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Trade Liberalization and Wage Inequality in the Philippines

by

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Trade Liberalization and Wage Inequality in the Philippines*

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Abstract: We examine the role of trade liberalization in accounting for increasing wage inequality in the Philippines from 1994 to 2000—a period over which trade protection declined and inequality increased dramatically. Using the approach of Ferreira, Leite, and Wai-Poi (2007), we find that trade-induced effects on industry wage premia and industry-specific skill premia account for an economically insignificant increase in wage inequality. A more substantial role for trade liberalization comes through trade-induced employment reallocation effects whereby reductions in protection appear to have led to a shift of employment to more protected sectors, especially services where wage inequality tended to be high to begin with. Nevertheless, the key drivers of wage inequality appear to be changes in economy-wide returns to education and changes in industry membership over and above those accounted for by our estimates of trade-induced employment reallocation effects. In order for trade liberalization to account for a relatively large portion of the increases in wage inequality, it would have to be a major determinant of the changes in economy-wide returns to education.

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1. Introduction

An important insight from trade theory is that reductions in trade protection have distributional implications. Moreover, based largely on the logic of the workhorse Heckscher-Ohlin (HO) model of trade, conventional wisdom has held that trade liberalization leads to declines in income inequality in developing countries—i.e., countries abundant in unskilled/less skilled workers.¹ Recent empirical work has not been supportive of the conventional wisdom, however. As Goldberg and Pavcnik (2007) note in their survey of the literature, carefully conducted studies for Mexico, Colombia, Argentina, Brazil, Chile, India, and Hong Kong tend to show trade liberalizations in these economies to be closely associated with increases in various measures of inequality.² Various factors have been put forward to explain the apparent deviations from the predictions of standard trade theory including the possibility of skill biased technological change induced by trade, barriers to within-country factor mobility, and trade in intermediate products. It has also been noted that patterns of protection prior to liberalization, and differential degrees of liberalization across sectors could be driving some of the results one sees.³

As may be noted from Goldberg and Pavcnik's survey, much of the rigorous empirical work on the effects of trade on wage inequality has focused on the experience of various Latin American countries with a few contributions considering experiences from Asia. In particular, there is a dearth of evidence from Southeast Asian countries, especially the Philippines—an economy where merchandise trade as a share of GDP has grown rapidly: from less than 50% in 1990 to a little over 100% by 2000. Exceptions include the work of

¹ Because developing countries are typically presumed to be abundant in unskilled rather than skilled labor, trade liberalization in such countries may be expected to raise the relative factor price of unskilled labor.

² Note, however, the recent work of Ferreira, Leite, and Wai-Poi (2007) who find that trade liberalization in Brazil has helped reduce wage inequality there.

³ For example, it is typically assumed that developing countries are more likely to protect skill-or capital-intensive sectors. In reality, in a number of countries, trade protection is highest among labor-intensive sectors. As we will see below, this is also the case in the Philippines.

Lanzona (2000) and Hasan and Chen (2004).⁴ While the first uses a factor returns approach and uses data from 1989 to 1995 to understand how changes in export prices have affected wages of different types of workers and industries, the second examines the relationship between trade and industry wage premia (i.e., the portion of wages that are purged of workers' observable characteristics and accrue to their industry of employment alone) in the manufacturing sector from 1988 to 1997.

In this paper we analyze the relationship between trade liberalization and wage inequality in the Philippines in much greater detail than the Hasan and Chen study mentioned above. In particular, we use a comprehensive approach to capture trade liberalization-wage inequality linkages—that developed recently by Ferreira, Leite, and Wai-Poi (2007) and henceforth referred to as FLW. While details are provided later, some salient features of FLW's approach can be noted here. First, the approach enables us to work with wage inequality as it pertains to all workers and not just those in tradable sectors. Second, it enables us to quantify the extent to which trade liberalization has contributed to changes in overall wage inequality. Third, the approach not only allows trade liberalization to affect wage inequality through its influence on industry wage premia and industry skill premia (i.e., wages accruing to industry of employment for high skilled workers—proxied here by a college degree), but also through employment reallocation effects that then affect the wage distribution. Finally, FLW's approach allows us to consider the effects of economy-wide (as opposed to industry-specific) returns to education on wage inequality. While no attempt is made to establish how much of the changes in economy-wide returns to education are driven by trade per se, FLW's approach does give us some sense of upper and lower bounds on the effects of trade on inequality under varying assumptions about the relationship between economy-wide returns to education and trade.

⁴ A study by Orbeta (2002) uses two data sets for the manufacturing sector—one at the three digit level and covering the years 1993-1997 and another at the two digit level covering the 1980-1995—to examine the impact of changes in export and import volumes on employment across manufacturing subsectors. The study finds some support for a positive relationship between export volumes and employment levels.

Another way we in which we build over the existing (but limited) work on trade and wage inequality in the Philippines is by extending its analysis to more recent years. It is important to point out, however, that while our data allow us to examine the trade-wage inequality relationship all the way up to 2006 (something that we do), we focus most of our attention on the 1994-2000 period during which trade policy was liberalized dramatically. Examining these years in detail, as opposed to the longer 1988-2006 period has several advantages.

First, trade liberalization, as opposed to large expansions in FDI and/or outsourcing of services to the Philippines, represented the main channel through which the country experienced globalization during 1994-2000. As Figure 1 shows quite clearly, tariff rates declined considerably over these years, and trade volumes seem to have responded in the expected manner, while FDI inflows as a proportion of GDP remained relatively unchanged. Indeed, the share of merchandise trade in GDP increased from 56% in 1994 to 101% in 2000—the highest share recorded even as of 2008. Second, data from labor force surveys reveal that wage inequality increased considerably between 1994 and 2000—for example, the Gini coefficient over hourly wages increased from 36% to 41%. If trade liberalization is responsible for increasing wage inequality, as found in other countries, we would be well placed to find evidence for it by focusing on 1994-2000. Finally, and most importantly, as we shall describe below the wage data for 2006 raises some serious concerns about its comparability with earlier years. In particular, taken at face value the data for 2006 indicate that wages in all but the lowest decile group *declined* over 2000 and 2006, and rather precipitously for wages belonging to the top 3 decile groups. Such widespread declines over a period when the Philippines economy performed reasonably suggests some comparability issues between 2006 data and those from earlier years.⁵

One disadvantage with focusing on trade-wage inequality linkages between 1994-2000 arises on account of the Asian financial crisis of 1997-98. Fortunately, the particular experience of the Philippines suggests that the effect of the financial crisis on the issue at

⁵ A decline in wages is also found between 2003 and 2007 by Luo and Terada (2009).

hand—disentangling the relationship between trade liberalization and wage inequality—may be minimal. The Philippines was the least affected of the major Southeast Asian economies affected by the financial crisis. While GDP contracted mildly in 1998, the economy recovered fairly quickly, registering growth the very next year. Indeed, in a review of the Philippines' experience with growth, employment creation, and poverty reduction, Canlas, Aldaba, and Esguerra (2006) explicitly note that the Philippines was not hit hard by the financial crisis. Moreover, an examination of time-series of various variables before and after the crisis suggests that the effects of the crisis on the economy were temporary; in particular, there seems to be little evidence that the crisis represented a break in trend. This may be seen by examining variables as diverse as investment rates and poverty rates over the 1990s and 2000s (Canlas, Khan, and Zhuang, 2009). It can also be seen through an examination of mean wages and Gini coefficients over wages for 1994, 1997, and 2000. Average hourly real wages were Pesos 22.09 and 27.93 in 1994 and 2000, respectively, while the Ginis over wages were 36% and 41%, respectively. The corresponding numbers for wages and inequality in 1997 are roughly in between and certainly in no way out of line with those for 1994 and 2000: Pesos 26.1 for wages and 38% for the Gini. In summary, it appears unlikely that the financial crisis had significant and lasting effects that would seriously contaminate the analysis of trade liberalization and wage inequality carried out in this paper.

With that as a caveat, our main findings are that trade-induced effects on industry wage premia and industry-specific skill premia account for an economically insignificant increase in wage inequality. A more substantial role for trade liberalization comes through trade-induced employment reallocation effects whereby reductions in protection appear to have led to a shift of employment to more protected sectors, especially services where wage inequality tended to be high to begin with. Nevertheless, changes in economy-wide returns to education and changes in industry membership over and above those accounted for by our estimates of trade-induced employment reallocation effects are much more important drivers of wage inequality. In order for trade liberalization to account for a relatively large portion of the increases in wage inequality would require it to be a major determinant of the changes in economy-wide returns to education.

The remainder of this paper is organized as follows. Section 2 discusses data and measurement issues pertaining to trade and wages. In addition to commenting briefly on the patterns of protection in the Philippines and describing the construction of industry specific tariff rates and other trade related variables, the section discusses available labor force survey data and how these are used to construct measures of wage inequality. Section 3 provides details on the methodology of FLW used here to understand the relationship between trade liberalization and wage inequality. Section 4 describes the results of our empirical analysis while Section 5 concludes.

2. Data and Measurement

Our analysis of trade, wage inequality and employment linkages makes use of two sources of data: trade related data which allows us to quantify the patterns of protection and trade flows across industries and the Philippines Labor Force Survey (LFS) data which provides information on workers.

Trade Protection and Trade Flows

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 serious efforts at liberalization began. In particular, tariff reduction programs (that also aim to reduce the variation in tariffs across products) and easing of quantitative restrictions on imports were introduced in various phases between the early 1980s and mid-1990s. While some of the efforts of the 1980s had to be abandoned due to a balance of payments crisis, and the liberalization of quantitative restrictions saw some reversals in the early 1990s, the cumulative efforts at trade liberalization seemed to have paid off so that the Philippines economy could be considered to be considerably more open by 2000 as compared to the early 1990s. Calculations by Manasan and Pineda (1999) and others reveal that effective rates of protection were reduced overall by half (29.4% in 1990 versus 14.4% in 2000). Greater openness is also seen in expanding trade flows. For example, 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 was to double the Philippines' export share in world markets from around 0.3% in 1985 to 0.6% in 1998. Manufacturing was the main contributor to this export boom (World Bank, 2000).

To capture the extent of protection and its reduction across industries we use a measure of average tariff rates for roughly 27 standardized Philippine Standard Industrial Classification (PSIC) industries in agriculture and manufacturing.⁶ Columns (1) and (2) of Table 1 reports the average tariff rates for 1994 and 2000, the two years we are most concerned with in this paper. From this table, we can see large declines in tariffs in almost all industries. Interestingly, protection in 1994 was higher in industries generally considered 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 1994 tariff rates in industries such as electrical and non-electrical machinery were more than 20-30 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 2). At the same time, while absolute differences in tariff rates across industries came down by 2000, the relative structure of protection appears not to have changed dramatically so that with some exceptions (for example, tobacco and leather products including footwear) relatively protected sectors in 1994 tended to remain so in 2000 (Figure 3).⁷

⁶ We thank Rafaelita M. Aldaba for the data on average tariff rates. This data is available for 1988-2006 and was generated as follows. First, Harmonized Commodity Description and Coding System (HS) tariff rates for the years 1988, 1991, 1994, 1997, 1998-2006 were obtained from the Tariff Commission's "Tariff and Customs Code of the Philippines". Second, HS tariff rates were converted from the 1996 HS to the 2002 HS using the concordance table provided by the Tariff Commission. Once uniformly coded, the 2002 HS tariff rates were then matched with their corresponding 1994 Input-Output (I-O) sectors using the standard definitions of the Tariff Commission. Next, simple average tariff rates were calculated for each I-O sector. Finally, the I-O coded tariff rates were converted into the 2-digit standardized PSIC. The 2-digit PSIC tariff rates represent weighted average levels using the domestic output structure from the 1994 I-O as weights.

⁷ The Spearman correlation coefficient for between tariff rates in 1994 and 2000 is 0.80.

We also utilize information on industry-specific trade flows (imports and exports). Imports and export values were obtained from the UN's COMTRADE database with the appropriate concordances to convert it into the standardized PSIC.⁸ The information was used to create import penetration, exports as a share of total exports for each industry, and the value of exports as a share of the value of domestic production.⁹ We also used exports and imports data combined with exchange rate data from the World Bank's *World Development Indicators* to construct industry-weighted exchange rates following the methodology of Goldberg (2004). Columns (3) to (12) of Table 1 presents import penetration, export shares, export as a proportion of domestic production, and export- and import-weighted industry-specific exchange rates for 1994 and 2000. Most manufacturing sectors tend to experience increases in import penetration over time. The sectors with the highest import penetration in 2000 seem to be the more capital-intensive ones. This could be explained in part by the high import content of inputs in production of these sectors. The value of exports as a proportion of the total value of domestic production is likewise highest in the capital intensive sectors. We also see that there has also been a remarkable expansion of trade in non-traditional exports when we look at the shares of sector exports to total exports. For instance, while textiles saw a decline in its export share from 1994 to 2000, electrical machinery saw a large increase in its export share over time so that by 2000 more than half of all manufacturing exports were accounted for by this industry.

Wages and Employment

Our source for information on wages and employment come from the micro records of the 1988, 1994, 2000, and 2006 labor force surveys (LFS) of the Philippines. We restrict our attention to individuals who were between 15-65 years old, worked in the reference period, and engaged in wage or salaried work. Additionally, we work only with the characteristics of the primary job. It may be noted that only about 11.34% of those with a primary job also reported a secondary job in 1994. In less than half of these cases did the

⁸ We employed a concordance matching the Standard International Trade Classification (SITC) industries into the 2-digit standardized PSIC industries.

⁹ See Muendler (2003) for the construction of these market penetration measures.

type of employment differ across the primary and secondary jobs. We divide total wage and salary earnings from the primary job for the quarter/week by the total number of hours worked on the primary job in order to arrive at workers' hourly wage rates.^{10, 11} Furthermore, we combine temporal CPIs at the region level with information on spatial variation in cost of living from Balisacan (2001). This allows us to adjust wages for spatial and temporal price differentials, with 1997 National Capital Region prices as base.

Table 2 presents summary statistics of the sample of these wage and salary workers. A quick examination of wages across columns 1-4 reveals a decline in average wages across all major production sectors between 2000 and 2006 though employment shares remain stable (columns 5-8). The data also indicate a sharp decline in inequality between 2000 and 2006 (column 11 versus 12 for the Gini coefficient and column 15 versus 16 for the 90th and 10th percentile wage ratio). A closer examination of the data reveal that the decrease in inequality from 2000-2006 is due to a dramatic reduction in wages in the top 3 deciles (ranging from -10% for 70th percentile wages to -20% for 90th percentile wages). Whether this reflects reality or is on account of survey and non-survey errors is something that is beyond the scope of this paper to determine. However, a large discrepancy between top wages reported in the LFS for 2006 and those described in published compilations of average salaries in the corporate sector (ADB, 2007), along with the fact that the Philippines economy performed reasonably between 2000 and 2006

¹⁰ While the LFS has maintained a fairly similar questionnaire over the years, there are some important differences between the questionnaire used in 1994 and that used in 2000. In particular, while the LFS is a quarterly survey, only the survey for the third quarter asked information on earnings prior to 2000. Since then, each of the quarterly surveys asks respondents about earnings. Additionally, while the self-employed were also asked to report earnings previously, this practice was stopped from 2000. Perhaps most importantly, the reference period of employment related information has changed since 2000. Previously, the reference period was a quarter (i.e., three months). Since 2000, the reference period has switched to one week for most job related characteristics except for earnings (of wage employees) which is recorded on a "per day" basis.

¹¹ 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 working 16 hours.

(GDP per capita grew at an average annual growth rate of 2.66 over 2000-2006) suggests that the 2006 wage data may not be comparable with previous years.

Focusing attention on the 1994-2000 period, we find that real average wages grew by close to 4% annually, driven partly by wage growth in the services sector (column 2 versus column 3) and partly by the increases in employment in the better paying (on average) services sector (column 6 and 7).¹² As for wage inequality, examination of the 90th-10th percentile (P90-P10) ratio and the Gini coefficients reveals that wages in services tend to be more dispersed. While the P90-P10 ratio registered a slight decrease in inequality for both agriculture and industry from 1994 to 2000, the Gini coefficient nevertheless increased. What drives this seemingly paradoxical result is that the wages of the highest earners in these sectors (i.e., those above the 90th percentile) increased rapidly. These statistics reveal a pattern of wage adjustments over a period of liberalization that are similar with those typically found for previous studies from Latin American countries. For example, Feliciano (2001) reports increasing inequality in the tradables 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 tradable industries (i.e., agriculture and manufacturing) by matching the industry-level trade data with workers' industry of employment. Table 3 presents various summary statistics by level of protection in 1994. Industries with lower tariff rates (below the median in the tariff distribution) on average paid the highest wages, had the highest share of educated workers but accounted for the lowest share of employment. In contrast, industries with tariff rates in the upper part 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

¹² The comparative real average wage growth figures for 1988-1994 and 2000-2006 are 1.6% and -2.8%, respectively

3. Methodology

As noted earlier, there were large reductions in trade protection and increases in trade volume during 1994-2000. Moreover, this period also witnessed increasing inequality as measured by both the Gini coefficient and the 90th-10th percentile ratio of hourly wages. In order to understand how much of the observed change in wage inequality between 1994 and 2000 (as well as other years) is accounted for by changes in trade policy, both directly through the effects of trade liberalization on wages as well as indirectly through the effects of trade on employment reallocation, we employ the method developed by Ferreira, Leite and Wai-Poi (2007; FLW). This method involves four interrelated steps and combines an extended version of the two-stage estimation framework of Pavcnik, et al. (2004) that identifies the impact of trade liberalization on industry and skill premia and employment reallocation effects with a decomposition of the changes in the entire wage distribution into trade and non-trade factors. Since it is fairly involved, it is worth going over the method in detail, following closely the exposition of FLW.

Step 1: Estimation of wage equations. This step involves regressing log hourly wages (w_{ij}) on a vector of worker i 's characteristics (including sex, age, education, region, job status, marital status and, household headship status); a vector of industry j indicators or dummies (I_{ij}); and a set of interactions between industry indicators and a dummy indicator for college-educated workers in order to capture industry-specific skill premia¹³:

$$\ln w_{ij} = X_{ij}\beta + I_{ij} * wp_j + (I_{ij} * S_{ij}) * sp_j + \varepsilon_{ij}$$

We estimate this wage equation in order to derive the industry wage premia (wp_j) and industry-specific skill premia (sp_j). We estimate the wage equation for the years 1988, 1994, 2000, and 2006 and pool the resulting industry wage and industry-specific skill premia to be used in Step 3 later. Although our decompositions of wage inequality are

¹³ Agricultural crops is the omitted industry in the wage equations.

mainly restricted to analyzing changes over 1994 and 2000, we also analyze changes over 1988 and 1994 and 2000 and 2006.

Step 2: Estimation of model of employment/occupation status. The second step is accomplished by estimating a multinomial logit model employment/occupation status.^{14,15} This involves regressing an individual's employment/occupation status on a set (Z_{ij}) of personal and household characteristics:

$$\Pr\{j = s\} = P^s(Z_i, \lambda) = \frac{e^{Z_i \lambda_s}}{e^{Z_i \lambda_s} + \sum_{j \neq s} e^{Z_i \lambda_j}}$$

The above equation includes 10 possible employment/occupation categories corresponding to combinations of industry affiliation, tradable/non-tradable status and employment type. The categories are: (1) "inactive" (not in the labor force or unemployed); (2) "self-employed in manufacturing sectors"; (3) "self-employed in non-manufacturing tradable sectors"; (4) "self-employed in the non-tradable sectors"; (5) "permanently-employed in manufacturing sectors"; (6) "permanently-employed in non-manufacturing tradable sectors"; (7) "permanently-employed in non-tradable sectors"; (8) "casually-employed in manufacturing sectors"; (9) "casually-employed in non-manufacturing tradable sectors"; and (10) "casually-employed in non-tradable sectors".¹⁶

¹⁴ As in Step 1, we estimate this equation for the years 1988, 1994, 2000, and 2006.

¹⁵ The spirit behind this model of occupational choice closely resembles McFadden (1974). Although the McFadden occupational choice model gives a description of preference by an individual, it may not be fully justified since the individual's choice may in reality be held in check by the demand side of the labor market (Bourguignon and Ferreira, 2005). A complete model must therefore include a mixture of both *preferences* and *rationing*. The interpretation of this model must be taken with a grain of salt.

¹⁶ Although we restrict our analysis to wage workers, our multinomial logit model allows for the possibility of individuals being predicted to be self-employed. After obtaining the counterfactual occupations, those who were predicted to be self-employed were excluded in constructing the counterfactual wages in Step 4 while those who were predicted to be wage workers were included and their counterfactual wages were computed.

Step 3: Estimating the impact of trade on industry wage/skill premia and employment/occupation status. This step requires collecting the three sets of estimated coefficients from the previous two steps—i.e., the industry wage premia (wp_{jt}) and the industry-specific skill premia (sp_{jt}) from the first step and the occupational constant terms in the multinomial logit model (λ_{jt}) from the second step—and regressing these on industry-specific and time varying measures of trade protection and other trade-related variables in addition to various controls. The trade-related variables (T_{ij}) include industry-specific tariff rates, import-weighted exchange rates, and import penetration rates and exports as a proportion of the value of domestic production¹⁷:

$$v_{jt} = T_{jt}\gamma_v + \eta_{ij}, \quad v_{jt} = \{wp_{jt}; sp_{jt}; \lambda_{0jt}\}$$

Step 4: Decomposing and attributing changes in wage inequality. The last step involves decomposing changes in the wage distribution over any two years and determining the quantitative importance of the various trade-induced effects in *accounting* for the observed changes in wage inequality between them.¹⁸ The decompositions used by FLW draw on the approach of Juhn, Murphy and Pierce (1993) whereby the difference between the wage distributions of any two years can be decomposed into three components: (i) those due to changes in observed worker characteristics (X); (ii) those due to changes in the return to these characteristics (the regression coefficients (β)); and (iii) those due to changes in the distribution of the residuals (ε).

¹⁷ Tariff rates for nontradable, such as services, are set at zero. This is not problematic since, as will be made clear later, what matters for the inequality decompositions that are carried out in this paper are *changes* in protection. For the other trade related variables such as import penetration and export shares, we likewise set their value to zero for nontradables. This makes it unnecessary to deal with the issue of what an exchange-rate for nontradables means or would look like given that our specifications introduce exchange rates only as in interaction with import penetration rates and export shares.

¹⁸ Is crucial to note that the decompositions do not inform us about the causal relationships involved. The exercise carried out here is an accounting decomposition.

In particular, FLW construct six counterfactual wage distributions that are used to isolate the effects of the different channels by which reductions in trade protection affect wage inequality (either by influencing some component of the X_s or β_s).¹⁹ Consider 1994 and 2000 as the two years over which we would like to decompose and attribute changes in inequality.

The first counterfactual wage distribution (C1) is then estimated as:

$$\ln w_{ij}^1 = X_{ij}^{94} \beta^{94} + I_{ij}^{94} * wp_j^s + (I_{ij}^{94} * S_{ij}^{94}) sp_j^{94} + F_{94}^{-1}(\theta_{i94})$$

where

$$wp_j^s = wp_j^{94} + \left[\hat{\gamma}_{wp} * (T_j^{00} - T_j^{94}) \right]$$

and $\hat{\gamma}_{wp}$ are the estimated coefficients from step 3 above—i.e., where industry wage premia are regressed on trade related variables—and $F(\varepsilon)$ represents the distribution function of the wage equation residuals. This simulation captures the changes in the wage distribution due to the trade-induced changes in industry wage premiums.

The second counterfactual (C2) is:

$$\ln w_{ij}^2 = X_{ij}^{94} \beta^{94} + I_{ij}^{94} * wp_j^s + (I_{ij}^{94} * S_{ij}^{94}) sp_j^s + F_{94}^{-1}(\theta_{i94})$$

where,

$$sp_j^s = sp_j^{94} + \left[\hat{\gamma}_{sp} * (T_j^{00} - T_j^{94}) \right]$$

and $\hat{\gamma}_{sp}$ are the estimated coefficients from step 3—i.e., where industry-specific skill premia are regressed on trade related variables. Analogous to the first counterfactual, this

¹⁹ It may be noted that the results of the Juhn, Murphy, Pierce decompositions are sensitive to the precise order in which the various counterfactuals are carried out. There is no reason, however, to suspect that the results would be qualitatively very different if a different ordering had been utilized.

simulation captures changes in the wage distribution due to trade-induced changes in industry-specific skill premiums.

The third counterfactual (C3) is:

$$\ln w_{ij}^3 = X_{ij}^{94} \beta^{94} + I_{ij}^s * wp_j^s + (I_{ij}^s * S_{ij}^{94}) sp_j^s + F_{94}^{-1}(\theta_{i94})$$

where I_{ij}^s is a counterfactual vector of occupations derived by substituting:

$$\lambda_{0j}^s = \lambda_{0j}^{94} + \left[\hat{\gamma}_{\lambda_0} * (T_j^{00} - T_j^{94}) \right]$$

into the multinomial logit model in step two so as to predict the counterfactual distribution of occupations.²⁰ This simulation captures the effect of trade-induced employment reallocation on wages.

Another important channel through which wage dispersion may change is through changes in the economy-wide skill premium (as opposed to just trade induced industry-specific skill premiums). These effects can be captured by a fourth counterfactual (C4):

$$\ln w_{ij}^4 = X_{ij}^{94} \beta^s + I_{ij}^s * wp_j^{00} + (I_{ij}^s * S_{ij}^{94}) sp_j^{00} + F_{94}^{-1}(\theta_{i94})$$

where $\beta^s = \{\beta_{ed}^{00}; \beta_{\sim ed}^{94}\}$. In this simulation, the coefficients on all education dummies and industry wage premiums and the industry-skill premiums are replaced with their 2000 estimates. Doing this extends the 'price effect' of trade liberalization to include changes in the returns to education and to industry membership beyond those which are induced by changes in trade variables as reflected in Step 3. As FLW argue, this stimulation "corresponds to a 'more generous' estimate of the 'price effects' of trade liberalization, in which the full changes in returns to education and industry membership—rather than only those mandated by the second stage—are included".

²⁰ Workers whose predicted occupations are different from their original 1994 occupations are allocated to specific industries by random draws with probabilities derived from the 2000 employment distribution.

The other two remaining counterfactual distributions account for changes that may have been driven by other channels apart from trade reforms. The first of these two, C(5), represents changes in the structure of returns to observed characteristics other than that of education and industry membership (for instance, sex, age, and region of employment, etc.):

$$\ln w_{ij}^5 = X_{ij}^{94} \beta^{00} + I_{ij}^s * w p_j^{00} + (I_{ij}^s * S_{ij}^{94}) s p_j^{00} + F_{94}^{-1}(\theta_{i94})$$

The final simulation, C(6), introduces the 2000 residuals consistent with a rank-preserving transformation²¹:

$$\ln w_{ij}^6 = X_{ij}^{94} \beta^{00} + I_{ij}^s * w p_j^{00} + (I_{ij}^s * S_{ij}^{94}) s p_j^{00} + F_{00}^{-1}(\theta_{i94})$$

The difference between C(6) and the estimated equation for 2000 is:

$$\ln w_{ij}^{00} = X_{ij}^{00} \beta^{00} + I_{ij}^{00} * w p_j^{00} + (I_{ij}^{00} * S_{ij}^{00}) s p_j^{00} + F_{00}^{-1}(\theta_{i00})$$

and accounts for the differences in the joint distribution of observed characteristics between 2000 and 1994. Moreover, this also accounts for changes in the correlation between the observed characteristics and the residual terms, which may include any changes in selection into the labor force that are not explained by trade-induced employment reallocation accounted for in C(3).

Different inequality measures for the actual wage distributions of 1994 and 2000, as well as the six counterfactual wage distributions estimated by C(1)-C(6) are presented later in the next section. (We also discuss briefly results for the decomposition of the wage

²¹ A rank-preserving transformation is carried out by replacing the residual in the n^{th} percentile (of residuals) at time t by the residual in the n^{th} percentile at time t' . In our case our rank-preserving transformation involves an approximate solution that assumes that both distribution of residual terms are the same up to a proportional transformation (e.g., when residuals are normally distributed with mean zero). Thus, it is equivalent to multiplying the residual observed at time t by the ratio of standard deviations at time t' and t . Thus, the residuals are estimated as $F_{00}^{-1}(\theta_{i94}) = \left(\frac{\sigma_{\varepsilon}^{00}}{\sigma_{\varepsilon}^{94}} \right) * F_{94}^{-1}(\theta_{i94})$. See

Bourguignon and Ferreira (2005).

distribution over 1988-1994 and 2000-2006.) The inequality measures reported are the 90th-10th percentile ratio, the mean log deviation (or the Theil-L index, also known as GE(0)), the Theil-T index (or GE(1)) and the Gini coefficient. This exercise is presented to decompose the observed changes between 1994 and 2000 into the factors resulting from each counterfactual. In addition, we also present different wage growth incidence curves between 1994 and 2000 and each of the counterfactuals in a cumulative manner.

4. Results

Estimation Results (Steps 1-3)

Table 4 presents the results of the wage equations for 1994 and 2000. The numbers in columns 1 and 2 are based on a specification that includes industry and region dummies while those in columns 3 and 4 also include the dummies formed by the interaction between industry dummies and a dummy for college education (i.e., the dummy interaction terms meant to capture industry-specific skill premia). We can see from a comparison of estimates across columns 1 and 2 that there has been an increase in returns to tertiary education between 1994 and 2000. However, this increase appears to be driven by the situation in certain industries. As a comparison of the coefficient of the college education dummy across columns 3 and 4 shows, adding the industry and college dummy interactions to the wage equation leads to a reduction in the coefficient on college education between 1994 and 2000. In contrast, the returns to primary and secondary education increase slightly between 1994 and 2000 in both specifications. The returns to experience (as proxied by the returns to age) have slightly fallen as have the returns to permanent workers. The male premium, on the other hand, increased slightly between 1994 and 2000.

Columns 1 and 2 of Table 5 present the estimated industry wage premiums for 1994 and 2000.²² The wage premiums are found to decline over time in 22 out of 26 industries. However, industry wage premiums are persistent in the sense that industries with low wage premiums in 1994 also tended to have low wage premiums in 2000 (Figure 4, panel

²² "Agricultural crops" is the omitted industry in the wage equations. Thus, the industry wage premiums represent premiums relative to the case in agricultural crops.

(a)). In both years, they are generally low in apparel, footwear, food, leather and wood products (all labor-intensive industries) and high in industrial chemicals, electrical machinery, medical instruments and transport equipment (all capital-intensive industries). Industry-skill premiums, on the other hand, are found to exhibit less stable pattern in terms of changes over time so that they increase (decrease) in 10 (16) out of 26 industries between 1994 and 2000 (columns 3 and 4 of Table 5). Accordingly, industry-skill premiums are less persistent over time (Figure 4, panel b).

Turning to the results of the multinomial logit model estimated in Step 2, these show some familiar (if not unsurprising) results (Tables 6a and 6b). College-educated (or skilled) workers tend to be employed in permanent jobs in manufacturing (in 2000) and non-tradables (both 1994 and 2000). Furthermore, more males seem to be entering into the labor force as reflected by the increasing coefficients of the male dummy on all the broad industrial categories. Finally, those with longer work experience do not tend to be employed as casual workers, suggesting that firms "test" workers who are early in their career by offering them shorter contracts.

As explained in the previous section, in Step 3 we regress separately the pooled industry wage premiums, industry-skill premiums and the multinomial logit constants on a vector of trade variables. Results are provided in Tables 7, 8, and 9, respectively. While specifications 1-6 in Tables 7, 8, and 9 do not control for the effects of time, specifications 7-12 do so by including year fixed effects while those in 13-18 include a time trend instead of year fixed effects. All specifications in the industry wage premium and industry-skill premium regressions include industry fixed effects to control for time invariant industry-specific characteristics.

An examination of the regression results for the industry wage premiums (Table 7) shows that the specifications without year fixed effects yield a positive and statistically significant relationship between tariff movements and the movement in industry wage premiums. In other words, declines in tariff reductions are associated with declines in industry wage premium in these specifications. For instance, a 10 percentage point

decline in average tariffs will translate into at most a little over a 5 point decline in average industry wage premiums (i.e., from an industry wage premium of, say, 0.40 to 0.35). Interestingly, an increase in export shares is associated with a decline in industry wage premiums. Finally, a currency appreciation—as measured by the increase in import-weighted industry specific exchange rates (interacted with either lagged import penetration or export shares)—decreases the industry-wage premium, although this effect is not statistically significant in all specifications. This finding is consistent with a scenario whereby an industry-specific appreciation of the peso and/or larger import penetration leads to a decline in the wage premium of the affected industry due to a decline in the competitiveness of the sector. For the industry-skill premium regressions, we find that tariff declines are associated with *increases* in the industry-skill premium, especially in industries with *lower* import penetration (Table 8). The latter can be inferred from the positive and statistically significant interaction term involving tariffs and lagged import penetration. As in the case of the industry wage premiums, the effects of tariffs become statistically insignificant once year fixed effects are introduced.

The regressions involving the multinomial logit constants (i.e., those capturing employment/occupation status) yield some interesting results (Table 9). First, the positive and significant relationship between the constants and tariffs suggests that industries which experienced larger declines in protection experienced reductions in employment (though this effect is moderated by larger levels of import penetration in one out of the three specifications which introduce an interaction between tariffs and import penetration—i.e., in specification 2). In other words, workers in the hardest hit industries (presumably the unskilled-labor intensive ones) seem to have been reallocated towards other (more protected) industries such as services. This explanation is quite plausible, since by looking back at Table 2 we can see that the sector with the largest increases in employment are in the services sector—i.e., industries that are non-traded. Also equally interesting is the relationship between conditional employment and exports: the positive sign on this relationship suggests that those industries which exported more hired more workers.

In summary, we see from the three trade exposure regressions that the fall in tariff rates has tended to exert downward pressure on industry wage premiums and induce employment to reallocate away from the industries that experienced a heavier tariff decline and/or from those industries that did not export more. Moreover, greater competition from imports and an appreciating currency has also put downward pressure on industry wage premiums. In contrast, the fall in tariff rates has shown some tendency to raise industry skill premiums, especially in industries with low levels of import penetration. The combined quantitative importance of these effects on wage inequality is unclear, however, without further analysis. To get a sense of this, we turn to the analysis of wage decompositions.

Wage Decompositions (Step 4)

In Step 4 we use the results of the trade exposure regressions to construct counterfactual wage distributions to determine the effects of trade-induced changes on wage inequality. In constructing these decompositions, we use the estimated coefficients on tariffs from the specifications that include time-trends and yield the largest (and statistically significant) impact of tariffs.²³ In other words, we are allowing trade to have its largest possible impact on wage inequality (within the context of the approach we are using).

Table 10 reports four inequality measures for both 1994 and 2000 (which are actual wage distributions) and also for the six counterfactual wage distributions (which are simulated). In addition, we also show different wage growth incidence curves corresponding to 1994-2000 and the various counterfactual wage distributions. (The growth incidence curves show the growth in wages at different statistical percentiles of the wage distribution for any two wage distributions.)

To determine the effect of trade liberalization on changes in the wage distribution through the industry-wage premium channel, we compare the actual change in the wage distribution between 1994 and 2000—as depicted by the growth incidence curve G(94-00) in Figure 5—with the change in the wage distribution between 1994 and the first

²³ The results hardly change when we use coefficients from the alternative specifications.

counterfactual wage distribution—as depicted by the growth incidence curve $G(94-C1)$ in Figure 5. Recall from the previous section that the first counterfactual wage distribution $C(1)$ allows us to capture the change to the 1994 wage distribution resulting from trade-induced changes in industry wage premiums.

As can be seen quite clearly from Figure 5 and the first two rows of Table 10, the industry-wage premium channel exerts a negligible effect on the actual changes in the wage distribution registered between 1994 and 2000. Most inequality measures hardly move across the first two rows of Table 10 and the growth incidence curve $G(94-C1)$ lies very close to the horizontal axis, depicting an insignificant change in wages from their 1994 values. Thus, the industry-wage premium channel is economically insignificant in terms of contributing to changes in inequality despite the positive and statistically significant relationship between trade protection and industry wage premiums seen in Table 7.

The situation is similar for the industry-skill premium channel. This can be seen by comparing the inequality measures across rows 2 and 3 in Table 10 and the growth incidence curve $G(C1-C2)$. As with $G(94-C1)$, this lies close to the x-axis.

The decomposition results so far suggest that declines in tariff rates did not affect the wage distribution through the industry wage or industry-specific premium channels. However, trade liberalization may have affected the wage distribution through other channels. The counterfactual wage distribution $C(3)$ incorporates the influence of trade liberalization induced employment reallocation effects on the wage distribution (in addition to the trade liberalization induced effects on industry wage and skill premiums). Figure 6 shows the wage growth incidence curve that results from a comparison of the counterfactual distributions $C(2)$ and $C(3)$ (i.e., $G(C2-C3)$). For purposes of comparison, the figure also shows the growth incidence curve for the actual 1994 and 2000 distributions (i.e., $G(94-00)$). The $G(C2-C3)$ is closer to the actual 1994-2000 growth incidence curve, save for those workers with wages above the 80th percentile level. There

is also a more noticeable change in the four inequality measures across rows 3 and 4 in Table 10.

Taken at face value, the results suggest that trade liberalization has had a larger impact on the wage distribution through employment reallocation effects than either the industry-wage and industry-skill premium effects combined. Thus one way in which trade liberalization may have increased wage inequality is by precipitating the movement of workers from agriculture and manufacturing (i.e., tradables) towards services (i.e., nontradables). As we have seen from Table 2 earlier, the services sector is characterized by greater inequality in wages than either agriculture or manufacturing.

While the employment reallocation effects are certainly not large enough to approximate the actual increases in wage inequality between 1994 and 2000 (compare, for example, the Gini coefficients for the 1994, C(3), and 2000 wage distribution in Table 10) they are not trivial either. Nevertheless, the biggest, most conspicuous jump in the inequality measures among all counterfactuals considered so far happens with C(4)—the counterfactual wage distribution that takes into account changes in the economy-wide returns to education and industry membership. Inequality is clearly higher for this counterfactual distribution compared to C(3). Compare, for example, the Gini coefficients reported and Table 10 for these two distributions: 36% versus 39%. This may also be seen by examining the upward-sloping growth incidence curve $G(C3-C4)$ in Figure 6. This result may seem puzzling since the wage equations in Table 4 show that the returns to tertiary education fell between 1994 and 2000 thereby suggesting slow growth in wages in the upper part of the distribution. However, this counterfactual also incorporates the effects of changes in industry membership, including changes in industry-specific skill premiums, not captured by the reduction in tariff rates as calculated in Step 3. It also incorporates the effects of rising returns to primary and secondary education between 1994 and 2000 relative to uneducated workers — typically the ones with the lowest wages. Thus while we can expect some erosion of wage growth of skilled workers because of the drop in the economy-wide returns to tertiary education, this seems to have been offset by non-trade related changes in the industry-skill premium

so that these relatively higher-earning workers benefited from increasing industry-specific returns to education.²⁴ Indeed, the sharp increase in the skill premium for non-tradables (Table 5) certainly points to this.²⁵ Overall, the results show us that changes in the economy-wide returns to education, combined with (possibly) non-trade induced changes in industry-specific returns, have been inequality increasing.

The remaining results from the last two counterfactuals take into account changes in the structure of returns to observed characteristics other than education and industry membership, C(5), and the 2000 residuals, C(6). The corresponding growth incidence curves and inequality estimates are described in Figure 7 and Figure 8 and rows 6 and 7 of Table 10, respectively. An examination of the various inequality measures indicates that the move from C(4) to C(5) leaves inequality essentially unchanged. However, incorporating the 2000 residuals is clearly inequality increasing leading to an increase in the Gini coefficient by around 1 point. Increases in inequality of a similar magnitude take place (at least in terms of the Gini coefficient) in moving from C(6) to the actual 2000 distribution.²⁶

Interestingly, repeating the procedures above (i.e., step 4) to analyze changes in wage inequality over 1988 to 1994 leads to a broadly similar conclusion: changes in trade policy have relatively mild effects on wage inequality. For example, starting with a Gini of 37.09% in 1988, trade liberalization induced changes in industry wage premiums, industry-skill premiums and employment reallocation raised the Gini to 37.81%—i.e., a change of less than 1 percentage point (row 4 versus row 1 in the first panel of Table 11).

²⁴ Recall from columns 1 and 2 of Table 4 that if we run the Mincerian regressions without controlling for industry- skill effects, the returns to tertiary education actually increased.

²⁵ The increase in the skill premium may be due partly to a very rapid pace of labor productivity growth during the period 1994 to 2000 (Felipe and Sipin, 2004). This growth was particularly influenced by quality upgrading among Philippine industries brought about by both trade (e.g., lower capital importation costs) and non-trade factors (e.g. flexible compensation schemes for managers).

²⁶ This involves introducing the 2000 characteristics for all observables (other than the employment/occupational changes induced by trade and already incorporated) and accounting for the changes between observables and the 2000 residuals.

Significantly, the actual Gini in 1994 was 35.51% and thus *lower* than what it was in 1988. In other words, non-trade related forces acted to *reduce* inequality levels and were powerful enough to counteract any upward pressure on inequality that trade liberalization may have generated.

The results from executing step 4 for analyzing changes in wage inequality over 2000 and 2006 are similar in that reductions in tariffs have a mild influence on wage inequality. But beyond this there are some differences in results. First, in contrast to the findings above for 1994-2000 and 1988-1994, employment reallocation effects work to *reduce* wage inequality (row 4 versus either row 3 or row 1 in the second panel of Table 11). Second, there are two nontrade related counterfactuals that generate large changes in inequality. The first arises from changes in the economy-wide skill premium and industry membership beyond trade and works to reduce inequality (row 5 versus row 4). The second arises from changes in observable worker characteristics, i.e., moving from 2000 values of the Xs to the 2006 values, and work to increase inequality (row 8 versus row 7). It is difficult to be sure about what is driving these changes. As noted earlier, wages for 2006 seem to be unreasonably low compared to those for 2000.

5 . Conclusion

This paper has analyzed the role of trade liberalization in influencing changes in wage inequality in the Philippines between 1994 and 2000. Tariff rates declined considerably between these two years while both exports and imports rose sharply. Unlike the post-2000 period, FDI and/or outsourcing of services to the Philippines did not expand in a big way. Thus, trade liberalization represented the main channel through which the Philippines experienced globalization. In the meantime, data from labor force surveys reveal that wage inequality increased considerably. In particular, the Gini coefficient over hourly wages increased from 35.5% to 40.8% between 1994 and 2000.

While these two sets of facts—i.e., increasing openness to trade and increasing inequality—are consistent with a growing body of literature that has found trade liberalization to lead to increases in inequality, the analysis of this paper finds little

evidence to suggest that trade liberalization had an important role to play in increasing inequality in the Philippines. Using the approach of Ferreira, Leite, and Wai-Poi (2007), this paper finds trade-induced effects on industry wage premia, industry-specific skill premia, and employment reallocation to account for slightly less than 17% the total increase in the Gini coefficient between 1994 and 2000. Interestingly, the effects of trade on industry wage premia and industry-specific skill premia are found to account for very little of the increases in wage inequality. The bulk of trade-induced increases in inequality—almost three fourths in the case of the Gini coefficient—are captured by the employment reallocation effects of trade. In particular, reductions in protection appear to have led to a shift of employment to more protected sectors, especially services where wage inequality tends to be high to begin with and increased still further.

A much more important driver of wage inequality appears to be changes in economy-wide returns to education and changes in industry membership over and above those accounted for by our estimates of trade-induced employment reallocation effects. Of course, we cannot discount the possibility that both factors are somehow linked to trade liberalization.

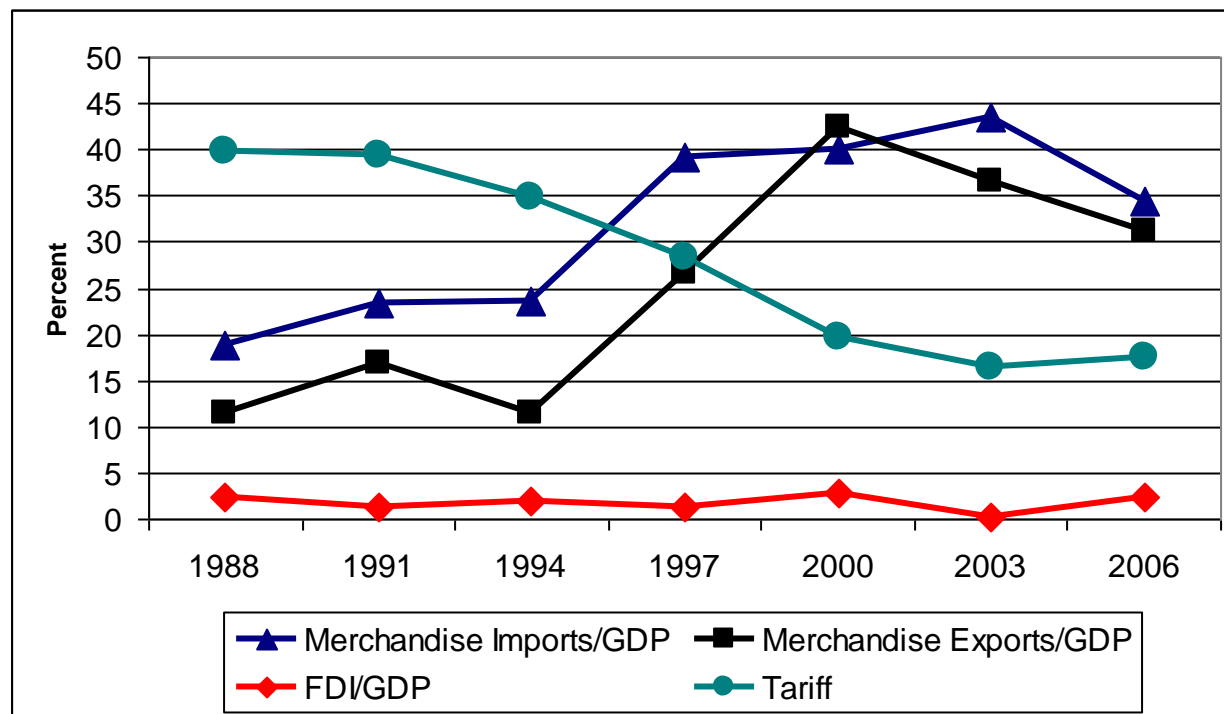
These findings suggest several areas for future work. First, a deeper understanding of how trade liberalization, or for that matter any major change in economic policy, influences employment opportunities across sectors is required. Second, understanding the drivers of inequality in the services sector requires some attention. Finally, understanding the connections between economy-wide changes in the returns to education and trade liberalization is needed.

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Figure 1. Trade Volume, Foreign Direct Investments and Average Tariff Rates 1988-2006



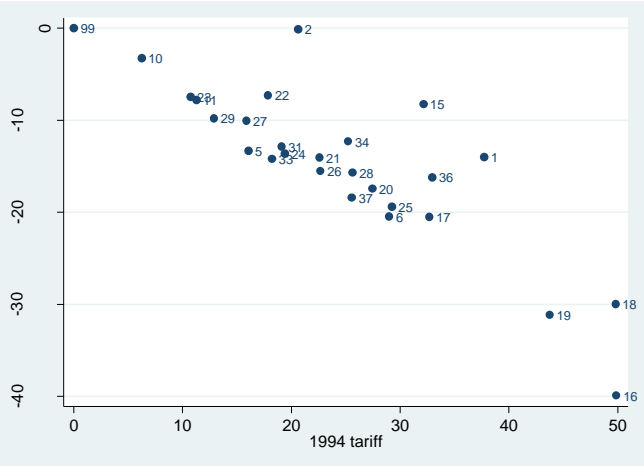
Source: Trade, FDI and GDP data from World Bank World Development Indicators.
Tariff Rates are based on author's computations

Table 1. Tariff Rates and Trade Flows, 1994 and 2000

PSIC	Description	Average Tariff		Import Penetration		Export Share		Export Value/Production Value		Import-weighted Industry-Specific Exchange Rate		Export-weighted Industry-Specific Exchange Rate	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		1994	2000	1994	2000	1994	2000	1994	2000	1994	2000	1994	2000
01	Growing of Crops	37.74	23.72	0.06	0.09	0.01	0.00	0.01	0.02	1.34	4.62	8.44	7.17
02	Farming of Animals	20.62	20.50	0.02	0.03	0.00	0.00	0.00	0.00	0.04	0.13	0.36	0.79
03	Agricultural and Animal Husbandry, Service Activities, Except Veterinary Activities	19.00	0.00			0.00	0.00			0.03	2.39	11.14	0.82
05	Forestry, Logging and Related Activities	16.05	2.71	0.00	0.00	0.00	0.00	0.00	0.00	3.95	39.08	1.83	1.23
06	Fishing, Aquaculture and Service Activities Incidental to Fishing	29.01	8.53	0.02	0.02	0.01	0.00	0.02	0.05	14.45	44.94	2.29	7.21
10	Metallic Ore Mining	6.25	3.00	0.55	0.96	0.03	0.01	0.35	0.55	59.97	43.53	4.17	3.86
11	Non-Metallic Mining and Quarrying	11.26	3.45	3.28	7.47	0.00	0.00	0.06	0.01	17.29	17.53	3.17	2.24
15	Manufacture of Food Products and Beverages	32.16	23.88	0.11	0.16	0.21	0.04	0.18	0.15	2.17	4.83	3.97	6.94
16	Manufacture of Tobacco Products	49.88	9.96	0.16	0.12	0.00	0.00	0.03	0.03	0.64	6.12	1.76	0.49
17	Manufacture of Textile	32.71	12.21	0.50	0.76	0.06	0.01	0.42	0.25	9.57	13.86	1.42	4.25
18	Manufacture of Wearing Apparel	49.83	19.87	0.01	0.03	0.06	0.07	0.29	1.59	10.34	8.05	0.47	0.58
19	Tanning and Dressing of Leather; Manufacture of Luggage, Handbags and Footwear	43.77	12.60	0.31	0.28	0.03	0.01	1.08	1.24	18.04	14.74	1.61	0.50
20	Manufacture of Wood, Wood Products and Cork, Except Furniture; Manufacture of	27.45	10.01	0.37	0.71	0.02	0.01	0.40	0.89	3.92	5.69	1.79	1.98
21	Manufacture of Paper and Paper Products	22.59	8.56	0.44	0.49	0.01	0.00	0.06	0.11	6.86	17.19	4.84	2.90
22	Publishing, Printing and Reproduction of Recorded Media	17.86	10.56	0.54	0.16	0.00	0.00	0.18	0.03	11.68	15.98	2.62	0.41
23	Manufacture of Coke, Refined Petroleum and other Fuel Products	10.74	3.29	0.17	0.06	0.01	0.00	0.03	0.02	10.47	80.24	7.82	13.59
24	Manufacture of Chemicals and Chemical Products	19.38	5.74	0.53	0.74	0.04	0.01	0.09	0.09	10.09	16.02	13.25	14.17
25	Manufacture of Rubber and Plastic Products	29.24	9.84	0.55	0.89	0.05	0.02	0.35	0.81	9.04	15.27	5.16	11.17
26	Manufacture of Other Non-Metallic Mineral products	22.68	7.12	0.18	0.25	0.01	0.01	0.07	0.15	11.38	28.60	3.49	3.77
27	Manufacture of Basic Metals	15.87	5.83	0.39	0.46	0.03	0.01	0.12	0.14	5.44	15.40	15.12	12.73
28	Manufacture of Fabricated Metal Products, Except Machinery and Equipment	25.63	9.92	1.02	0.97	0.01	0.01	0.12	0.25	5.40	8.70	1.83	5.02
29	Manufacture of Machinery and Equipment, n.e.c.	12.88	3.07	3.86	0.93	0.01	0.08	0.22	0.65	4.21	3.26	6.55	3.22
31	Manufacture of Electrical Machinery and Apparatus, n.e.c.	19.11	6.23	0.66	1.81	0.34	0.67	0.66	3.00	3.31	4.55	1.34	1.65
33	Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	18.23	4.02	0.56	0.81	0.01	0.01	1.41	1.01	2.44	2.22	0.18	2.13
34	Manufacture of Motor Vehicles, Trailers and Semi-Trailers	25.23	12.92	0.87	0.60	0.00	0.01	0.01	0.10	2.93	11.21	1.38	3.65
36	Manufacture and Repair of Furniture	32.96	16.76	0.02	0.08	0.02	0.01	0.23	0.43	15.70	9.13	1.68	0.48
37	Manufacturing , n.e.c.	25.55	7.14	0.16	1.65	0.02	0.01	0.52	1.83	5.72	3.69	1.11	1.17

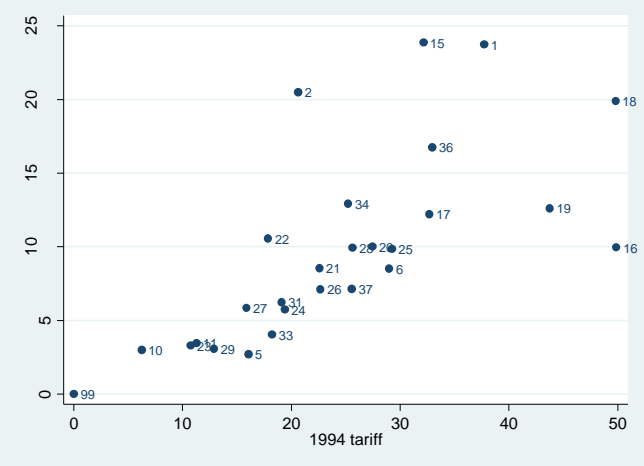
Source: Authors' calculations based on UN COMTRADE data for trade flows and production data, World Bank World Development Indicators for exchange rates and Tariff Commission for tariff rates

Figure 2. Tariff reduction vs. 1994 Tariff



Source: Authors' calculations based on data from Tariff Commission

Figure 3. 1994 Tariffs vs. 2000 Tariff levels



Source: Authors' calculations based on data from Tariff Commission

Table 2. Wages and Employment, 1988, 1994, 2000 and 2006

	Mean Hourly Wages (1997 NCR Pesos)				Employment Shares				Wage Inequality Measures							
									Gini Coefficient				P90-P10 Ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Production Sector	1988	1994	2000	2006	1988	1994	2000	2006	1988	1994	2000	2006	1988	1994	2000	2006
Overall	20.80	22.09	27.93	23.48	100%	100%	100%	100%	0.37	0.36	0.41	0.36	6.98	6.31	7.62	6.16
Agriculture	14.01	14.70	17.49	14.63	23%	20%	17%	17%	0.33	0.32	0.34	0.26	4.24	3.88	3.62	3.02
Industry	21.65	23.60	27.58	22.93	17%	17%	15%	15%	0.32	0.29	0.32	0.27	4.71	4.07	4.00	3.57
Services	23.09	24.02	30.70	25.84	60%	63%	67%	68%	0.37	0.35	0.41	0.36	8.43	7.35	9.59	7.61

Source: Authors' calculations based on the Labor Force Surveys

Table 3. Worker Characteristics in 1994 by Rank of Tariff

Worker Characteristic	Rank of Tariff in 1994	
	Below Median	Above Median
Average hourly wages, in 1997 Pesos (Standard Deviation)	25.23 14.13	17.51 11.89
Male (%)	74	69
Average age (Standard Deviation)	31.20 10.56	32.80 12.21
Education Level(%)		
Below Primary Education	9.07	27.90
Primary Graduate	28.99	38.86
High School Graduate	48.39	29.00
College Graduate	13.55	4.24
Observations	676,608	3,467,958

Source: Authors' calculations based on the Labor Force Survey and Tariffs information based from the Tariff Commission

Table 4. Wage equations, 1994 and 2000

	(1)	(2)	(3)	(4)
Dependent Variable: Log of Real Wages	1994	2000	1994	2000
Age	0.03603 [350.65]***	0.03496 [354.71]***	0.03631 [353.83]***	0.03543 [360.69]***
Age squared	-0.00036 [279.78]***	-0.00033 [267.08]***	-0.00037 [283.26]***	-0.00034 [273.44]***
Primary	0.08523 [152.97]***	0.08768 [155.83]***	0.08513 [152.81]***	0.08821 [156.85]***
Secondary	0.32743 [549.92]***	0.3336 [570.77]***	0.32447 [543.96]***	0.32945 [562.51]***
Tertiary	0.95193 [1409.30]***	1.14759 [1698.81]***	0.73217 [146.80]***	0.66617 [138.91]***
Male	0.31581 [677.84]***	0.31725 [729.66]***	0.31994 [686.89]***	0.32309 [742.29]***
HH head	0.0325 [62.05]***	0.04026 [82.81]***	0.0335 [64.04]***	0.04105 [84.79]***
Married	0.15761 [290.99]***	0.17133 [347.50]***	0.15551 [287.58]***	0.16917 [344.36]***
Separated	0.06684 [60.15]***	0.07584 [75.59]***	0.06863 [61.99]***	0.07391 [73.96]***
Permanent Worker	0.03376 [81.23]***	0.011 [28.51]***	0.0327 [78.61]***	0.00901 [23.35]***
Constant	1.2756 [695.56]***	1.48855 [834.69]***	1.2758 [696.59]***	1.48815 [837.12]***
Region Dummies	Yes	Yes	Yes	Yes
Industry Indicators	Yes	Yes	Yes	Yes
Industry*Skill Interactions	No	No	Yes	Yes
Observations	11,300,000	13,500,000	11,300,000	13,500,000
R-squared	0.37	0.41	0.38	0.41

Robust t statistics in brackets

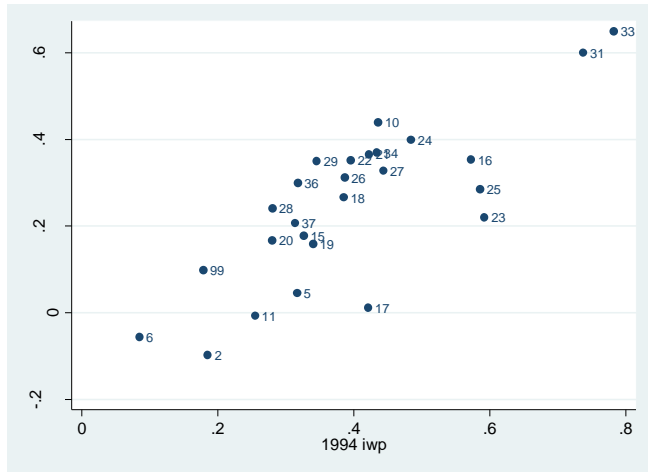
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Industry and Industry-Skill Premium

Industry	Industry Wage Premium		Industry-Skill Wage Premium	
	(1)	(2)	(3)	(4)
	1994	2000	1994	2000
02 Farming of Animals	0.185	-0.097	0.256	0.238
05 Forestry, Logging and Related Activities	0.317	0.045	-0.092	0.414
06 Fishing, Aquaculture and Service Activities Incidental to Fishing	0.085	-0.056	0.156	-0.245
10 Metallic Ore Mining	0.436	0.439	-0.199	0.202
11 Non-Metallic Mining and Quarrying	0.255	-0.007	0.079	0.682
15 Manufacture of Food Products and Beverages	0.327	0.178	0.184	0.359
16 Manufacture of Tobacco Products	0.573	0.353	-0.384	0.671
17 Manufacture of Textile	0.421	0.012	0.037	0.446
18 Manufacture of Wearing Apparel	0.385	0.266	-0.178	0.060
19 Tanning and Dressing of Leather; Manufacture of Luggage, Handbags and Footwear	0.340	0.159	-0.074	0.071
20 Manufacture of Wood, Wood Products and Cork, Except Furniture; Manufacture of	0.280	0.167	0.055	0.138
21 Manufacture of Paper and Paper Products	0.422	0.365	0.070	-0.005
22 Publishing, Printing and Reproduction of Recorded Media	0.396	0.352	0.019	0.080
23 Manufacture of Coke, Refined Petroleum and other Fuel Products	0.592	0.220	0.278	0.530
24 Manufacture of Chemicals and Chemical Products	0.484	0.399	0.063	0.241
25 Manufacture of Rubber and Plastic Products	0.586	0.285	-0.066	0.219
26 Manufacture of Other Non-Metallic Mineral products	0.387	0.312	-0.132	0.422
27 Manufacture of Basic Metals	0.444	0.327	-0.068	0.023
28 Manufacture of Fabricated Metal Products, Except Machinery and Equipment	0.280	0.241	0.129	0.169
29 Manufacture of Machinery and Equipment, n.e.c.	0.346	0.350	0.074	0.249
31 Manufacture of Electrical Machinery and Apparatus, n.e.c.	0.738	0.600	-0.329	-0.008
33 Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	0.783	0.649	-0.068	-0.029
34 Manufacture of Motor Vehicles, Trailers and Semi-Trailers	0.434	0.369	-0.045	0.084
36 Manufacture and Repair of Furniture	0.318	0.300	-0.313	-0.120
37 Manufacturing , n.e.c.	0.314	0.207	0.386	0.267
99 Nontradables	0.178	0.099	0.252	0.523

Figure 4. IWP and ISP levels in 1994 vs. 2000

Panel (a)



Panel (b)

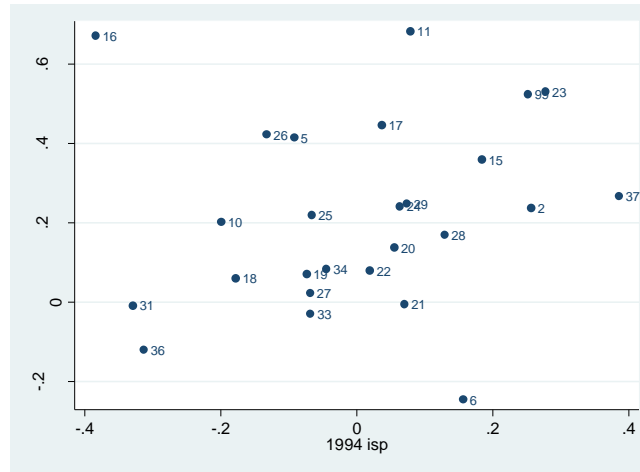


Table 6a and 6b. Multinomial Logit model of Occupational Choice (1994 and 2000)

1994

	SE manuf.	SE non-manuf.	SE non-tradable	PE manuf.	PE non-manuf.	CE manuf.	CE non-manuf.	PE non-tradable	CE non-tradable
Age	0.2083***	0.12037***	0.2224***	0.21381***	0.20965***	0.10378***	0.14821***	0.19364***	0.14784***
Age squared	-0.00201***	-0.00107***	-0.00227***	-0.00273***	-0.00245***	-0.00143***	-0.00174***	-0.00216***	-0.00175***
Primary	0.16979***	-0.47445***	0.19722***	0.33683***	-0.77623***	-0.067***	-0.74226***	0.2345***	-0.00982***
Secondary	-0.40192***	-1.54772***	-0.07795***	0.35746***	-1.93924***	-0.26287***	-2.20507***	0.14917***	-0.4857***
Tertiary	-1.1385***	-2.93452***	-0.80749***	-0.05029***	-2.50275***	-1.62587***	-4.72283***	0.86793***	-1.00939***
Sex	-0.21917***	1.2688***	-0.16438***	0.21997***	1.98912***	0.45573***	1.30672***	0.26042***	0.71244***
Urbanity	-0.12279***	-1.13039***	0.26505***	0.24515***	-0.65361***	0.47996***	-1.0259***	0.2611***	0.06669***
HH Head	1.70436***	1.85046***	1.67213***	2.11534***	1.64845***	1.17326***	1.34731***	2.19056***	1.881***
Married	0.87731***	0.8866***	1.11304***	0.53976***	0.58344***	0.46737***	0.49664***	0.28216***	0.2045***
Separated	0.62729***	0.54217***	0.92571***	-0.00485***	0.60974***	0.45073***	0.41065***	-0.1171***	0.30034***
Burden	-0.00814***	-0.04143***	-0.06099***	-0.0802***	-0.0173***	-0.07466***	-0.02947***	-0.02874***	-0.00859***
Number of Employed in HH	1.27427***	1.24985***	1.16528***	1.17574***	1.09913***	1.08945***	1.19314***	1.15435***	1.1389***
Constant	-8.94628***	-7.97977***	-7.34525***	-7.15152***	-8.87296***	-5.87265***	-8.9193***	-6.14849***	-5.80685***

* significant at 10%; ** significant at 5%; *** significant at 1%

Region dummies are added but not reported

"Inactive" is the base category

2000

	SE manuf.	SE non-manuf.	SE non-tradable	PE manuf.	PE non-manuf.	CE manuf.	CE non-manuf.	PE non-tradable	CE non-tradable
Age	0.36029***	0.29914***	0.37659***	0.44175***	0.36834***	0.31244***	0.31613***	0.38129***	0.32809***
Age squared	-0.00404***	-0.00345***	-0.00444***	-0.00599***	-0.00463***	-0.00434***	-0.00408***	-0.0047***	-0.00432***
Primary	0.09099***	-0.46644***	0.15118***	0.31858***	-0.72037***	0.15982***	-0.77054***	0.27759***	-0.10809***
Secondary	0.11779***	-0.973***	0.2796***	0.72016***	-1.5083***	0.24608***	-1.69731***	0.60835***	-0.20372***
Tertiary	-0.01802***	-1.476***	0.47409***	1.08372***	-1.57463***	-0.27054***	-3.18535***	1.93547***	0.08208***
Sex	0.3131***	1.8193***	0.46778***	0.68796***	2.51637***	0.70191***	1.77616***	0.6872***	1.16785***
Urbanity	-0.18702***	-1.51848***	0.26132***	0.2524***	-0.95389***	0.3433***	-1.44041***	0.17915***	0.09477***
HH Head	1.68224***	1.80151***	1.62654***	2.10265***	1.87987***	1.60836***	1.47744***	2.04462***	1.69763***
Married	0.31497***	0.19034***	0.53621***	-0.14109***	-0.00979***	-0.23724***	0.06997***	-0.28696***	-0.21561***
Separated	0.09643***	0.04014***	0.51883***	-0.39771***	-0.00626***	-0.19862***	0.39413***	-0.47419***	0.06077***
Burden	-0.02179***	-0.0471***	-0.08583***	-0.11466***	-0.0089***	-0.02891***	0.02117***	-0.04443***	-0.03474***
Number of Employed in HH	0.97942***	0.95871***	0.90468***	0.82903***	0.78454***	0.76941***	0.88853***	0.88007***	0.8135***
Constant	-13.38343***	-12.55055***	-11.59923***	-12.29787***	-13.32769***	-10.79879***	-12.48823***	-10.78131***	-10.01137***

* significant at 10%; ** significant at 5%; *** significant at 1%

Region dummies are added but not reported

"Inactive" is the base category

Table 7. Industry Wage Premium-Trade Exposure Regression

Dependent Variable: Industry Wage Premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Tariff	0.00343***	0.00774***	0.00778***	0.00737***	0.00768***	0.00727***	0.00111	0.00317	0.0032	0.00278	0.00327	0.00304	0.00317*	0.00588***	0.00592***	0.00588***	0.00603***	0.00597***
Tariff*Lagged Import Penetration		0						-0.00006						-0.00002				
Lagged Import Penetration			-0.00199						-0.00186						-0.0014			
Lagged Exports/Value of Domestic Production				-0.03556**						-0.04494**						-0.02534		
Lagged Import Penetration*Import Weighted RER					-0.00068						-0.00024						-0.00038	
Lagged Exports/Value of Domestic Production*Import Weighted RER						-0.015**						-0.01532**						-0.0116
Constant	0.23942***	0.19561***	0.19657***	0.2126***	0.20119***	0.21346***	0.26788***	0.22828***	0.2293***	0.25406***	0.22993***	0.24922***	0.2489***	0.27453***	0.27435***	0.27495***	0.26916***	0.26839***
Year Dummy	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Time Trend	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	104	78	78	78	78	78	104	78	78	78	78	78	104	78	78	78	78	78
R-squared	0.15	0.51	0.51	0.52	0.51	0.53	0.38	0.57	0.58	0.59	0.58	0.59	0.15	0.53	0.53	0.53	0.53	0.54

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Industry-Skill Premium-Trade Exposure Regression

Dependent Variable: Industry-Skill Premium	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Tariff	-0.00011	-0.0091**	-0.00856**	-0.00896**	-0.00792**	-0.00917**	-0.00538	-0.00956	-0.0098	-0.00897	-0.01042	-0.00904	-0.01067**	-0.01668***	-0.01679***	-0.01582***	-0.01715***	-0.01566***
Tariff*Lagged Import Penetration		0.00104***						0.00109***						0.00098***				
Lagged Import Penetration			0.02267**						0.02646***						0.02528***			
Lagged Exports/Value of Domestic Production				-0.09041						0.00009						-0.04332		
Lagged Import Penetration*Import Weighted RER					0.00126						0.00263						0.00296	
Lagged Exports/Value of Domestic Production*Import Weighted RER						-0.03658						-0.0111						-0.01949
Constant	0.12529**	0.2037***	0.18872***	0.24279***	0.18934***	0.24312***	0.38416**	0.1205	0.10581	0.12025	0.10251	0.13547	0.50989***	0.52567***	0.53162***	0.53***	0.57086***	0.51895***
Year Dummy	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Time Trend	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	104	78	78	78	78	78	104	78	78	78	78	78	104	78	78	78	78	78
R-squared	0	0.17	0.16	0.15	0.14	0.16	0.25	0.33	0.33	0.29	0.31	0.29	0.11	0.25	0.25	0.22	0.24	0.22

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9. Industry Participation (Multinomial Logit Constant) -Trade Exposure Regression

Dependent Variable: Multinomial Logit Constants	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Tariff	0.27191***	0.58629***	0.44596***	0.40982***	0.36274***	0.41656***	0.01144	0.02044	0.03633	0.03967	0.03632	0.03949	0.04877	0.03578	0.0812	0.1902***	0.14505**	0.19842***
Tariff*Lagged Import Penetration		-0.03544***						0.00248						0.01618				
Lagged Import Penetration			-0.35607***						0.0033						0.23503			
Lagged Exports/Value of Domestic Production				0.75209						0.06125						1.75093***		
Lagged Import Penetration*Import Weighted RER					-0.02306***						0.00103						0.00354	
Lagged Exports/Value of Domestic Production*Import Weighted RER						0.19027*						0.01125						0.38429***
Constant	-12.3276***	-13.94479***	-13.11778***	-13.70958***	-12.71233***	-13.78823***	-12.49636***	-12.56085***	-12.59946***	-12.63643***	-12.62683***	-12.63089***	-7.15226***	-6.82355***	-7.1009***	-7.97409***	-7.52597***	-8.08525***
Year Dummy	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Time Trend	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Broad Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36	27	27	27	27	27	36	27	27	27	27	27	36	27	27	27	27	27
R-squared	0.56	0.67	0.66	0.65	0.68	0.65	0.98	0.98	0.98	0.98	0.98	0.98	0.85	0.86	0.87	0.89	0.86	0.89

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10. Wage Inequality Indicators, Actual (1994 and 2000) and counterfactuals

	P90/P10	GE(0)	GE(1)	Gini
1994	6.3146	0.2297	0.2069	0.3551
C(1)	6.5692	0.2327	0.2090	0.3568
C(2)	6.6163	0.2363	0.2130	0.3597
C(3)	6.5525	0.2428	0.2236	0.3664
C(4)	7.3127	0.2696	0.2496	0.3872
C(5)	7.3505	0.2712	0.2502	0.3871
C(6)	7.7955	0.2869	0.2637	0.3964
2000	7.6157	0.2937	0.2954	0.4082

Table 11. Wage Inequality Indicators, Actual and counterfactuals**A. 1988-1994**

	P90/P10	GE(0)	GE(1)	Gini
1988	6.9827	0.2512	0.2244	0.3709
C(1)	7.3540	0.2571	0.2276	0.3734
C(2)	7.4062	0.2588	0.2294	0.3748
C(3)	7.2424	0.2624	0.2361	0.3781
C(4)	6.9506	0.2503	0.2236	0.3683
C(5)	6.5301	0.2387	0.2157	0.3616
C(6)	6.4966	0.2375	0.2147	0.3608
1994	6.3146	0.2297	0.2069	0.3551

B. 2000-2006

	P90/P10	GE(0)	GE(1)	Gini
2000	7.6157	0.2937	0.2954	0.4082
C(1)	8.0364	0.2995	0.2967	0.4114
C(2)	8.0374	0.3000	0.2972	0.4117
C(3)	6.4587	0.2678	0.2664	0.3945
C(4)	5.4644	0.2232	0.2219	0.3598
C(5)	5.6560	0.2256	0.2258	0.3641
C(6)	4.4633	0.1660	0.1659	0.3164
2006	6.1579	0.2219	0.2110	0.3560

Figure 5. Wage Growth Incidence Curves I: Actual and Counterfactual, 1994 and 2000

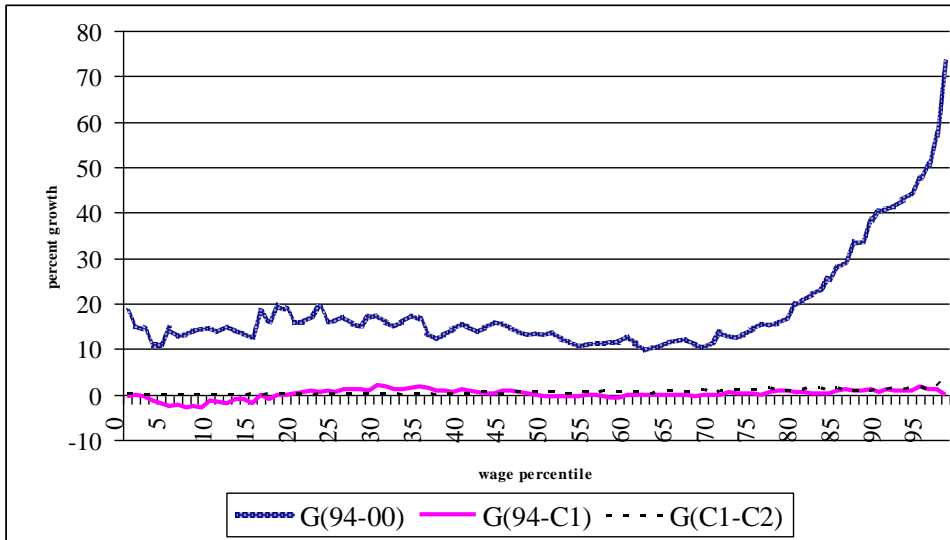


Figure 6. Wage Growth Incidence Curves II: Actual and Counterfactual, 1994 and 2000

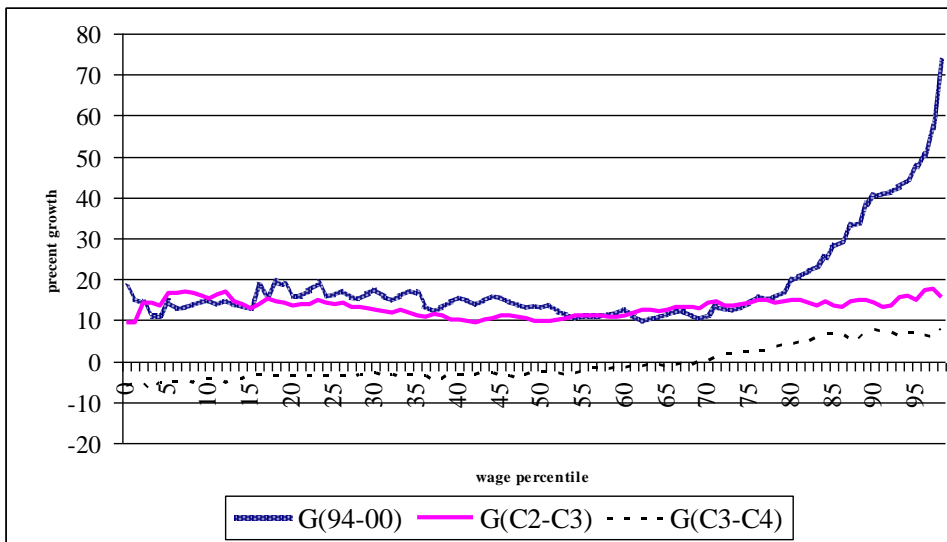


Figure 7. Wage Growth Incidence Curves III: Actual and Counterfactual, 1994 and 2000

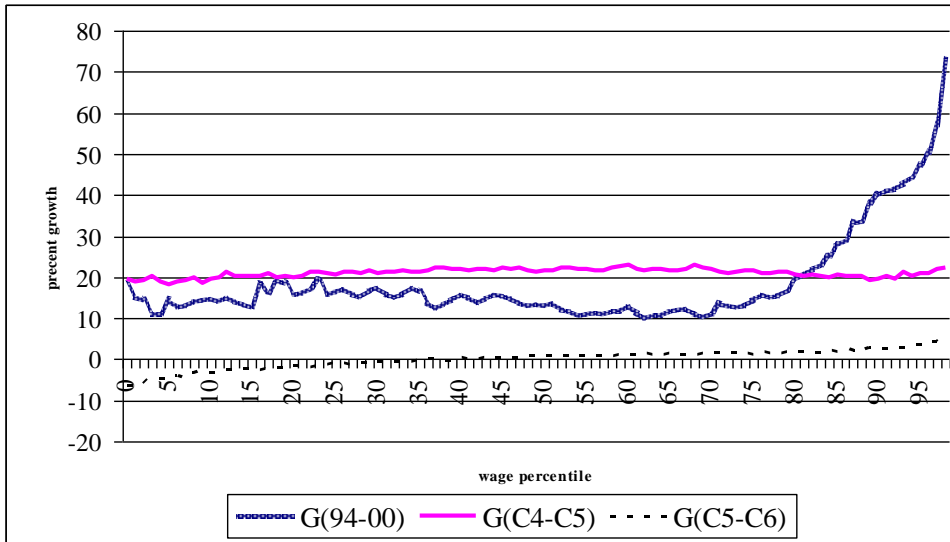


Figure 8. Wage Growth Incidence Curves IV: Actual and Counterfactual, 1994 and 2000

