)	(1.18)	(1.15)	(1.10)
Log Lagged Real Import		0.003			0.011*			0.002	
		(0.37)			(1.79)			(0.27)	
Log Lagged Real Export		-0.005			-0.010*			0.001	
		(1.15)			(1.96)			(0.10)	
Lagged Import Ratio			0.005			-0.000			0.010
			(0.41)			(0.02)			(0.89)
Lagged Export Ratio			-0.008			-0.009			-0.006
			(1.02)			(0.85)			(0.67)
P value of F Test	0.35	0.36	0.35	0.67	0.64	0.67	0.23	0.23	0.22
R-squared	0.56	0.56	0.56	0.37	0.41	0.38	0.55	0.55	0.55
Observations	100	100	100	100	100	100	100	100	100

Note: All regressions include year and industry dummies. Absolute, robust t-statistics in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. F test pertains to the null hypothesis that the marginal effect of tariff rates is zero. The marginal effect is evaluated at the 75th percentile value of the capital–labor ratio. [A] Absolute value of the estimated parameter is zero to the third decimal place.