Chapter 4

Impact of Trade Liberalization on Wage Skill Premium in Philippine Manufacturing

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CHAPTER 4

Impact of Trade Liberalization on Wage Skill Premium in Philippine Manufacturing

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The paper aims to examine how trade liberalization affect wage premium at the firm level. Using effective protection rate as trade proxy, the paper assumes that in the face of increasing competition, an import-substituting firm may decide to remain at the low value added stage of the production process which requires relatively less skilled workers and suggests a decline in the wage premium. On the other hand, a firm may move away from the product whose protection rate has fallen and shift and expand toward a higher value added activity. This would require relatively more skilled workers suggesting an increase in the wage premium. The main findings of the paper show that: First, trade liberalization lowers the wage premium. A firm responds to import competition by shifting to the manufacture of products with lower value added and importing intermediate inputs rather than producing these within the plant. Second, using ASEAN tariff rates as trade proxy, the same results are obtained, however, when ASEAN tariff is interacted with skill intensity, the results show that tariff reduction on skill intensive products is associated with rising wage skill premium. Third, firm characteristics such as skill intensity, firm size, and capital labor ratio matter in assessing the impact of trade reform on the wage premium. Lastly, exports are associated with increasing wage premium at the firm level the higher their skill intensity. In the literature, greater openness is associated with skill biased technological change with export-oriented and technology intensive activities as channels.

Keywords: wage skill premium, trade liberalization, Philippine manufacturing, labor market

JEL Classification: F16

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1. Introduction

Since the 1980s, the Philippines has made considerable progress in opening-up the manufacturing industry by removing tariff and non-tariff barriers. Despite the market-oriented reforms, the growth of the manufacturing industry has been slow. Average manufacturing growth was 0.9 percent in the 1980s, 2.5 percent in the 1990s, and 3.5 percent in the early 20s. Average manufacturing share to total industrial output remained unchanged during the same periods; it accounted for 28 percent of total output in the 1970s, 26 percent in the 1980s, and 24 percent in the 1990s. In terms of employment generation, the manufacturing industry failed in creating enough employment to absorb new entrants to the labor force as its share to total employment dropped from 11.3 percent in the mid-1970s to 9.7 percent in the 2001-2003 period. The industry's total factor productivity growth was negative from 1996 to 2006.

Trade liberalization and integration into the global economy offers opportunities for creating output and employment. Trade liberalization leads to a reallocation of factors of production (labor and capital) within and between firms and sectors. This is the source of the efficiency improvements that underpin the gains from trade. According to the Hecksher-Ohlin model, countries will export goods that use intensively those factors that are relatively abundant at home and import goods that use intensively those factors that are relatively scarce. Trade will increase the demand for the abundant factors, assuming that exports will expand, and will reduce the demand for scarce factors as import-competing sectors contract. In developing countries where unskilled labor is abundant and skilled labor is scarce, trade will increase unskilled labor wages and lower skilled wages, thus, narrowing wage inequality.

In the real word, many of the simplifying assumptions of the model do not hold. Countries do not use exactly the same technology, and transportation costs and non-tariff barriers are present. Many industries operate under conditions of imperfect competition and non-constant returns to scale. The empirical literature indicates that in general, trade liberalization leads to relatively large increases in skill premiums due to the increased demand for skilled workers (Hoekman & Winters 2005 and Goldberg

& Pavcnik 2004). In Mexico, Cragg & Epelbaum (1996) reported a skill premium increase of about 68% between 1987 and 1993. In Columbia; Attanasio, *et al.* (2004) found a 20% increase between 1990 and 1998. Studies indicated that the demand for skilled workers particularly in developing countries may have increased due to the increase in returns to particular occupations that are associated with a higher educational level; shift of skill intensive intermediate goods production from developed to developing countries; skill-biased technological change (SBTC): and compositional changes and quality upgrading of firms and products produced by developing countries.

Despite substantial trade liberalization in the last two decades, the growth of manufacturing has been sluggish and services has become the main driver of growth and employment in the country. Wage premiums declined in industry as education intensity increased suggesting an oversupply of skilled labor relative to the sector's skill needs (World Bank, 2010). With trade liberalization as a major economic reform carried out in the country, it is important to ask whether it has contributed to the decline in the wage skill premium. Using firm level data, the paper aims to analyze the impact of trade liberalization on wage skill premium in the Philippine manufacturing industry. Trade indicators such as output tariffs, input tariffs, and effective protection rates are used in the analysis.

The paper is divided into five parts, after the introduction, section two will provide a brief review of the trade and employment literature. Section three will discuss the trade and employment policies affecting the manufacturing industry along with a review of its performance and contribution to employment. Section four will present the empirical framework and analysis of major findings. Section five will summarize the results and policy implications of the paper.

2. Review of the Trade and Employment Literature Review

2.1. Overview of the Trade and Employment Literature: Rising Skill Premium and Wage Inequality between Skilled and Unskilled Workers

The trade and employment literature focuses on the channels emphasized by the workhorse model of trade, the Hecksher-Ohlin (H-O) model and the Stolper-Samuelson model. A simple version of the model with 2 countries, 2 goods and 2 factors of production predicts that countries should specialize in the production and export of goods that use more intensively their relatively abundant factor and import those goods that use intensively those factors that are relatively scarce. The Stolper-Samuelson model suggests that trade liberalization will increase the demand for and returns to the abundant factor in each of the two countries. If the two factors are skilled and unskilled labor, trade reform in the unskilled abundant country should lead to a decrease in wage inequality between skilled and unskilled labor as the demand for unskilled workers rises. The opposite happens in the skilled labor abundant country.

The Heckscher-Ohlin model suggests that trade liberalization would lead to a redistribution of employment away from import-substituting sectors towards export-oriented sectors under the assumptions of homogeneous firms and products and inter-industry specialization and trade. In many developing countries, however, empirical work has consistently documented a lack of major labor reallocation across sectors despite substantial trade liberalization episodes in these countries from the 1980s to the 1990s (Goldberg & Pavcnik, 2004).

New studies using micro-level data provide evidence of substantial output reallocation following trade reforms from less productive towards more productive firms within an industry leading to an increase in aggregate productivity. Faced with increased import competition, less efficient firms in the industry are forced to downsize, improve efficiency or exit while efficient firms expand their market shares. Overall total factor productivity increases more in industries that liberalized more (Hoekman & Winters, 2005).

It is important to note that in these studies, the assumption of firm heterogeneity within an industry has been adopted in contrast to traditional models that rely on the representative firm assumption. In the presence of within-industry firm heterogeneity,

trade liberalization may lead to improved productivity through the exit of inefficient firms and the reshuffling of resources and outputs from less to more efficient firms. As Melitz (2002) points out, trade opening may induce a market share reallocation towards more efficient firms and generate an aggregate productivity gain, without any change at the firm level.

One of the robust stylized facts on the trade and employment literature is the **significant increase in skill premium and wage inequality between skilled and unskilled workers (**Hoekman & Winters 2005 and Goldberg & Pavcnik 2004). While the Hecksher-Ohlin model would predict that trade liberalization could induce a decline in skill premium and wage inequality; empirical studies show relatively large increases in skill premiums over a short period of time. The increase in skill premium is driven by increased demand for skilled workers. Studies indicate that the demand for skilled workers particularly in developing countries may have increased due to the following:

2.1.1. Increase in returns to particular occupations that are associated with a higher educational level

In the case of pre NAFTA Mexico, Cragg & Epelbaum (1996) find strong support for this hypothesis especially in the occupational premia of professionals and administrators. The authors attributed the increase to the rapid changes introduce in the economy by reforms that increased the demand for individuals who could implement these reforms. Although in Columbia, Attanasio, *et al.* (2004) found that occupational returns remained relatively stable during the period 1986-1998. Although there is a spike in the returns to managers and other professionals in 1992, a year after a dramatic trade and labor reform, this was short-lived and cannot explain the increase in skill premium in the late 1980s and 1990s.

2.1.2. Shift of skill intensive intermediate goods production from developed to developing countries

It is important to point out that trade takes place not only in final goods but also in intermediate goods. As Feenstra & Hanson (1996, 2003) indicated, the increase in global production sharing or outsourcing can partly account for the increased demand for skilled labor in both developed and developing countries. The production of final goods requires the use of intermediate inputs that differ in their skill intensities. Trade

and investment liberalization shift the production of some of these intermediate goods from developed to developing countries. While these products would be characterized as unskilled labor intensive from a developed country's perspective, they appear as skilled labor intensive from the point of view of developing countries. Hence, the average skill intensity increases in both the developed and developing countries, inducing an increase in the skill premium in both places.

2.1.3. Skill-biased technological change (SBTC)

Most of the existing evidence favors the SBTC view as responsible for the rising skill premium. Based on studies using different methodologies (inspired by the H-O model); Lawrence and Slaughter (1993), Sachs & Shatz (1994), Robbins (1996), Desjonqueres, *et al.* (1999) and others find that trade has little explanatory effect on changes in labor demand and relative wages across industries. Freeman & Katz (1991), Katz & Murphy (1992), Revenga (1992), Bernard & Jensen (1995) and Berman, *et al.* (1994) conclude that SBTC explains a large part of the changes in employment and relative wages based on the finding of a strong positive association between R&D expenditures and a rise in the relative return to skilled labor.

Note however, that although the evidence is in favor of SBTC, this does not necessarily imply that trade policy did not indirectly contribute to changes in the wage distribution especially if technological change was itself an endogenous response to more openness (Goldberg & Pavcnik, 2004). Recent theoretical papers have explored channels through which trade openness may have induced or at least contributed to SBTC. Wood's (1995) defensive innovation hypothesis states that intensified competition from abroad may induce firms to engage in R&D or take advantage of existing new technologies that they may have had little incentive to adopt prior to liberalization. The same argument was put forward by Thoenig & Verdier (2003). Acemoglu (2003) develops an endogenous technological change model and argues that in the case of developing countries this technological change may take the form of increased imports of machines, office equipment, and other capital goods that are complementary to skilled labor.

Trade liberalization affects the demand for skilled labor by reducing the prices of the relevant capital goods and hence increasing their imports. In the model developed by Aghion, *et al.* (2003), firms' response to trade liberalization depends on how close

they are to the technology frontier. Firms that are sufficiently close can survive or deter entry of competitors by innovating while those that are far from the frontier may not be able to fight external entry. The authors also emphasize the role of domestic institutions, labor market restrictions in particular, and their interactions with technology adoption for the impact of trade policy on wage inequality. Another explanation focuses on the increased exports from developing countries following trade reforms. Empirical evidence from the US suggests that exporting is a skill-intensive activity (Bernard & Jensen, 1997) and to the extent that this is true for developing countries, an increase in exports will increase the relative demand for skilled labor. In Mexico, Harrison & Hanson (1999) finds a positive association between a firm's exporting status and the relative employment of white collar workers during a period of trade liberalization. Based on regressions relating the change in the share of skilled workers by sector to the change in tariff protection during the 1984-1998 period; Attanasio, *et al.*(2004) show that the increase in demand for skilled workers was largest in those sectors that experienced the largest tariff cuts (textiles and apparel). This provides some support for the theory that SBTC was itself an endogenous response to trade liberalization.

2.1.4. Compositional changes and quality upgrading of firms and products produced by developing countries

One puzzling finding in studies on trade liberalization studies in developing countries is the lack of labor reallocation across sectors which is the complete opposite of trade and productivity studies that are based on micro-level data. These studies find major resource reallocation across firms after trade liberalization with resources moving from less productive to more productive firms within the same industry which leads to increases in aggregate industry productivity. Recent work focus on compositional change in response to trade reform that may induce reallocation of both capital and labor towards "higher quality" firms. Trade openness induces a quality upgrading of firms where quality can mean either firm productivity or product quality. This higher quality firms employ a higher proportion of skilled workers so that aggregate demand for skilled workers increases relative to unskilled workers. In response to trade reforms, firms in import-competing sectors try to avoid competition

from cheaper countries by differentiating themselves. Trade can also shift resources from non-exporters to exporters and there is sufficient evidence that exporters tend to be more productive than non-exporters.

Using Indonesian manufacturing data and assuming firm heterogeneity, trade in final and intermediate goods as well as firm-specific wages; Amiti & Davis (2011) shows that the impact of a tariff change on wages depends on the globalization mode of the firm at which a worker is employed. A decline in output tariffs reduces wages of workers that sell only in the domestic market, but increases wages of workers at firms that export. Meanwhile, a decline in input tariffs increases the wages of workers at firms using imported inputs, but reduces the wages of workers at firms that do not import inputs.

In another paper, Amiti & Cameron (2011) analyzed the wage skill premium impact of tariff reduction on intermediate and final goods within firms in Indonesia. The analysis relied on firm-level census data on manufacturing covering firms employing 20 or more workers during the period 1991-2000. Their findings show a strong link between input tariffs and wage skill premium; their results indicate that tariff reduction on inputs reduces the wage skill premium within firms. However, in terms of tariff reduction on final goods, no similar significant impact on the wage skill premium was observed within firms.

2.2. Philippine Trade and Employment Studies

In the Philippines, similar studies that examine the relationship between trade and employment are still relatively few. Lanzona (2001) tested the Samuelson-Stolper theory and the findings showed that liberalization led to an increase in the incomes of all resource owners, although the increase in returns to unskilled labor had been lower than the other factors. Lanzona also found moderate increases in wage inequality. In another paper, Orbeta (2002) indicated that increases in the propensity to export shifts the demand for labor upward and increases in export propensity increase the proportion of low-skilled production workers.

Meanwhile, Hasan & Chen (2003) showed that wage inequality in the manufacturing sector declined over the period 1988-1997 despite large reductions in tariff rates in less skill intensive manufacturing industries and tariff reductions had an

insignificant impact on both employment and average hours of work among full-time workers across industries. Their results also showed that tariff reductions were associated with declines in industry wage premiums in capital-intensive industries and these declines seemed to be largest for skilled workers.

Hasan & Jandoc (2010) found little evidence that trade liberalization had an important role to play in increasing wage inequality in the Philippines. The authors concluded that there is little evidence that trade liberalization had an important role to play in increasing wage inequality in the Philippines. The bulk of the trade-induced increases in inequality are due to employment reallocation effects of trade as employment shifted to more protected sectors. Based on the decomposition of changes in the entire wage distribution from 1994 to 2000, they showed that the trade-induced effects on industry wage premia, industry-specific skill premia, and employment reallocation accounted for slightly less than 17% of the total increase (in the Gini coefficient).

3. Trade and Employment Policies and Performance of the Manufacturing Industry

3.1. Trade Policy Reforms

After more than three decades of protectionism and import substitution from the 1950s up to the 1970s, the government started to liberalize the trade regime by removing tariff and non-tariff barriers in the 1980s. In 1982, the country's first tariff reform program (TRP 1) substantially reduced the average nominal tariff and the high rate of effective protection that characterized our industrial structure. TRP I also reduced the number of regulated products with the removal of import restrictions on 1,332 product lines between 1986 and 1989.

In 1991, the second phase of the tariff reform program (TRP II) further narrowed down the tariff range with the majority of tariff lines falling within the three to 30 percent tariff range. It also allowed the tariffication of quantitative restrictions for 153 agricultural products and tariff realignment for 48 commodities. As such, the number

of regulated products declined to about three percent in 1996 and by 1998, most quantitative restrictions were removed except those for rice.

In 1995, the government initiated the third round of tariff reform (TRP III) as a first major step in its plan to adopt a uniform five percent tariff by 2005. This further narrowed down the tariff range for industrial products to within three and ten percent range. In June 1999, Executive Order 63 was issued to increase the tariff rates on textiles, garments, petrochemicals, pulp and paper, and pocket lighters and at the same time, froze tariff rates at their 2000 levels.

In 2001, another legislation (TRP IV) was passed to adjust the tariff structure towards a uniform tariff rate of 5 percent by the year 2004. However, this was not implemented, instead, in October and December 2003, the government issued Executive Orders 241 and 264 which modified the tariff structure to protect selected industries. These Executive Orders restructured tariffs such that the rates on products that were not locally produced were made as low as possible while the tariff rates on products that were locally produced were adjusted upward. Since 2004, no major unilateral tariff changes have been made; mostly the tariff reductions carried out were those covered by the ASEAN Free Trade Area-Common Effective Preferential Tariff (AFTA-CEPT) scheme.

4. Tariff and Protection Structure

Table 1 presents the tariff rates from 1996 to 2004 for the country's major economic sectors. Note that since 2004, no major most favored nation (MFN) tariff changes have been implemented. The tariff changes pursued were mainly those arising from the ASEAN Free Trade Agreement.

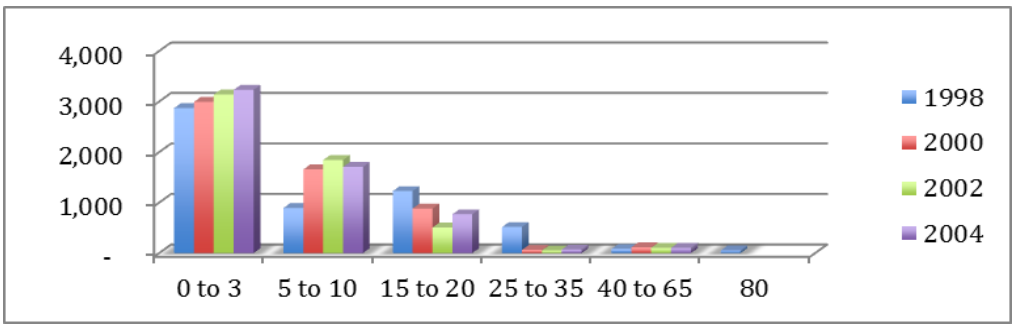
Table 1: MFN Tariff Structure

	Implementation of Major Tariff Policy Changes							
Major Sectors	1996	1998	1999	2000	2001	2002	2003	2004
All Industries	25,5	11,32	10,25	8,47	8,28	6,45	6,6	6,82
CV	1,02	0,96	0,91	0,99	1,04	1,17	1,06	1,07
Agriculture	29	15,9	13,2	11,5	12,3	10,4	10,4	11,3
CV	0,81	1,07	1,14	1,3	1,23	1,31	1,22	1,17
Fishing & forestry	22	9,4	8,9	6,7	6,7	5,8	5,7	6
	0,95	0,63	0,7	0,66	0,62	0,45	0,48	0,57
Mining & quarrying		3,3	3,3	3,1	3,2	2,8	2,7	2,5
CV		0,42	0,41	0,24	0,23	0,38	0,4	0,48
Manufacturing	28	11,38	10,35	8,5	8,28	6,39	6,57	6,76
CV	0,97	0,93	0,88	0,95	1	1,13	1,03	1,03

Note: CV coefficient of variation (ratio of SD to mean).
Source: Aldaba (2005)

It is evident from the data that the country's overall level of tariff rates are already low. As of 2004, the average tariff rate for all industries is 6.82 percent. Manufacturing rates are almost the same as the total industry average with an average tariff rate of 6.76 percent. In terms of frequency distribution, Figure 1 shows that in 2004, more than 50% of the total number of tariff lines were already clustered in the 0 to 3% tariff range while 29% were in the 5 to 10% range. 13% were in the 15 to 20% tariff range, 1% in the 25 to 35% tariff range, and 2% in the 40 to 65% tariff range. Between 2002 and 2004, the number of lines in the 5 to 10% tariff range fell but those in the 15 to 20% range increased.

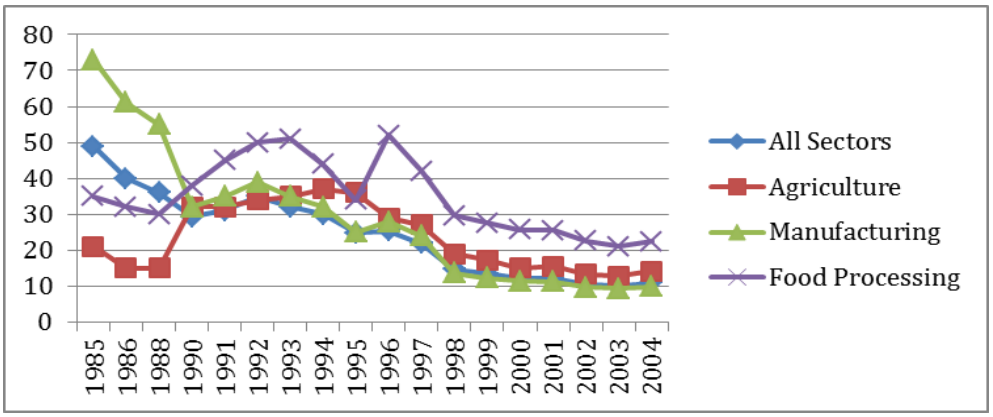
Figure 1: Frequency Distribution of Tariff Rates



Source: Aldaba (2005).

Compared to tariff rates, effective protection rates (EPRs)[1] provide a more meaningful indicator of the impact of the system of protection. EPRs measure the net protection received by domestic producers from the protection of their outputs and the penalty from the protection of their inputs. Figure 2 shows that average effective protection rates for all sectors declined from 49% in 1985 to 36% in 1988. In 1995, this further dropped to around 25%, to 15% in 1998 and to 10.9% in 2004. For manufacturing, EPR fell from 73% in 1985 to 55% in 1988 and to 28% in 1996. This further declined to 11.4% in 2000 to about 10% in 2004.

Figure 2: Effective Protection Rates (1985-2004)



Source: Medalla, E (1990), Tan, E. (1995), Manasan, R. & V. Pineda (1999), and Aldaba (2005)

5. Overall Economic Performance

Table 2 presents the average growth rates of the economy from the 1970s to the 2000s. While the industry sector was the best performer in terms of average annual growth rate in the 1970s, the services sector has become the most important sector in the succeeding decades. Both agriculture and industry, manufacturing in particular,

[1] EPRs are rates of protection of value added, are more meaningful than actual tariff rates and implicit tariff rates (representing excess of domestic price of a product over its international price) since it is value added (rather than the value of the product) that is contributed by the domestic activity being protected. EPRs measure the net protection received by domestic producers from the protection of their outputs and the penalty from the protection of their inputs. However, as Francois & Reinert (1997) cited, EPRs are partial equilibrium rather than equilibrium measure. It assumes that there is no change in technology in shifting between actual and world prices. It assumes that there is perfect substitutability between domestic and foreign goods, whereas most modern trade models assume imperfect substitutability or the so-called "Armington assumption".

experienced sluggish growth in the 1980s and 1990s; modest gains were registered in the current period. In contrast, the average growth rate of the services sector increased particularly in the last two decades as its average growth rate went up from 3.6% in the 1990s to 5.8% in the 2000s.

Table 2: Average Growth Rates by Sector (in %, at constant 1985 prices)

Year	1971-80	1981-90	1991-00	2001-10
Gross Domestic Product	5,7	1,7	3	4,7
1. Agriculture, Fishery, Forestry	3,9	1,1	1,8	3
2. Industry Sector	7,6	0,3	3	4,2
Manufacturing	5,9	0,9	2,5	4,1
3. Service Sector	5,2	3,3	3,6	5,8

Source of basic data: National Accounts of the Philippines, National Statistical Coordination Board

*: figure refers to combined finance and trade sectors

Table 3 shows that the average share of manufacturing value added increased from 28% in the 1970s, this declined to 26% in the 1980s, to around 24 percent in the 1990s and 23.7% in the 2000s. It is also evident from the table that the Philippine economy's output structure is characterized by a large services sector. The services sector's share continued to increase from an average of 37 percent during the 1970s to 40.4 percent in the 1980s, 42.4 percent in the 1990s and to 48 percent in the most recent period.

Table 3: Value Added Structure by Major Economic Sector

Year	1971-80	1981-90	1991-00	2001-10
Agriculture, Fishery,Forestry	25,6	23,9	20,8	18,9
Industry Sector	38,3	38	34,1	33,1
Manufacturing	28,2	26,3	24,3	23,7
Service Sector	36,6	40,4	42,4	48

Source of basic data: National Accounts of the Philippines, National Statistical Coordination Board

*: figure refers to combined finance and trade sectors

6. Productivity

Table 4 shows total factor productivity (TFP)[2] growth figures for manufacturing which are normalized and interpreted as growth relative to 1996. From 1996 to 2006, aggregate productivity gains are evident in leather, textile, furniture, other manufacturing, and basic metals and fabricated metal sectors. Leather grew by 9.5%, textile by 2.4%, other manufacturing by 2.9%, furniture by 1.9% and basic metals by 1.3%. On the whole, the manufacturing sector's aggregate productivity declined by 3.4% from 1996 to 2006.

Table 4: TFP Growth from 1996 to 2006

Sector	TFP	Sector	TFP
Food, beverages, & tobacco	-1,44	Non-metallic products	-0,65
Textile	2,35	Basic metal & fabricated metal products	1,32
Garments	-0,99	Machinery & equipment, motor vehicles & other transport	-0,86
Leather	9,54	Furniture	1,86
Wood, paper, & publishing	-5,39	Other manufacturing	2,87
Coke, petroleum, chemicals & rubber	-4,76	All Manufacturing	-3,37

Source: Aldaba (2010)

Herrin & Pernia (2003) attributed the deterioration in the country's productivity to the failure of firms to invest in state-of-the-art technology and implement best practice, the lack of investments in human capital, and the relatively quick expansion of employment in low productivity services sector.

[2] Total factor productivity was estimated using the methodology of Levinsohn and Petrin (2001).

7. Employment

In terms of employment contribution, the manufacturing sector has failed in creating enough employment to absorb new entrants to the labor force as well as those who move out of the agricultural sector. As Table 5 shows, its share dropped from 11 percent in the mid-1970s to 9 percent in the 2000-2009 period. The services sector has become the largest provider of employment in the most recent period.

Table 5: Structure of Employment (in percent)

Major Sector	1975-78	1980-89	1990-99	2000-09
Agriculture, Fishery and Forestry	52,83	49,6	43,16	36,58
Industry	15,23	14,49	15,98	15,2
Manufacturing	11,29	9,93	10,01	9,24
Services	31,87	35,9	40,94	48,21

Source: Yearbook of Labor Statistics (1980-2000) and Current Labor Statistics (2001-2002), Bureau of Labor and Employment Statistics, Department of Labor and Employment and Employed Persons by Major Industry Group, National Statistics Office Labor Force Survey (1970, 1975-1976, 1977-1978, 2003-2009).

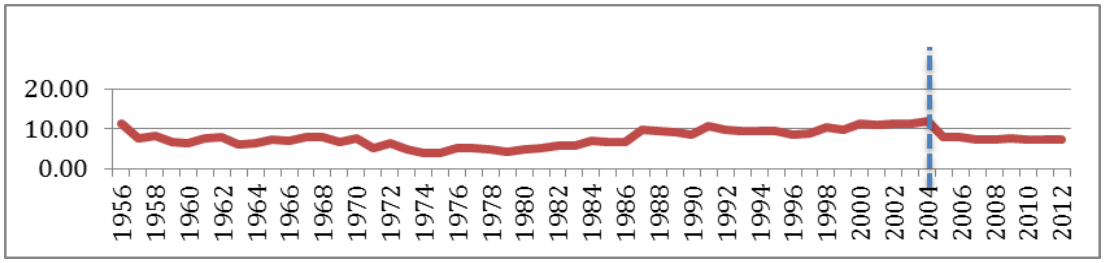
Table 6 and Figure 3 presents the average unemployment and underemployment rates from the 1970s to present. Unemployment increased steadily from an average of 4.9% in the 1970s to 7% in the 1980s, 9.8% in the 1990s and 11% during the early 2000s. Underemployment rate was high and was more than double the unemployment rate up to the 1990s. It declined from 26% in the 1980s to 21% in the 1990s and to 17% in the early 2000s. Note that due to the change in the definition of unemployment in 2005, there has been a big drop in the unemployment rate and an increase in the underemployment rate for the period 2005-2010.

Table 6: Labor Market Indicators

Year	Unemployment Rate	Underemployment Rate	GDP growth rate
1971-75	4,86	21	4,8
1981-90	7,43	25,74	5,7
1991-00	9,75	21,39	1,7
2001-04	11,43	17,2	3
2005-10	7,57	20,14	4,7
2011	7,2	18,8	3,7
2012	7,4	19,4	6,6

Source: Yearbook of Labor Statistics. BLES-DOLE. The rates for 2011 & 2012 are from Labor Force Survey of NSO. Notes: (1) Starting April 2005, unemployed persons include all persons 15 years old & over & are reported as (i) without work & currently available for work & seeking work & (ii) without work & currently available for work but not seeking for work due to the following reasons: tired/believed no work available; awaiting results of previous job application; bad weather; & waiting for rehire/job recall. (2) Prior to 1976, working age population covered 10 years old and over, and from 1976 onwards, 15 years and above.

Figure 3: Philippine Unemployment Rate



Note: Starting April 2005, NSO changed the definition of unemployment (see above).
Source: Yearbook of Labor Statistics. BLES-DOLE. The rates for 2011 & 2012 are from Labor Force Survey of NSO.

8. Wage Premium Trends

Table 7 presents the relative wages of skilled to unskilled workers using the Occupational Wages Survey of the Bureau of Labor Statistics. The Survey covers average monthly wage rates of time-rate workers on full-time basis employed in non-agricultural establishments employing 20 or more workers. These are based on basic pay referring to pay for normal/regular working time before deductions for employees contributions and withholding taxes and excluding overtime, night shift differential and other premium pay. Skilled workers include production supervisors, general foremen, engineers, quality inspectors, accounting and bookeeping clerks, production

clerks and related workers. Unskilled refers to other workers excluding janitors, messengers, and freight. On the average, the data show a general downward trend between 2004 and 2010 except for certain sectors such as wood, wood products ex. furniture; rubber and plastic products; and motor vehicles, trailers, and semi-trailers.

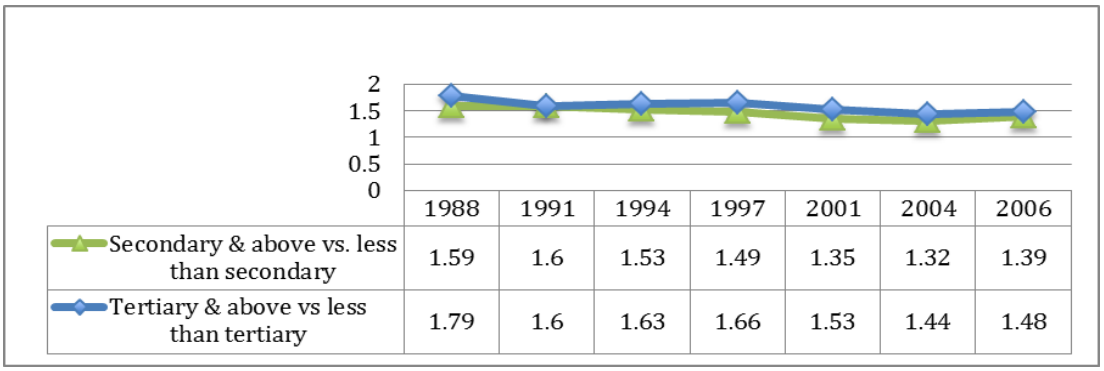
Table 7: Relative Wages of Skilled and Unskilled Workers

Sector	2004	2006	2008	2010
Food Products and Beverages	1,69	1,55	1,37	1,61
Manufacture of Textiles	1,33	1,23	1,22	1,17
Manufacture of Wearing Apparel	1,36	1,25	1,06	1,19
Tanning and Dressing of Leather; Luggage, Handbags and Footwear	1,2	1,16	1,14	1,14
Wood, Wood Products except Furniture	1,28	1,29	1,25	1,34
Paper and Paper Products	1,76	1,48	1,5	1,31
Publishing and Printing	1,51	1,36	1,27	1,36
Coke, Refined Petroleum and Other Fuel		3,14	1,71	2,2
Chemicals and Chemical Products	2,08	1,73	1,88	1,97
Rubber Products	1,37	1,74	1,44	1,74
Plastic Products	1,27	1,25	1,28	1,46
Other Non-Metallic Mineral Products	1,93	1,58	2,06	1,79
Basic Metals	1,37	1,23	1,29	1,26
Fabricated Metal Products, except Machinery and Equipment	1,21	1,36	1,25	1,1
Machinery and Equipment, n.e.c.	1,47	1,15	1,56	1,29
Electrical Machinery and Apparatus, n.e.c.	1,7	1,64	1,8	1,29
Radio, Television and Communication Equipment and Apparatus	1,55	1,31	1,52	1,35
Motor Vehicles, Trailers and Semi-Trailers	1,88	1,37	1,6	1,92
Building and Repairing of Ships and Boats	1,98	1,46	1,18	1,31
Manufacture and Repair of Furniture	1,25	1,3	1,23	1,19
Average	1,54	1,48	1,43	1,45

Source: Bureau of Labor Statistics Occupational Labor Survey.

In the manufacturing industry, the share of the workforce with higher education increased dramatically between 1988 and 2006. The share with some secondary education and above went up from 0.5951 in 1988 to 0.6901 in 1994 to 0.745 in 2001. This further increased to 0.7548 in 2004 and to 0.7779 in 2006. In the light of increasing skill shares, wage premium for the employed with secondary and above vs. those with less than secondary declined from 1.59 in 1988 to 1.39 in 2006. Wage premiums for the employed with tertiary and above vs. less than tertiary also dropped from 1.79 in 1988 to 1.48 in 2006 (see Figure 4). Figure 5 shows the declining trend in wage premiums in the various manufacturing sub-sectors.

Figure 4: Skill Wage Premium in Manufacturing



	1988	1991	1994	1997	2001	2004	2006
Secondary & above vs. less than secondary	1.59	1.6	1.53	1.49	1.35	1.32	1.39
Tertiary & above vs less than tertiary	1.79	1.6	1.63	1.66	1.53	1.44	1.48

Source of basic data: Skills wage premiums are calculated as ratio of hourly pay of each skill group relative to comparator skill group. World Bank 2010. Philippine Skills Report.

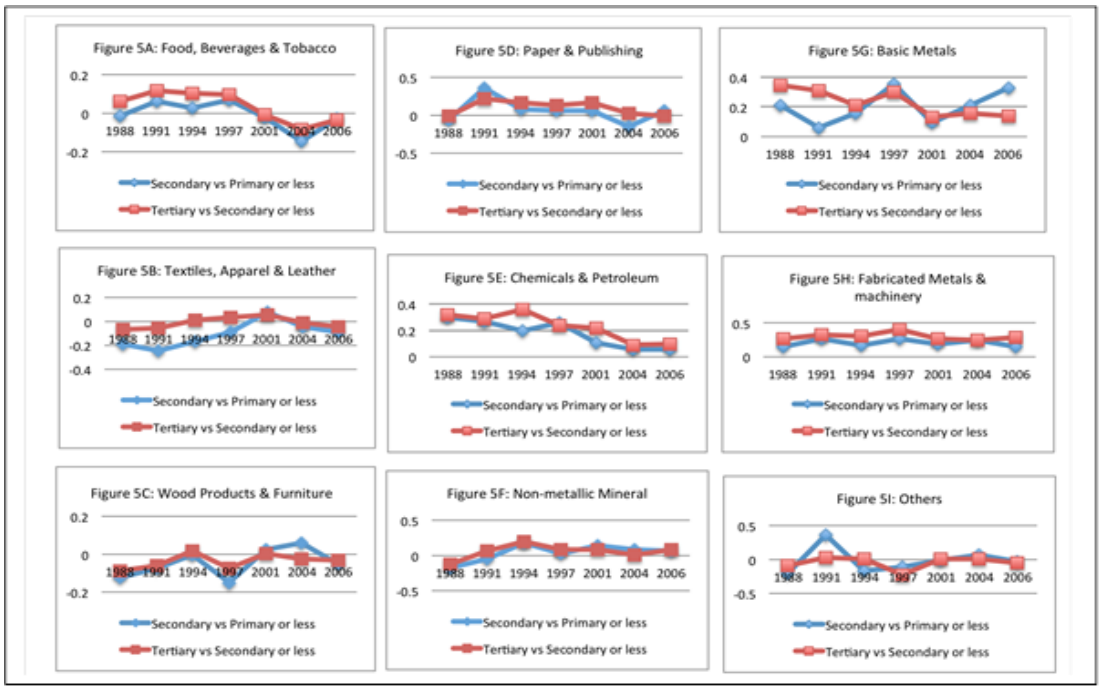
9. Labor Market Policies

Labor regulations in the Philippines are characterized by minimum wages and stringent protection laws especially on workers dismissal. Since the 1950s, wage boards (consisting of members appointed by the President) have governed the determination of wages in the country. Prior to 1989, minimum wages were set at the national level. Thereafter, these have been set at the regional level through the issuance in 1989 of Republic Act (RA) 6727 or the Wage Rationalization Act. This shifted wage setting from a national to a regional system of wage determination and assigned the function of minimum wage setting to the Regional Tripartite Wages and

Productivity Boards (RTWPBs) to take into account the differences in living standards and economic development across regions. It aimed to rationalize minimum wages, promote productivity as well as to reduce labor market rigidities in response to liberalization and other market-oriented reforms being carried out in the country.

The Labor Code requires employers to justify termination for authorized causes such as redundancy, installation of labor-saving devices, and other similar measures. The Labor Code also mandates employers to regularize probationary employees after their 6th month of service. Regularized employees have the right to full benefits and security of tenure, and can only be removed under just or authorized causes. Other workers may be terminated after their contracts have expired. However, due to their complexities, many of the regulations are not effectively implemented as indicated by the low compliance and enforcement rates. Less than 25 percent of workers comprising mostly formal wage and salaried workers are *de facto* covered and protected by labor regulations. The informal sector and informal workers in the formal sector are largely left out and are not protected from job and income losses (World Bank PDR 2012).

Figure 5: Wage Premium in Manufacturing Sub-sectors[3]



Source: World Bank ,2010. Philippine Skills Report.

10. Methodology and Analysis of Results

10.1. Estimation Methodology

To examine the impact of trade on the wage skill premium, the framework draws from the Amiti & Cameron (2011) study. The following reduced form equation will be estimated:

$$WS_{it} = \beta_0 X_{it} + \beta_1 Trade_{jt} + \beta_2 Industry + \beta_3 Time + \mu_{it}$$

where *i* indexes firms, *j* industry, and *t* year. The μ_{it} are error terms. The dependent variable, *WS*, is the log of the wage skill premium for firm *i* at time *t*. It is measured by the ratio of the average wage of skilled or nonproduction workers to the average wage of unskilled or production workers. The explanatory variables include trade

[3] Estimates are based on log hourly wage regressions controlling for individual attributes, 16 regions, 34 industries & 5 occupations. Industry premiums are deviations from employment-weighted average industry wage premium (World Bank 2010. Philippine Skills Report).

policy proxies and a vector of firm-level controls denoted by *X* such as export share, capital intensity, number of workers (to control for size) and skill share (to control for skill intensity). *Industry and time dummies* are also included in the analysis. *TRADE* is the trade policy variable proxied by the effective protection rate (EPR) in sector *j*.

Effective protection rates (EPR) or rates of protection of value added are more meaningful than actual tariff rates since it is value added rather than the value of the product that is contributed by the domestic activity being protected. EPRs measure the net protection received by domestic producers from the protection of their outputs and the penalty from the protection of their inputs. The EPR formula is given by

$EPR = (V-V^*)/ V^*$

where V is the domestic value added per unit of the final good (including the tariffs on that good and on its inputs) and V^* is the value added under free trade. Value added per unit is defined as the gross value of output minus the cost of inputs used in production. Domestic value added is given by

$V = (1+ t_j) - \sum a_{ij} * (1+t_i)$

free trade value added is the same, except that in this case tariffs do not exist (the value of t is zero)

$V^* = 1- \sum a_{ij}$

where

a_{ij}: technical coefficient derived from the 1994 and 2000 input-output table indicating the amount of input from sector i needed to produce a unit of output j

tj : tariff on output from sector j

ti : tariff on input from sector i.

EPR increases (decreases) under the following conditions: (i) the larger (smaller) the tariff on the output; (ii) the smaller (larger) the tariffs on the inputs and; (iii) the lower (higher) the world value added. With tariff reduction on both inputs and output, competition from foreign goods increases. As tariffs on both the inputs that the firm uses and the output that it produces are reduced, the level of effective protection rate declines; the decline can be offset depending on the size of the world value added of the firm's activity. The lower the world value added, the higher the EPR. Faced with some small positive protection, an import-substituting firm may decide to remain at the low value added stage of the production process and given the reduction on tariffs on its inputs, the firm would import these intermediate inputs rather than manufacture these within the plant. The low value added activity in which the firm is engaged in

would require relatively less skilled workers. This suggests a decline in the wage premium within the firm and a positive coefficient on EPR.

On the other hand, the firm may decide to move away from the domestic market and production of import substitutes whose protection rate has fallen and shift and expand towards a higher value added stage of the production process and export. This would require relatively more skilled workers suggesting an increase in the wage premium within the firm. Thus, a negative coefficient on EPR is expected.

The other trade policy variables used are MFN and ASEAN tariff rates. Following Amiti & Cameron (2011) input and output tariffs are calculated separately. MFN and ASEAN tariff rates are average tariffs at the two-digit level classification code. Tariff rates were linked to the manufacturing data by converting HS and AHTN Codes into their corresponding two-digit industry codes. MFN output rates are obtained from the Philippine Tariff Commission while the ASEAN rates are from the ASEAN Secretariat database. MFN input tariff rates are weighted averages based on the technical coefficients obtained from the Input-Output table of the Philippines.

The firm-level characteristics are measured as follows:

KL is capital intensity measured as the ratio of the book value of assets to total workers.

SKILL INTENSITY is the ratio of wages of nonproduction workers to total wages

EXPORT is the ratio of exports to total revenue.

LNWORKERS is the log of number of workers

11. Data

In linking trade liberalization and wage inequality, the paper will use the firm level panel data created in the first ERIA Micro Data Project. The panel dataset was based on the Annual Survey of Establishments and Census of Establishments conducted by the National Statistics Office (NSO)[4]. The dataset consists of firm level information

[4] The National Statistics Office provided assistance in building the panel dataset.

on sales revenues, export, employment, compensation, physical capital, and production costs including the cost of domestic outsourcing.

The firm-level panel dataset covers four years: 1996, 1997, 1998, and 2000. The year 2000 is a census years while the remaining six years are survey years. The panel dataset is unbalanced and covers all firms with two or more overlapping years during the period 1996-2000. Firms with missing, zero or negative values for any of the variables listed above as well as firms with duplicates were dropped. These are mostly firms with less than 10 workers.

The dataset has export information for the years 1996, 1998, and 2000. For the years 1996 to 2000, compensation by type of workers is also available. This enables us to differentiate between wages and salaries received by skilled and unskilled workers. Skilled workers are defined as managers and other office and administrative workers while unskilled workers refer to production and other workers. Domestic outsourcing is measured by the cost of industrial services done by other firms. This is defined as contract or commission work done by others on materials owned and controlled by the firm. The summary statistics are presented in Table 8.

Table 8: Summary Statistics

Variable	N	Mean	Std. Dev.
EPR	9481	0,1936065	0,2444629
MFN output tariff	9481	0,1694335	0,0986249
ASEAN tariff	9427	0,1109581	0,0592453
MFN input tariff	9481	0,1396643	0,0969018
KL	9481	176307	978528,5
Export share	9475	0,1860599	0,3687404
Skillint	8943	0,1868895	0,1370246
Ratio Skilled-unskilled workers	8041	0,661974	1,419953
Ratio Skilled-unskilled wages	7541	1,049153	2,137425
Employment	9481	283,4903	613,065
Lnworkers	9481	4,732057	1,323537
LnWS	7535	0,5081771	0,5467905

Between 1996 and 2000, the overall declining trend in effective protection along with MFN and ASEAN tariff rates is evident in Table 9. The table shows rising capital intensity during the same years. LnWS (log of the wage skill premium measured by

the ratio of the average wage of skilled or nonproduction workers to the average wage of unskilled or production workers) also increased between 1996 and 2000. Increases in export ratio are also observed.

Table 9: Mean Values for 1996, 1997, 1998 and 2000

Variable	1996	1997	1998	2000
EPR	0,208446	0,18964	0,217849	0,153088
MFN output tariff	0,214108	0,187993	0,150031	0,110985
ASEAN tariff	0,138768	0,121553	0,103311	0,071621
MFN input tariff	0,179051	0,154957	0,120401	0,091885
KL	145506,2	139726,2	192869,8	243333,3
LNWS	0,485142	0,487143	0,517172	0,550841
Export	0,214526	ND	0,280447	0,282356

12. Results

In analyzing the impact of trade liberalization on wage inequality; firm heterogeneity and output and input tariffs are taken into account. The model to be tested is given by the following:

$$LNWS_{it} = \beta_0 TRADE_{jt} + \beta_1 EXPORT_{ijt} + \beta_2 Skillint_{ijt} + \beta_3 TRADE_{jt} * Skillint_{ijt} + \beta_4 EXPORT_{jt} * Skillint_{ijt} + \beta_5 LNWorkers_{ijt} + \beta_6 KL_{ijt} + \mu_{it}$$

where *i* indexes firms, *j* industry, and *t* year. *LNWS*, is the log of the wage skill premium for firm *i* at time *t.* It is measured by the ratio of the average wage of skilled or nonproduction workers to the average wage of unskilled or production workers. *TRADE* is a trade policy proxy measured by MFN input and output tariffs, ASEAN rates, and effective protection rates. *EXPORT* is export share, *KL* is capital intensity, *LNWorkers* is a control for size measured by the number of workers and *Skillint* is a control for skill intensity measured by skill share. The trade variables (MFN Output tariff, ASEAN tariff, and EPR) as well as Exports are interacted with Skill intensity.

12.1. Trade liberalization and skill intensity

Two estimation techniques are used, fixed effects (FE) and random effects (RE) methods. Table 10A presents the results using MFN tariffs as trade variables. Table 10B summarizes the results using ASEAN tariff rates as trade proxy variable while Table 10C presents the results with EPR as trade variable.

Using MFN tariffs as trade policy variable, Table 10A shows that based on FE estimates (1A and 1B), firm characteristics like skill intensity, size (Ln workers), and capital intensity (KL) are highly significant and positively correlated with the wage skill premium. Based on the FE results, the coefficients on MFN output and MFN input tariffs are not statistically significant. The coefficient on export share is positive but not statistically significant.

Table 10A: MFN Tariffs

lndiff	FE (1A)	FE (1B)	RE (2A)	RE (2B)
Output tariff	-0,182	0,04	0.25***	0.308***
	-0,18	-0,2	-0,096	(0.106)
Input tariff	0,017	0,039	-0.57***	-0.459***
	-0,19	-0,19	-0,108	(0.129)
Export share	0,025	0,012	0.095***	0.08***
	-0,017	-0,02	(0.01)	(0.016)
Skill intensity	2.190***	2.212***	1.79***	1.86***
	-0,137	-0,137	(0.076)	(0.077)
Ln workers	0.140***	0.143***	.0777***	.074***
	-0,03	-0,03	(.007)	(0.007)
KL	1.44e-08***	1.36e-08***	-2.67e-09	-2,19E-09
	-3,65E-09	-3,58E-09	(7.55e-09)	-6,69E-09
Year	N	Y	N	Y
Industry	N	Y	N	Y
Obs	7530	7530	7530	7530
R2	0,165	0,17	0,15	0,156

Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors in parentheses.

Compared with the FE model where the trade and export regressors were not significant, the RE results show that these variables have highly significant effects on the wage premium. Capital intensity which is highly significant in the FE model is insignificant in the RE model. As might be expected from the different results

generated by the RE technique, the Hausman test's null hypothesis that the RE estimator is consistent is soundly rejected.

Using ASEAN tariff as trade variable, Table 10B shows the same general results as those obtained using MFN tariffs as trade variable. The coefficients on ASEAN output tariff and input are not statistically significant. The coefficient on export share while positive is not significant. Firm characteristics such as skill intensity, size, and capital intensity are strongly significant and are positively associated with wage skill premium. The RE results generated are different from the FE results. Based on the Hausman test, the RE estimator is rejected.

Table 10B: ASEAN Tariffs

lndiff	FE (1A)	FE (1B)	RE (2A)	RE (2B)
ASEAN Output tariff	-0,002 -0,002	0,001 -0,002	-0,002 -0,002	0.003** (0.002)
Input tariff	-0,06 -0,154	0,048 -0,17	-0.06 (0.154)	- 0.335*** .117131
Export share	0,024 -0,017	0,013 -0,02	0.024 (0.017)	0.084*** (0.016)
Skill intensity	2.188*** -0,137	2.207*** -0,137	2.188*** (0.137)	1.85*** (0.077)
Ln workers	0.140*** -0,03	0.143*** -0,03	0.14*** (0.03)	.073*** (0.007)
KL	1.45e-08*** -3,65E-09	1.37e-08*** -3,60E-09	1,45E-08 -3,65E-09	-2.24e-09 (6.67e-09)
Year	N	Y	N	Y
Industry	N	Y	N	Y
Obs	7493	7493	7493	7493
R2	0,16	0,17	0,15	0,156

Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors in parentheses.

Table 10C presents the results using the effective protection rate on the firm's output as trade policy variable. EPR nets out the effect of protection by taking into account tariffs on both intermediate inputs and final output. The FE results show that trade liberalization is associated with lower wage skill premium as indicated by the positive and significant coefficient on EPR (in both models 1A and 1B). The coefficient on Export share is positive but not significant. The coefficients on skill

intensity, Ln workers, and KL are positive and highly significant. The RE technique produces different results and based on the Hausman test, the RE estimator is rejected.

Table 10C: EPR

lndiff	FE (1A)	FE (1B)	RE (2A)	RE (2B)
EPR	0.041**	0.052***	0.027*	0.048***
	-0,017	-0,02	-0,015	(0.017)
Export share	0,024	0,011	0.102*** (0.01)	0.0817***
	-0,017	-0,02		(0.016)
Skill intensity	2.189***	2.210***	1.79*** (0.077)	1.854***
	-0,137	-0,137		(0.077)
Ln workers	0.139***	0.14***	0.077***	0.073***
	-0,03	-0,03	(0.007)	(0.007)
KL	1.47e-08***	1.36e-08***	-2,29E-09	-2.43e-09
	-3,68E-09	-3,58E-09	-7,35E-09	(6.65e-09)
Year	N	Y	N	Y
Industry	N	Y	N	Y
Obs	7530	7530	7530	7530
R2	0,165	0,174	0,16	0,16

Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors in parentheses.

12.2. Interacting skill intensity with trade and export variables

Interaction terms are added to the model by interacting skill intensity with trade variables and exports. The results are presented in Tables 11A (using MFN tariffs as trade variable), 11B (ASEAN tariffs), and 11C(EPR). The FE results show that the coefficient on Export share interacted with skill intensity is positive and significant. The coefficient on the interaction between output tariff and skill intensity is positive while the coefficient on input tariff and skill intensity is negative but both are not statistically significant. Skill intensity, capital intensity and size remain highly significant. The RE estimator is rejected by the Hausman test.

Table 11A: MFN Tariff Rates

lndiff	FE (1A)	FE (1B)	RE (2A)	RE (2B)
Output tariff	-0,246 -0,3	-0,032 -0,3	-0.018 (0.178)	0.034 (0.185)
Input tariff	0,213 -0,3	0,238 -0,3	-0.244 (0.181)	-0.114 (0.19)
Export share	-0,014 -0,027	-0,028 -0,029	0.009 (.022)	0.002 (0.02)
Skill intensity	2.228*** -0,2	2.236*** -0,2	1.68*** (0.137)	1.77*** (.136)
Output tariff*Skill intensity	0,39 -1,56	0,477 -1,55	1.572 (0.97)	1.55 (0.967)
Input tariff*Skill intensity	-1,161 -1,4	-1,187 -1,4	-1.865** (0.876)	-1.97** (0.869)
Export*Skill intensity	0.25* -0,145	0.266* -0,145	0.54*** (0.12)	.514*** (0.12)
Ln workers	0.141*** -0,03	0.143*** -0,029	.080*** (.007)	0.075*** (0.007)
KL	1.44e-08*** -3,64E-09	1.36e-08*** -3,57E-09	-2,81E-09 -7,90E-09	-2.39e-09 (7.03e-09)
Year	N	Y	N	Y
Industry	N	Y	N	Y
Obs	7530	7530	7530	7530
R2	0,166	0,17	0,15	0,157

Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors in parentheses.

Table 11B summarizes the results based on ASEAN tariff rates as trade policy variable. It is important to note that in Model 2B (which includes year and industry dummy variables), the coefficient on the ASEAN tariff rate is positive and significant at 5% level. When this is interacted with skill intensity, the coefficient turns negative and highly significant indicating that tariff reduction on skill intensive products is associated with rising wage skill premium. The coefficient on the interaction term Export*Skill intensity is positive and significant at 5% level. The coefficients remain positive and highly significant for skill intensity, size and capital intensity. The RE estimator is rejected by the Hausman test.

Table 11B: ASEAN Tariff Rates

lndiff	FE (1A)	FE (1B)	RE (2A)	RE (2B)
Output tariff	0,003 -0,003	0.01** -0,004	0.003 (0.002)	0.004 (0.003)
Input tariff	-0,032 -0,23	0,077 -0,242	-0.337** (0.147)	-0.162 (0.164)
Export share	-0,016 -0,027	-0,027 -0,029	0.008 (0.02)	0.002 (0.02)
Skill intensity	2.446*** -0,2	2.455*** -0,22	1.81*** (0.149)	1.892*** (0.147)
Output tariff*Skill intensity	-0.03* -0,017	-0.029*** -0,017	-0.004 (0.013)	-0.002 (0.013)
Input tariff*Skill intensity	-0,086 -1,07	-0,082 -1,058	-0.776 (0.730)	-0.955 (0.72)
Export*Skill intensity	0.269* -0,14	0.277** -0,14	0.551*** (0.12)	.517*** (0.12)
Ln workers	0.140*** -0,03	0.143*** -0,03	0.079*** (0.007)	0.075*** (0.007)
KL	1.39e-08*** -3,59E-09	1.31e-08** -3,53E-09	-3.34e-09 (7.97e-09)	-2.85e-09 (7.07e-09)
Year	N	Y	N	Y
Industry	N	Y	N	Y
Obs	7493	7493	7493	7493
R2	0,19	0,175	0,15	0,157

Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors in parentheses.

Table 11C indicates that with EPR as trade policy variable, the results show a positive and significant coefficient (at 5% level based on Model 1B results which include year and sector dummies). This implies that a reduction in protection is associated with a decline in the wage premium of firms that produce using low value added process requiring relatively less skilled workers. Interacting Export with Skill intensity shows a positive and significant coefficient at the 5% level. This indicates that an increase in the export of skill intensive products is associated with a rising wage premium of firms that respond to the reduction in protection by reallocating its resources towards high value added production processes that require relatively more skilled workers.

Table 11C: EPR

lndiff	FE (1A)	FE (1B)	RE (2A)	RE (2B)
EPR	0.096*	0.117**	0,038	0.075**
	-0,06	-0,06	-0,0383	-0,039
Export share	-0,018	-0,033	0,009	-0,006
	-0,027	-0,029	-0,022	-0,02
Skill intensity	2.177***	2.2***	1.673***	1.76***
	-0,147	-0,146	(.088)	-0,09
EPR*Skill intensity	-0,255	-0,297	-0,048	-0.128
	-0,2	-0,216	-0,16	(0.159)
Export*Skill intensity	0.272*	0.284**	0.58***	0.55***
	-0,145	-0,145	-0,12	(0.119)
Ln workers	0.14***	0.144***	0.078***	0.075***
	-0,03	-0,03	(0.007)	(0.007)
KL	1.48e-08***	1.37e-08***	-2.42e-09	-2,61E-09
	-3,64E-09	-3,54E-09	(7.69e-09)	-6,99E-09
Year	N	Y	N	Y
Industry	N	Y	N	Y
Obs	7530	7530	7530	7530
R2	0,167	0,175	0,155	0,161

Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors in parentheses.

The above tends to show that the relationship between trade liberalization and wage skill premium seems to be driven by the firm's response to foreign competition arising from the decline in protection. A firms can continue to produce import-substitutes for the domestic market and move toward low value added processes that require relatively less skilled labor or they can engage in high value added stage of the production process for the export market that would require relatively more skilled workers.

The regression results show a positive and significant coefficient on EPR which implies that due to foreign competition, firms shifted to the manufacture of low value added products for the domestic market that requires relatively less skilled workers and where foreign competition is less intense. On the other hand, interacting Export share with Skill intensity yields a positive and statistically significant coefficient indicating that the export of relatively more skill intensive products is associated with higher wage premium. In the literature, greater openness is associated with skill biased

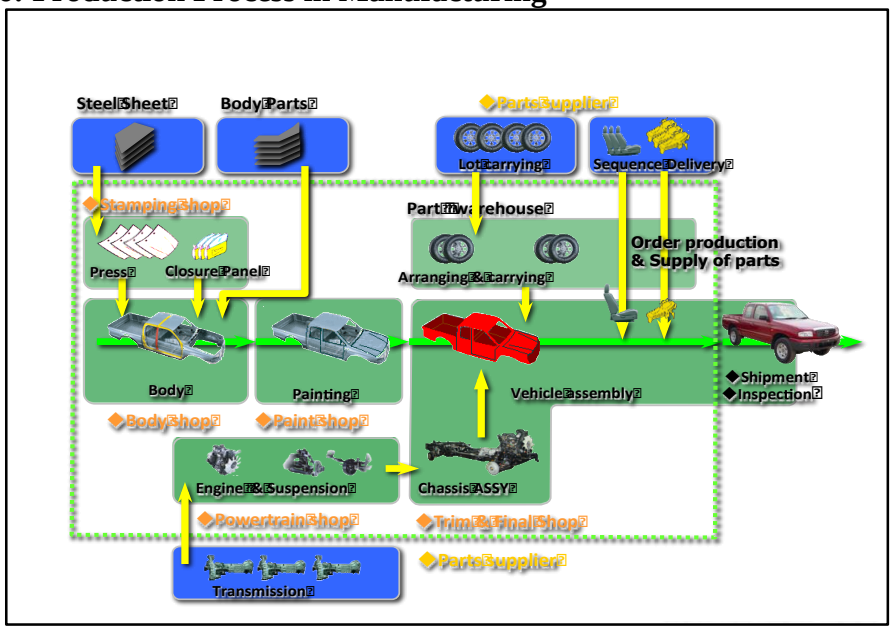
technological change with export-oriented and technology intensive activities as channels.

It is also important to note that the ASEAN tariff results tend to show the same with the significant positive coefficient on the ASEAN tariff. This implies that a reduction in ASEAN tariff rate is associated with a lower wage premium. However, when ASEAN tariff is interacted with skill intensity, the coefficient turns negative indicating that tariff reduction on skill intensive products is associated with rising wage skill premium. The impact of trade liberalization on the wage premium is affected by the stage where the firm is in the value chain process.

As output tariffs are reduced, competition in import-competing industries intensifies but at the same time, tariffs on intermediate inputs in the production of the final products that firms manufacture also fall. As firms import skill intensive inputs and expand their less-skill intensive production process, the relative demand for skilled workers falls leading to a reduction in the wage skill premium.

For instance, firms engaged in the assembly process do not produce intermediate parts or products within the plant as these are mostly imported from abroad. In the case of high-tech vehicle manufacturing, the production process would cover multiple activities such as stamping shop, powertrain shop, trim and final shop, body shop, paint shop, assembly, and shipment and inspection (see Figure 6).

Figure 6: Production Process in Manufacturing



Source: Auto Alliance Thailand.

In the Philippines, vehicle manufacturing is basically assembly with only welding, painting, trimming, and inspection being carried out within the assembly plants. CKD (completely knocked down) packs are imported with a few small parts sourced domestically. The linkage between the automotive assembly sector and local parts and components has remained weak with the domestic parts sector accounting for only 10 to 15 percent of the total number of parts and components required by local motor vehicle assemblers. Box 1 illustrates the experience of a typical company which used to enjoy substantial protection from imports.

Box 1: Liberalization and the Need to Upgrade

This auto parts firm is a manufacturer of brake discs and owns a foundry shop (the only one in the Philippines accredited by Japan). It has CNC machines and automatic second-hand equipment. From the 1980s till the mid 1990s, it was manufacturing brake discs for Mitsubishi, Toyota, and Honda. After liberalization, the three companies started to pull out. Toyota wanted a 20% reduction in its price, which it could not meet given its volume of operations. It tried export, but a buyer from France wanted a 15% reduction in its price for 1.5 million pieces annually. A buyer from Japan wanted it to fulfill major requirements such as upgrading of its existing equipment. Its grinding and finishing operations were not acceptable. To reduce its cost, the firm has downsized its labor force and outsourced its machining process. Toyota wanted the firm top do only the finishing of brake discs which would be imported from its affiliate in Thailand. Mitsubishi asked it to do the finishing of its bearing retainers.

In the case of Indonesia, Amiti & Cameron (2011) differentiated the impact of input and output tariffs on the wage premium. They pointed out that the mechanism affecting the wage skill premium differs for reducing tariff on inputs from reducing tariff on outputs. Interacting input tariffs with imports of intermediate goods, their results show that a reduction in input tariffs reduces the wage skill premium within firms that import their intermediate inputs. However, changes in output tariffs have no significant effect on the wage skill premium within firms. They noted that this evidence is contrary to the current emerging view in the literature that trade liberalization increase the wage skill premium. They argued that Indonesia has a very high share of unskilled labor and is a very low skill economy rather than a middle income country. With its comparative advantage is in low-skill labor intensive activities, unskilled labor is likely to benefit relatively more than skilled labor following trade liberalization.

13. Summary and Policy Implications

Since the 1980s, the Philippines has made considerable progress in opening-up the economy and currently, the trade regime is substantially more open, particularly in the manufacturing industry. Despite the market-oriented reforms, the impact on the overall growth and employment of the manufacturing industry has been limited. In terms of performance, manufacturing growth remained sluggish in the past two decades and its contribution declined substantially. This is the opposite of the performance of the manufacturing industry in ASEAN countries such as Indonesia, Thailand, Malaysia, and China whose contribution experienced rising trends.

In terms of export performance, the country's export base has become less diversified as manufactured exports became largely concentrated in three product groups. These consisted of electronics, garments and textile, and machinery and transport equipment which together accounted for around 76% of total exports in 2008. These goods are considerably dependent on imported inputs and have weak backward and/or upward linkages with the rest of the manufacturing industry.

One of the major stylized facts in the empirical trade and employment literature indicates relatively large increases in skill premiums driven by increased demand for skilled workers in both developed and developing countries (Hoekman & Winters 2005; Goldberg & Pavcnik 2004). In the Philippines, however, wage premiums in manufacturing declined as education intensity increased indicating an oversupply. In understanding these seemingly perverse effects of trade liberalization in the country, firm characteristics are crucial. In particular, how are wage premiums affected by firm export activities, skill intensity, capital intensity, firm size and the interaction between trade policy and skill as well as between export and skill intensity.

As such, the present study is a departure from the H-O model. In contrast to the H-O model that relies on the representative firm assumption, the study assumes firm heterogeneity within an industry with firms using different technologies, having different skill requirements and market orientation. The main findings of the paper are given by the following:

First, using effective protection rates as trade variable, trade liberalization lowers the wage premium as firms respond to import competition by shifting to the

manufacture of products with lower value added and importing intermediate inputs rather than producing these within the plant. Lower value added processes require relatively less skilled workers thus reducing the wage skill premium within the firm.

Second, based on ASEAN tariff rates as trade proxy variable, the same results are obtained as shown by the significant positive coefficient on the ASEAN tariff. A reduction in ASEAN tariff rate tends to be associated with a lower wage premium within the firm. However, when ASEAN tariff is interacted with skill intensity, the coefficient turns negative indicating that tariff reduction on skill intensive products is associated with rising wage skill premium.

Third, exports are associated with increasing wage premium at the firm level the higher their skill intensity. This suggests that firm exports of high value added products which require more skilled labor is an important factor in increasing the wage premium.

Fourth, firm characteristics matter in assessing the impact of trade reform on the wage premium. Increases in skill intensity, firm size, and capital labor ratio are associated with rising wage premium at the firm level.

The above results suggest the need to transform and upgrade manufacturing and shift toward more diversified and sophisticated export products. The process of structural transformation and diversification would require climbing the industrial ladder, moving into higher value added sectors as sources of production advance. With the caveat of endogeneity, the case of the Philippines shows that on the overall, tariff reduction is correlated with a decline in wage skill premium within firms in the manufacturing industry. Openness and trade liberalization has led to increases in import competition which seemed to have lowered wage skill premium as domestic firms shifted their manufacturing process towards low value added activities requiring relatively less skill intensity production.

Technological upgrading is an important channel to drive the demand for skilled labor and skill intensive manufacturing processes. Further upgrading of education levels, promoting productivity growth, increasing technological capability and providing incentives for further labor reallocation towards high productivity processes will also be required. These reforms would allow the country to deepen its participation in global and regional production networks and strengthen its competitive

position to take advantage of the opportunities arising from increasing globalization, openness and liberalized markets.

References

Acemoglu, D. (2003), 'Patterns of Skill Premia', *Review of Economic Studies* 70, pp.199-230.

Aghion, P., R. Burgess, S. Redding, and F. Zilibotte (2003), *The Unequal Effects of Liberalization: Theory and Evidence from India.* London: London School of Economics and Political Science.

Aldaba, R. M. (2010), 'Micro Study: Philippines Does Trade Protection Improve Firm Productivity? Evidence from Philippine Micro Data', in Hahn, C. H. and D. Narjoko (eds.), Causes and Consequences of Globalization in East Asia: What Do the Micro Data Analyses Show?. ERIA Research Project Report 2009-2, Jakarta: ERIA. pp.143-195.

Amiti, M. and D. Davis (2011), 'Trade, Firms, and Wages: Theory and Evidence', Oxford University Press *Review of Economic Studies* 79, pp.1-36.

Amiti, M. and L. Cameron (2011), 'Trade Liberalization and the Wage Skill Premium: Evidence from Indonesia', *Journal of International Economics,* pp.277-287.

Attanasio, O., P. Goldberg, and N. Pavcnik (200), 'Trade Reforms and Wage Inequality in Columbia', *Journal of Development Economics,* 74, pp.331-366.

Bernard, A. B. And J. B. Jensen (1995), 'Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987', *Brookings Papers on Economic Activity: Microeconomics* , pp.67-112.

Berman, E., J. Bound and ZviGriliches (1994), 'Changes in the Demand for Skilled Labor within U.S. Manufacturing: Evidence from the Annual Survey of Manufactures', *Quarterly Journal of Economics* 42, pp.2-31.

Cragg, M. I. and M. Epelbaum (1996), 'Why Has Wage Dispersion Grown in Mexico? Is it the Incidence of Reforms or the Growing Demand for Skills?', *Journal of Development Economics,* 51. pp.99-116.

Desjonqueres, T., S. Machin and J. Van Reenen (1999), 'Another Nail in the Coffin? or Can the Trade Based Explanation of Changing Skill Structures be Resurrected?', *Scandinavian Journal of Economics*, 101, pp.533–554.

Feenstra, R. and G. Hanson (1996), 'Foreign Investment, Outsourcing and Relative Wages', in Feenstra, R. C. (ed.) *Political Economy of Trade Policy: Essays in Honor of Jadish Bhagwati*. Cambridge: MIT Press, pp.89-127

Feenstra, R. and G. Hanson (2003), 'Global Production Sharing and Rising Inequality: A Survey of Trade and Wage', in Choi, E. K. and J. Harrigan (eds.), *Handbook of International Trade*, MA: Malden, Blackwell, pp.146-185.

Francois, J. F. and K. A. Reinert (1997), 'Applied Methods for Trade Policy Analysis: An overview', in Francois, J. F. and K. A. Reinert (eds.), *Applied Methods for Trade Policy Analysis: A handbook*. Cambridge: Cambridge University Press, pp. 3-24.

Freeman, R. B. and L. F. Katz (1991), 'Industrial Wage and Employment Determination in an Open Economy', in Abowd, J. M. and R. B. Freeman (eds.), *Immigration, Trade and the Labor Market*. Cambridge: NBER, pp.235-259.

Goldberg, P. K. and N. Pavcnik (2004), 'Trade, Inequality, and Poverty: What Do We Know? Evidence From Recent Trade Liberalization Episodes in Developing Countries', NBER Working Paper Series. Working Paper 10593. Cambridge: National Bureau of Economic Research.

Harrison, A. and G. Hanson (1999), 'Who Gains From Trade Reforms? Some Remaining Puzzles', *Journal of Development Economics*, 59, pp.125-154.

Hasan, R. and K. Jandoc (2010), 'Trade Liberalization & Wage Inequality in the Philippines', University of the Philippines School of Economics Discussion Paper No. 2010-06, Quezon City: UPSE.

Hasan, R. and L.Chen (2003), 'Trade & Workers: Evidence from the Philippines', East-West Center Working Papers, Economic Series. Hawaii: East-West Center.

Herrin, A and E. M. Pernia (2003), 'Population, Human Resources, and Employment', in Balisacan, A. and H. Hill (eds.), *The Philippine Economy: Development, Policies, and Challenges*. New York: Oxford University Press, pp. 283-310.

Hoekman, B. and L. A. Winters (2005), 'Trade and Employment: Stylized Facts and Research Findings', WPS3676. World Bank Policy Research Working Paper 3676, Washington, D. C.: World Bank.

Hoekman, B. M. and G. Porto, (2011), *Trade Adjustment Costs in Developing Countries: Impacts, Determinants and Policy Responses*, Washington, D. C.: World Bank and CEPR.

Katz, L. and K. Murphy (1992), 'Changes in Relative Wages, 1963-1987: Supply and Demand Factors', *Quaterly Journal of Economics* 107, pp.35-78.

Lanzona, L. (2001), 'An analysis of Globalization & Wage Inequality in the Philippines: An Application of the Stolper-Samuelson Theory', Chapter 2 in Lanzona, L., (ed.) *The Filipino Worker in a Global Economy*. Makati City: PIDS-PASCN.

Lawrence, R. Z. and M. J. Salugter (1993), 'International Trade and American Wages in the 1980s: Giant Sucking Sound or Small Hiccup?', *Brookings Papers on Economic Activity* 1993(2), pp.161-226.

Levinsohn, J. and A. Petrin, (2003), 'Estimating Production Functions Using Inputs to Control for Unobservables', *Review of Economic Studies*, 70, pp.317-341.

Melitz, M. (2003), 'The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity', *Econometrica*, 71(6), pp. 1695-1725.

Orbeta, A. (2002), 'Globalization & Employment: The Impact of Trade on Employment Level & Structure in the Philippines', PIDS Discussion Paper Series No. 2002-04, Manila: PIDS.

Revenga, A. (1992), 'Exporting jobs? The Impact of Import Competition on Employment and Wages in U.S. Manufacturing", *Quarterly Journal of Economics* 107 (1), pp.255–84.

Revenga, A. (1997), 'Employment and Wage Effects of Trade Liberalization: The Case of Mexican Manufacturing', *Journal of Labor Economics*, 15, pp.S20-43.

Robbins, D. J. (1996), 'HOS Hits Facts: Facts Win; Evidence on Trade and Wages in the Developing World', Development Discussion Paper No. 557, Cambridge: Harvard Institute for International Development, Harvard University, (Mass.).

Sachs, J. and H. Shatz (1994), 'Trade and Jobs in US Manufacturing', *Brookings Papers on Economic Activity, Microeconomics*, 1994(1), pp.1-84.

Thoenig, M. and T. Verdier (2003), 'A Theory of Defensive Skill-based Innovation and Globalization', *American Economic Review* 93(3), pp. 709-728

Wood, A. (1995), 'How Trade Hurt Unskilled Workers', *The Journal of Economic Perspectives*, 9(3), (Summer), pp.57-80.

World Bank (2010), 'Philippine Skills Report, Skills for the Labor Market in the Philippines', Human Development Department, East Asia and Pacific Region, Report No. 50096-PH, March.