The Impact of Trade on Workers: Evidence from the Philippines

Tianshu Chu, East-West Center
Rana Hasan, East-West Center
Sang-Hyop Lee, University of Hawaii at Manoa

Working Paper Series Vol. 2002-17
May 2002

The International Centre for the Study of East Asian Development, Kitakyushu

The Impact of Trade on Workers: Evidence from the Philippines*

Tianshu Chu, East-West Center
Rana Hasan, East-West Center
Sang-Hyop Lee, University of Hawaii at Manoa

May 2002

Abstract

This paper uses data from the Philippines to examine the impact of trade on workers. The empirical analysis is based on two exercises. The first uses industry-level panel data from the Philippines' manufacturing sector to examine how trade has affected total employment and average wages in 28 manufacturing industries. A key result which emerges is that greater openness - whether measured in terms of increasing trade shares or reduction in average tariff rates - has had a weak impact on total employment and average real wages. Our second exercise, which uses labor force survey data and explicitly recognizes the significant degree of heterogeneity in worker characteristics, examines the effects of trade on wage inequality between educated and relatively uneducated workers. While an increase in the supply of education is found to be an important factor in exerting downward pressure on wage inequalities in the Philippines, our results also indicate that the expansion of trade has led to an increase in the relative demand for unskilled workers as standard trade models would predict.

* We are extremely grateful to the International Center for the Study of East Asian Development (Kitakyushu, Japan) for their generous support of this project. We would like to thank Andy Mason and Emily Cabegin for providing us with the Philippines Labor Force Surveys. Thanks are also due to Emily Cabegin for her valuable help in explaining to us the structure of the Labor Force Survey data set. Finally, we thank Marcelo Olarreaga and Alessandro Nicita of the World Bank for making available their trade and production database for the Philippines and to Andriy Mykytiv for research assistance in analyzing that database.

1. Introduction

The impact of trade on workers in developing countries is a subject of growing controversy. While proponents of openness to trade argue that it leads to growing economic opportunities for workers in labor abundant developing countries, a number of analysts claim that the impact of trade on workers is much more complex. For example, some observers believe that the benefits of trade liberalization tend to go mainly to the small proportion of highly educated and skilled workers in the integrating countries (Robbins and Gindling, 1999; Wood, 1997; Robbins, 1996). Still others argue that although trade is potentially beneficial for workers in developing countries, overly tight labor market regulations may have impeded the flow of benefits from trade liberalization (Hasan, forthcoming; Edwards and Edwards, 1994)

In this paper we examine the impact of trade on workers using the experience of the Philippines. Our analysis is based on two distinct, though related, empirical exercises. A first exercise uses industry-level panel data from the Philippines' manufacturing sector to examine how trade has affected employment and wages in 28 manufacturing industries. In particular, we estimate reduced form equations for *total* employment and *average* real wages to examine how indicators of openness are related to labor market outcomes. A second and more in-depth exercise uses labor force surveys from the mid-1980s to mid-1990s to examine the behavior of real wages of workers with different educational backgrounds. To the extent that educational attainment of individuals is a good proxy for skills, this exercise is able to bring new evidence to bear on one of the most important debates concerning the international trade-labor linkage: That is, whether greater openness to trade (as has been exhibited by the Philippines' economy since the mid-1980s) has been associated with increased premiums to skills and thereby led to an increase in wage inequality.

The Philippines presents itself as an important country in which to study the effects of trade on workers. In particular, it is a country where the conventional wisdom of liberalization advocates should hold strongly: its labor force of over 30 million ranks among the largest in East Asia while its population density is greater than that of such neighbors as China, Indonesia, and Thailand. Thus liberalization of the Philippines' trade regime should benefit its workers by shifting the composition of output and employment toward labor intensive sectors. If, however, greater openness to trade is not helping workers in the Philippines it is important to understand why this is so.

The remainder of this paper is organized as follows. Section 2 outlines the conceptual linkages between trade and labor market outcomes. Section 3 briefly reviews the Philippines' trade policies and some features of labor market policy. Section 4 consists of the industry-level analysis of total employment and average wages in the manufacturing sector. Section 5 consists of the individual level analysis of the evolution of skill premia and their relationship to trade. Readers interested in this issue can skip Section 4 without any loss of continuity. Section 6 ends with some concluding remarks.

2. Trade and Labor Market Linkages: A Brief Survey

In this section, we provide a brief but yet comprehensive discussion of the various ways in which trade may affect labor markets. While the analysis of this paper focuses on only one aspect of the trade-labor nexus, we think a comprehensive discussion is still useful to provide.

In examining the various links between trade and labor markets it will often be important to distinguish between workers of various types. Workers differ in terms of such broad characteristics as age, gender, experience, and the industry/sector they work in. They

also differ in terms of the skills and education they possess as well as their innate abilities, drive to succeed, etc. The main distinction made between workers here is in terms of their skills/education: workers will be considered as either skilled/educated or unskilled/uneducated (or undereducated). Unskilled workers will be assumed to provide raw labor, while skilled workers will be assumed to provide skills.

In what follows, we will outline the various different ways in which economists believe trade liberalization affects labor markets. No attempt has been made here at providing an integrated theory. Instead, the discussion is based on more on heuristics although the starting point is, as is probably appropriate, a discussion of the Stolper-Samuelson Theorem.

Goods prices and wages: the Stolper-Samuelson theorem At its most basic level, trade liberalization affects workers (and indeed any factor of production) through its effect on the price of the goods they produce. In particular, an increase in the price of labor intensive goods relative to skill intensive goods will, under certain conditions, lead to an increase in the wages – nominal, relative, and real – of unskilled labor. This insight, known to economists as the Stolper-Samuelson Theorem, does depend on a number of assumptions. While these assumptions may not hold in a strict sense in the real world, the logic of the theorem is powerful enough that the basic insight of the theorem has a broad applicability. That is, facing an increase in the price of labor intensive goods –expected to be the case when a country with abundant supplies of unskilled workers opens itself to trade – profit seeking firms will respond by attempting to expand production of the now more profitable labor intensive goods. With given supplies of the various types of workers, the result will be an increase in the wages of unskilled labor.

In practice, however, the effects of market-oriented liberalizations on labor markets are more complex. Focusing again on trade liberalizations, there are a number of factors which can interfere with the story above:

Short-run adjustment effects: An implicit assumption of the standard model described above is that production factors are perfectly mobile within a nation. Thus, factors are assumed to be able to move costlessly from contracting import-competing sectors to expanding exporting sectors in response to trade liberalizations. In reality, factors tend to be much less mobile than the standard model would allow.

Consider, for example, the standard trade model whereby trade liberalization in a labor abundant country will lead to an expansion of labor intensive industries and a contraction of capital intensive industries. In terms of Figure 1, which depicts the production possibility frontier for the economy, trade liberalization should be associated with a move from point A to point B. However, what is the actual transition path from point A to B? Rather than move along the production possibility frontier, the economy may actually, move to a point like C which lies inside the frontier in the intermediate term. This would happen if, for instance, import-competing industries contracted faster than export-oriented industries could expand.

For a variety of reasons, it is very likely that this will be the case. Workers are likely to have developed firm and industry specific skills. It is unrealistic to expect them to be able make the transition from import-competing to export oriented industries without some lags. Moreover, the process of being disengaged from a job and finding a suitably new one itself is time consuming. The recent literature in labor economics stresses the high cost of job searches for workers (and even firms). Additionally, a number of recent studies point out that entry into exports markets can entail significant start up costs. Even if they are

internationally competitive, local firms need to establish contact with buyers in foreign markets, ensure that their product specifications conform with those of foreign markets, etc. (see for example, Roberts and Tybout, 1996). All of which can take considerable time. At the same time, foreign firms waiting to export to the newly liberalized economy are not likely to face these problems to the same degree. The reason is that they typically have a long history of exporting to various developing country markets and can use this experience to good effect. Moreover, they have the resources and the reputation (for quality) to be able to enter a new market and be accepted by buyers relatively easily.

The result of these factors is to generate short-term unemployment as displaced workers from contracting industries face limited opportunities in other industries. The resulting temporary unemployment is an example of an adjustment cost. Of course, as time passes by and capital can begin to move between sectors, the familiar Stolper-Samuelson effects will begin to kick in and trade liberalization should improve the welfare of labor for a labor abundant country. However, the main point here is that it is unrealistic to expect that factors of production can be reallocated across sectors in a costless or frictionless fashion.

Labor-market rigidities: The discussion so far has assumed that wages are flexible and are determined through the unhindered interaction of labor demand and supply. This assumption is unrealistic, however, in so far as labor markets in certain sectors of the economy are concerned. In these sectors (such as public sector enterprises or large scale manufacturing in many developing countries) there can be a variety of factors which introduce rigidities in labor markets, including minimum wages that may be well above market clearing rates, regulations outlawing job severance (or at least making it very difficult), and militant labor unions.

To determine what trade theory predicts will be the effects of these rigidities on labor market outcomes under trade liberalization it is useful to contrast the case of liberalization with and without minimum wages operating in labor markets. Consider Figure 2 in which labor demand curves for both the exportable (X) and importables (M) are depicted in the same diagram. The demand for labor in exportables has been drawn as being a downward sloping function of wages relative to the origin OX. The demand for labor in importables is drawn relative to the origin OM. For simplicity, let us for now ignore the distinction between labor as being either skilled and unskilled. Also, assume that the only other factor of production in this model is capital which we will assume is immobile in the short-run but free to move across sectors in the long-run. The supply of labor is fixed and equal to the distance OX-OM.

Since labor is mobile across both sectors X and Y, the wage that it gets in equilibrium must be the same across sectors. Let this equilibrium wage be W1. At this wage rate, OX-L1 units of labor are employed in industry X and OM-L1 units of labor are employed in industry Y. Now suppose that the government liberalizes trade by eliminating tariffs on imported goods. If PM* is the international price of imports and per unit tariff was originally T, then the domestic price of importables is reduced from PM*+T to PM*. Diagrammatically, this shows up in Figure 2 as a downward shift in the demand for labor in the importable sector M. The new equilibrium short-run wage rate declines to W2. Total employment remains the same although a smaller proportion of the workforce now is employed by the contracting importables sector. In terms of real wages, workers are worse off in relation to the exportables but better off in relation to importables in the short run (because the decline in wages is less than the decline in price of importables, T).

What is the effect of minimum wages in this model? As Figure 3 shows, a minimum wage level above the pre-trade liberalization market clearing rate of W1 has the effect of

generating a certain level of unemployment (equal to LX1-LM1). After trade liberalization, when the price of importables is reduced by the amount of the tariff T and the labor demand for importables has shifted downwards, the difference between the market clearing wage rate and the minimum wage rate is even more. However, firms are obligated to pay the minimum wage and consequently they employ even less labor than before and unemployment increases to LX1-LM2. Unlike the no-minimum wage case in Figure 2 where wages fell to equilibrate supply with the new demand lower demand for labor, it is employment which must adjust given the minimum wage. This model, though a very simple one, therefore helps to illustrate the point that labor market distortions may exacerbate conditions for workers, at least in the short run.

Labor supply: The standard trade model's prediction that opening to trade in an unskilled labor abundant country will lead ultimately to an increase in wages of unskilled workers relative to skilled workers depends on, among other things, the assumption that the supplies of the two types of labor, skilled and unskilled, are fixed. If this assumption were to be relaxed, then the effects of trade on wages become less clear cut. A diagrammatic explanation for this, taken from Suryahadi, Chen, and Tyers (1999) can convey this effectively. As shown in Figure 4, suppose that the supply of unskilled labor is more elastic than that of skilled labor (not an unreasonable assumption in most developing countries). Now, consider an increase in the demand for both skilled and unskilled labor, but such that the increase in demand for unskilled labor is greater. Nevertheless, as Figure 4 shows the wage increase is higher for skilled labor than unskilled labor. This illustration serves to show that in considering the effects of trade liberalization on labor, it is important to factor in the role that is played by supply elasticities.

Technological change: The standard trade model considered here has the feature that in the absence of frictions to adjustment, trade liberalization should benefit unskilled labor in labor abundant countries and skilled labor in a skill abundant country. Interestingly, research for a number of developing countries presumably abundant in unskilled labor (for example, Chile, Mexico, Columbia, and Costa Rica) indicates that there has been an increase in wage inequality after trade liberalization rather than the decrease that standard trade theory would predict (Robbins and Gindling, 1999; Robbins, 1996). One explanation put forward for this for phenomena is "skill-biased technological change" (SBTC) resulting from trade. The argument is that by opening to trade, developing countries are seeing greater inflows of technology (embodied in imported capital goods, for example), from the developed countries. These technologies generate a premium to skills for their effective operation and counter the Stolper-Samuleson effects whereby wage inequality between skilled and unskilled workers should have fallen in labor abundant developing countries.

Thus the new technologies are argued to display a factor bias: they complement the work of skilled workers and displace unskilled workers thereby increasing the demand for skilled workers relative to unskilled workers. With national supplies of the two types of labor fixed (or with the supply of unskilled labor more elastic than that of skilled labor as seen in the previous sub-section), the increased relative demand for skilled workers leads to an increase in their relative wages.

It is important to note here that this logic is not without its problems. In particular, there is a disagreement in the literature about the effects of SBTC, and indeed all types of technical change, on wage inequality. More specifically, a number of trade theorists argue that SBTC by itself will not lead to a worsening of wage inequality. Instead what will worsen wage inequalities is technological change of any type in sectors which make intensive use of

skilled labor. In other words it is not the factor bias of technological change that is relevant to the issue of relative wage inequality but its sector bias.

Haskel and Slaughter (1998) present an especially succinct account of the arguments. Consider a two sector economy where one sector is machinery and makes intensive use of skilled labor and the other sector is apparel which makes intensive use of unskilled workers. If workers are mobile across sectors and assuming competitive markets, the economy will be in equilibrium when production in both sectors is equally profitable.

In such a world, technological progress in one sector, say the apparel sector, will mean that at initial product and factor prices, the production of apparel will become more profitable. Firms will respond to this by attempting to expand production of apparel. However, because the production of apparel makes more intensive use of unskilled labor, the relative demand for unskilled labor will increase. But give fixed labor supplies, relative wages will have to adjust so that "the profit opportunities are arbitraged away". Note that in this model, we have said nothing about the nature of technical change. All that matters is that technological change was concentrated on the apparel sector. In other words it is the sector bias of technological change that matters for the changes in relative wages and not the factor bias.

Trade and the elasticity of demand for labor: While the framework used until now stresses shifts in the demand for labor in response to trade liberalization (see Figures 2 and 3 for example), it is also possible that trade may affect the elasticity of demand for labor. This is particularly likely in the context of imperfectly competitive product markets. When there are only a few main producers in any market, trade can have a powerful impact in making the market more competitive. In terms of the demand curve for the product, the effect of greater competition will be to make it more elastic. However, a more elastic demand curve for the

product will in turn make the demand curve for labor more elastic as well. What are the implications for labor? For one, any shocks in demand would lead to greater volatility in both wages and employment with a steeper demand curve for labor. More fundamentally according to Rodrik (1999), "a large increase in the substitutability of unskilled workers [which is what a greater elasticity of demand for labor can imply] is likely to undermine the traditional implicit bargain between employers and workers to the detriment of the latter."

However, the greater elasticity of demand (for both products and labor input) that trade may lead to can have beneficial effects for labor also. For example, as Kambhampati, Krishna, and Mitra (1997) point out, consider a domestic monopolist who restricts output and earns extra profits through a markup in price to marginal cost. In such a scenario trade liberalization will be likely to increase competition faced by the domestic monopolist and make the product demand curve more elastic. Now under very plausible circumstances the only way for the domestic monopolist to compete will be to offer lower prices and cover the fixed costs of production through producing larger volumes. However, the production of larger volumes will require an expansion of the domestic firm's labor input. In this way, a more elastic demand curve for a product can lead to an increase in employment.

3. Trade Policy and Labor market Issues in the Philippines: A Brief Review

3.1 Trade Policy

The process of trade liberalization in the Philippines has displayed for long a stop and go pattern. However, from the mid-1980s or so, the process of liberalization has progressed relatively steadily. The Philippines' international trade was subject to a large degree of government restrictions in the 1960s and 1970s. This was mainly the result of following an

import substitution industrialization strategy. Several attempts at liberalization did not effectively reduce the degree of protection; some even strengthened protection. For example, in 1973, the number of levels of tariff rates were simplified to six. However, the use of non-tariff barriers and quantitative restrictions increased. Consumptions goods that were classified as non-essential, unclassified or semi-classified were prohibited from importation. Moreover, taxes were imposed on major traditional exports. (See Manasan and Querubin). According to Gerson (1998), this policy imposed biases against the primary and agriculture sectors where the poor were employed, and protected the manufactured sectors. A study by Alburo and Shepherd (1986) shows that the effective protection from taxes, tariffs and subsidies was 90% or below in 1950s, but climbed to around 200% during 1960s and 1970s in import substituting sectors. At the same time protection for the non-traditional exports averaged around 10% while traditional exports received negative protection of around –10% to –20% throughout the period.

In contrast, the 1980 reform was considered a fundamental program toward liberalization. This reform reduced the peak tariff rate from 100% to 50% and raised the floor tariff rate form 0 to 10% (Tariff Reform Program or TRP) . A complimentary realignment of indirect taxes was also implemented. However, an essential component of the reforms that would have lifted quantitative restrictions on imports (Import Liberalization Program or ILP), was suspended due to a balance-of-payment crisis in 1983 and some items that had been deregulated were regulated again.

When the Aquino government came to power, it abolished export taxes on all but logs, and revived the formerly suspended ILP program. As a result, the number of regulated items decreased from 1802 in 1985 to 609 in 1988. Although no further tariff reduction was implemented, an EPR calculation based on price comparison (Medalla, 1990 and cited in

Mansan and Querubin, 1997) revealed that the EPR has decreased dramatically from 49% in 1985 to 36% in 1988 (see Table 1).

Efforts at tariffication of quantitative restrictions (QR) were re-attempted in 1992 and 1996. In 1992, Executive Order 8 (EO 8) doubled tariff rates on 153 commodities and provided a five-year plan to phase down the tariff rates. However, it was partly reversed by an act in 1993 such that the regulated products increased to 257 in 1993. In July 1996, all import restrictions were lifted in compliance with WTO commitments, while some products were allowed tariff rates above the tariff ceiling of 30%. The tariffication of NTB in the 1992 and 1996 reforms resulted in an increase in tariff indicators in both average nominal tariff rates and the EPR, as shown in Table 2 and Table 3. The tariff increased by 4.5% and 3.5% in 1992 and 1996, respectively, according to the EPR calculation. The average nominal tariff increased by 5.6% and 1.3% during the same period. Because these tariff indicators cannot properly account for the extent of non-tariff barriers (NTB), however, a higher level of the indicator due to tariffication of NTBs does not necessarily imply that the degree of protection increased.

New rounds of tariff reforms were initiated in 1991 (TRP-II), at the end of the Aquino government, and in 1994 (TRP-III). By end of 1995 the majority of products were subject to tariff rates between 10-30%, and around 10% of commodity lines were still subject to rates of 0-5% or 50%. TRP-II aimed to establish a four-tier tariff structure: 3% for raw materials and capital equipments not locally produced, and 10% for those that are available locally; 20% for intermediate goods and 30% for final goods.

Overall, the EPR has decreased by 39% during 1990-2000 as calculated by Manasan and Querubin (1997) (see Table 2). The reduction of protection in the manufacture sector has been larger than that in the agriculture sector. However, since agriculture was traditionally

less protected, the manufacture sector still received higher protection than the agriculture sector.

Another important observation is that while some sectors with low to medium protection to begin with proceeded with rapid tariff reduction, tariff reduction in formerly highly regulated sectors has progressed rather slowly. These sectors include agriculture and food processing industry. Indeed the effective protection rates in Table 2 indicate that the protection of food processing has increased from 40.4% in 1990 to 42.34% in 2000. Manasan and Querubin (1997) suggest that this may be due to the sensitive nature of the affected products. Often, political factors can effectively block the trade liberalization process.

The impacts of trade liberalization were analyzed using CGE models in some studies. Research by Cororaton and Cuenca (2000) using APEX framework shows that the liberalization during 1995-2000 has resulted in a small increase in GDP of .02%. Changes in labor income of households have been positive across all levels, but the higher income groups realized higher gains, while the lowest income group received less gains that all other groups. The total change in employment has been positive, with industry sector increasing the most by 29,053, the service sector employment increases by 1,548, and agriculture sector sees declining of employment of minor scale by 1,758.

In conclusion, the Philippines economy has gone though rapid and comprehensive trade liberalization in the late 1980s and through out the 1990s. It has made progress in three dimensions: the reduction of tariff rates, the tariffication of non-tariff barriers, and the simplification of tariff tiers. By 2000, massive tariff reduction and other forms of trade liberalization have been achieved, and the remaining two sectors that are still relatively heavily protected are agriculture and food processing sectors.

3.2 Philippine labor market policy, employment and income distribution

This section provides an overview of labor market regulations and the evolution of employment and wages in the Philippines. It draws heavily upon Jurado and Sanchez (1998).

The Philippines labor market is characterized by a rapid expansion in labor force and gradual decline in unemployment rate during 1987-1996. As shown in Table 4, the labor force grew at an annual rate of 2.9% during this period (30% increase for the entire period), while the unemployment rate gradually decreased from 9.1% in 1987 to 7.4% in 1996. This indicates strong growth in job creation, and indeed employment has increased at 3.1% during this period.

The composition of employment has changed as well.. As demonstrated in Table 5, the proportion of salary workers has increased from 44.07% in 1987 to 47.73% in 1996. At the same time the other two categories, own-account workers and unpaid family workers, have both decreased by less than 2%. Even though unpaid family workers have decreased in proportion, the total number of these unpaid workers has actually increased during this period due to the large increase in the size of the labor force.

According to Jurado and Sanchez (1998), real wages increased during 1987-1996 and were accompanied by an expansion of employment. The growth of wages has had the following three patterns. First, agriculture wages were much smaller, but grew at a higher speed than non-agriculture wages. As shown in Table 6, The agricultural real wage grew at annual rate of 3.9%, and registered a 36% increase during 1987-1996. The non-agricultural wage grew at only 2.0%, and registered an increase of 17% during the same period. Secondly, however, despite the higher growth rate in agriculture wage, agricultural wages were still only 58% of non-agriculture wage in 1996 (as compared to 49% in 1987). Finally, the

growth of real wages was higher than the growth of labor productivity, indicating an increased share of labor income in value added. The may be in part the result of the upward pressure of overseas contact workers. As can be seen in Table 8, the labor productivity index did not show significant increase, while real wages had increased by 25% during 1987-1995. This led to a rise in unit labor cost of 19%. Significant increases in unit labor cost occurred essentially in traded sectors. The only exception was the construction sector, a non-traded service sector, that also experienced dramatic increases in unit labor cost. The rising unit labor cost in Philippines has posted a serious concern to the international competitiveness of Philippines products. On the other hand, this may also be the result of increased trade which may have increased the wage of traded sectors in the short-term.

Philippines labor market regulation has been a mixture of restrictions to layoff and incentives to hire. The Labor Code specifies safeguarding measures for the security of workers including preventing dismissals without just cause and prohibiting pay cuts for union work. Moreover, Regional Tripartite Wages and Productivity Board (RTWPBs) set regional minimum wages. These policies in theory would have provided disincentive for job creation. On the other hand, incentives to hire more labors also exist as the Board of Investment provides tax-exemptions and credits for high labor intensity. These two sets of regulations may have offset each other with the net effect being ambiguous.

Industrial relations in Philippines have substantially improved since the mid 1980s. Although the number of workers unionized and the number of unions both increased, the actual number of strikes and lockouts decreased steadily, as did the number of man-days lost. Unionized workers increased from 594,157 in 1987 to 3.627 million in 1996, which was from 2.6% to 12.2% of the total labor force. Despite the increase in union membership, the incidence of management-worker conflicts actually decreased drastically. The peak number of strikes and lockouts occurred in 1986 with 581 actual strikes, 169,479 workers involved,

and 3,638,000 man-days lost. In 1996, the numbers became 89 actual strikes, 32,000 workers involved, and only 519,000 man-days lost. Various factors were cited for the improvement in industrial relations. One was the end of the Marcos government in 1986 and steady economic growth since then. Also, the Department of Labor and Employment (DOLE) established Labor Management Cooperation councils. These have been widely used in settling worker-management disputes. Finally, unions became less fervent in the wake of increased globalization of the Philippines economy.

It is worth mentioning that overseas contract workers play a significant role in the Philippines labor market. The importance of remittances has long been recognized in terms of improving the balance of payment. However, the influence of overseas contract workers in labor markets is equally important. As briefly mentioned earlier, the overseas contract workers may have contributed to the increase of the real wages of Philippines workers when the labor productivity was almost stagnant. The ratio of overseas workers to total workers can be calculated using employment numbers from Table 4 and total number of overseas contract workers from Table 7. In 1996, it was 2.4% of total employment in Philippines, a slight increase from the 1987 level. An average overseas worker sent remittances of around $1, 594 in 1987 and $6,356 in 1996. These remittances increased household income and may have had raised the reservation wage of domestic workers.

In summary, the Philippines labor market has been characterized by a rising labor force, rising employment, and rising real wages during 1987-1996.[1] The labor productivity has remained stagnant, therefore suggesting that other forces, such as trade or overseas contract workers, may have been the driving force behind the increase in real wages. At the

[1] It may be noted that our own measure of real wages constructed using Labor Force Survey data from 1985 to 1994 shows stagnation. This is not necessarily at odds with the findings of Jurado and Sanchez since our periods do not overlap completely. In particular, we suspect that the difference between our numbers and theirs' is driven by a large decrease in real

same time, labor-management frictions have greatly reduced, indicating an overall improvement in governance and the economic environment.

4. Trade, Employment, and Average Real Wages: Analysis of Industry-Level Data

As mentioned in the introduction, our project is aimed at examining various dimensions of the linkages between trade and labor markets. In this section we consider employment and average wages in the manufacturing sector and focus on how these may have been affected by trade. The analysis of trade and wage inequality is left for the next section and interested readers can skip to that section without any loss of continuity.

4.1 Empirical Framework and Data Issues

Because we focus on the effects of trade on the manufacturing sector and more so, individual industries, this study is partial equilibrium in nature. Conceptually, a reduction in tariffs or other types of trade protection given to an industry should lead to a downward shift in the demand for the industry's product. This will tend to push that industry's demand for labor in the same direction. Assuming flexible labor markets employment should decline, with the decline mediated by downward adjustments in wages. Of course, it is unlikely that labor markets are perfectly flexible. Collective bargaining arrangements and various regulations on labor and labor adjustments are likely to play an important role in determining how employment and wages actually adjust to the downward shift in demand for labor induced by reductions in protection. In this section we will not attempt to arrive at firm conclusions on the nature of labor market adjustments. What we will attempt to do is,

---

wages from 1985 to 1988 which would not be fully captured by Jurado and Sanchez's

however, outline what the general pattern of adjustments to trade and trade liberalization has been.

4.1a. Estimation Strategy

The empirical strategy adopted in order to determine the actual pattern of adjustments is to estimate simple reduced form equations for employment and average wages using a panel of 28 three-digit ISIC manufacturing industries. The employment and wage equations take the following form:

$$\log L_{it} = a_i + a_{i1} \ln(T_{it}) + a_{i2} \ln(LR_{it}) + a_{i3} \ln(Z_{it}) + \sum a_t YR_t + \varepsilon_{it}, \quad (1)$$

and

$$\log W_{it} = b_i + b_{i1} \ln(T_{it}) + b_{i2} \ln(LR_{it}) + b_{i3} \ln(Z_{it}) + \sum b_t YR_t + \eta_{it}, \quad (2)$$

where L denotes employment, W denotes average wages, i denotes industry, and t is year. T and LR are measures of openness to trade and labor market regulations, respectively while Z represents a vector of other variables which are likely to effect employment and wages through their impact on demand for and supply of labor. These include real GDP, and the size of the labor force. The estimating equations also include industry and year dummies. These are included in order to control for omitted, time-invariant industry characteristics and common period specific shocks. Finally, ε_{it} and η_{it} represent error terms which pick up random measurement errors in employment and wages, respectively, and the effects of labor demand and supply shocks on employment and wages which are not picked up by the included independent variables.

---

computations which start in 1987.

4.1b. Data and Variables

The use of industry fixed effects to control for time-invariant industry specific unobservables and year dummies to control for common shocks necessitates that the variables used in estimation vary in the within industry dimension. Unfortunately, this presents a small complication: many commonly used indicators of trade policy and labor market regulations are at best country specific rather than industry and year specific. Thus unless one obtains indicators of trade policy and labor market regulations which vary over time and across industry, these cannot be included jointly with the industry effects and year dummies.

Fortunately, we are able to obtain measures of trade and trade policy which are industry specific. We were unable, however, to get indictors pertaining to conditions in labor markets (such as union density or number of strikes) by industry. Thus, we are unable to isolate the effects of labor market regulations and conditions on labor market outcomes. Though this is disappointing it must be noted that to the extent that labor market regulations have been common across industries our year dummies will capture any changes in these regulations. Similarly, even if labor market regulations have been different across industries, as long as these differences have been slow to change our usage of industry dummies will ensure that our estimates are not contaminated by the omission of indicators of labor market regulations. With this in mind, we can move on to a discussion of the data and variable construction.

Employment and Real Average Wages: Annual data on employment and average wages are obtained from the UNIDO Industrial Statistics Database. While employment is measured by the number of employees or persons engaged in each industry, wage rates are derived by dividing the annual wages and salaries paid to employees by the total number of employees in each industry. The wage and salary data, expressed originally in current local currency terms, are converted into constant local currency terms by deflating these by the CPI (base year = 1995).

Measures of Openness: To capture openness this paper uses two types of measures. The first is based on the trade volume data. Import penetration rates are obtained as the ratio M/Q, where M denotes imports and Q denotes domestic industry output. Similarly, an export (X) to output(Q) ratio is obtained as X/Q. Note that the individual series for X, M, and Q are in terms of US dollars. They are not converted into constant pesos; this is not likely to be a serious issue since we are taking ratios of these variables .

Clearly, there are some well known problems with a measure of openness which relies upon trade volume/share data. First, trade volume/shares are likely to reflect not only the stance of trade policy but other determinants of trade as well. For example, trade volumes may reflect industry specific factors such as a matching of an industry's production technology with a country's factor endowments. At another level, high trade volumes relative to domestic production may result from high growth if industries with superior economic performance integrate more closely with the world economy. A positive correlation between employment and wage growth and trade shares may then be driven by the positive effects of economic growth on all three variables.

By using our trade shares data along with industry fixed effects, we are able to alleviate some of these criticisms. This is because the usage of fixed industry effects in estimation means that it is the within industry variation of trade shares that is relevant. In

particular, to the extent that trade shares fail to capture trade policy adequately because of industry specific determinants of trade shares the inadequacy of trade shares as a measure of trade policy is alleviated. Similarly, lagging the trade shares variables is likely to alleviate the problem of endogeneity of trade shares.

Nevertheless, we also use tariff based measures of openness. Since these are directly in the control of policymakers, tariff rates are probably a better reflection of the stance of trade policy than trade shares. In particular, we use average tariff rates computed by UNCTAD and matched to the three-digit ISIC industrial categories.[2] These tariff rates are available for the years 1988 to 1995, with 1991 missing. Details on the construction of these tariff rates are contained in Nicita and Olarreaga (2001). Here we can note that the tariff rates are simple MFN averages of tariff rates based on tariff data at the six digit HS classification. The HS classification is converted into ISIC classification using a one-to-one concordance table. The simple averages are then computed by using only the actual number of dutiable lines in the denominator.[3, 4]

One problem with using tariff information is that a widespread usage of non-tariff barriers can restrict the usefulness of average tariff rates as a measure of trade barriers. One way out of the latter problem would be to combine information on tariffs with non-tariff barriers. Unfortunately, time-series data on non-tariff barriers have not been available to us.

---

[2] We are very grateful to Marcelo Olarreaga and Alessandro Nicita of the World Bank for kindly providing us information on exports, imports, and tariff rates at the 3 digit ISIC level. It may also be noted that we preferred to use these tariff rates rather than the tariff rates reported by Manasan and Querubin because the latter are available from 1990 onwards only and are not as well matched to our industry definitions as the UNCTAD numbers.

[3] This is different from tariff rates reported by WTO in that WTO average tariff rates are computed by includes all lines in the denominator. It is difficult to say which is the more appropriate procedure. For our analysis, however, there is not much of a choice. WTO tariff rates are available for one year 1996.

[4] As noted above, average tariff rates are a more direct measure of trade policy than trade volumes/shares, but even these are not perfect. Since high tariff rates tend to drive the import of corresponding goods down, average tariff rates will underestimate the extent of trade restrictions.

However, the non-availability of data on non-tariff barriers may not be too problematic. Rodriguez and Rodrik (2000) point out in their critical review of the empirical literature on trade policy and growth that average tariff rates seem to serve the purpose of capturing the restrictiveness of trade regimes reasonably well across countries. Consistent with this, we find that the correlation for the two measures of openness we have tell a consistent story across industries as well. In particular, the correlation between tariff rates and import penetration rates is negative and statistically significant at least at the 5 percent level (-0.48 in 1988, -0.41 in 1995). Similarly, regressions of UNCTAD tariff rates on various regressors including M/Q yields a negative and statistically significant estimate on import penetration when the cross-industry variation is emphasized (not reported). When tariff rates, M/Q, and X/Q are expressed in logs, then even the within-estimates yield a negative estimate on M/Q. However, when these three variables are expressed in levels (percent terms), then there is no significant relationship. This suggests that for within industry analysis based on levels of tariff rates and M/Q, the effects of these two measures of openness on variables of interest may not be consistent with one another. In such cases which of the two should one adopt as a better measure of openness? In general, this will vary with what the nature of the analysis and data issues – for example, it is quite likely that measure of M/Q are not only easier to obtain at the desired industrial classification but they are also likely to be measured with less error. For our purposes it seems reasonable to assume that tariff rates are a better measure of trade policy.

Other Variables: Since the capital intensity of a given industry can have implications for labor productivity and potential for employing labor, we include a measure of the capital to labor ratio in our regressions (K/L). Construction of L has been described above. For K, the capital stock, we use the perpetual inventory method. Denoting real investment by I and depreciation by δ :

$$K_{it} = I_{it} + I_{it-1} \cdot [1- \delta] + \ldots + I_{it-4} \cdot [1- \delta]^4, \quad (3)$$

I is obtained by deflating the industry specific series on fixed capital formation (UNIDO) by the nationwide deflator for gross domestic fixed investment (available in World Development Indicators, 2000 but re-based to year = 1995). We assume depreciation to be 10 percent.

Because overall economic activity is bound to have an important effect on labor demand in manufacturing and, therefore, employment and wages, a measure of GDP in equations 1 and 2 may be included in case year dummies are not also included in the estimating equations. The GDP variable is in 1995 pesos available from the World Development Indicators 2000. Similarly, it is important to control for the size of the overall pool of labor available to manufacturing sector. This is captured by using the population between ages 15 and 65.

It is worth noting two important limitations of the data, especially that relating to employment and wages. First, as mentioned above the industrial data does not allow us to distinguish between employees in terms of their skill levels. Additionally, since a large proportion of workers in the manufacturing sector are employed in the so-called informal or unregistered sector, they are not likely to be captured adequately in the industrial statistics used here. If production in the informal sector is the more labor-intensive one, an expansion of the unorganized sector at the expense of the more capital intensive organized sector as a result of trade liberalization will go unrecorded in our data. Trade liberalization could then be associated with a decline in employment as it is measured here even if in reality total employment in the manufacturing sector increased.

Both of these problems can be alleviated by a different approach – one which uses nationally representative labor force surveys to examine the impact of trade on labor markets. However, that analysis is carried out in the next section. For now, we continue with the

current analysis and note that the results of this section essentially pertain to average workers characteristics and to formal or organized/registered manufacturing.

4.2. Empirical Findings

4.2a. Descriptive Statistics

In this section we examine various aspects of trade/trade protection and labor market indicators in the Philippines' manufacturing sector. Table 9 provides a snapshot of the patterns of protection and various industry level characteristics including capital intensity of production, employment, and wages over time. The industries are classified in terms of three digit ISIC categories and are sorted in terms of average tariff rates for 1988, the first year for which we have tariff information as reported by UNCTAD. Tariff rates are also presented for 1995, the last year for which UNCTAD tariff rates are available.[5, 6] For the other variables, we report values for 1986 and 1996.

An interesting feature of the table is that industries typically considered labor intensive tend to have among the highest tariff rates. In particular, note that in terms of capital to labor ratios in 1986, the apparel and footwear industries were the first and fourth most labor intensive industries in the manufacturing sector. Yet, the average tariff rates in 1988 (UNCTAD) were almost 50 percent – the second and fourth highest in the manufacturing sector. And while tariff rates have typically declined over the years – though

[5] We prefer to use UNCTAD tariff rates rather than those reported by Manasan and Querubin because of their greater disaggregation across industries.
[6] UNCTAD tariff rates were unavailable for 1991. For our analysis we assume these to be the average of 1990 and 1992 rates. This assumption is probably not a strong one since tariff rates between 1990 and 1992 didn't display much variation typically.

not consistently: average tariff rates spiked upwards in 1992/93 – this has not been the case for the footwear industries where the average tariff rate in 1995 has actually gone up!

Of course, average tariff rates are only an incomplete and imperfect measure of overall protection. But to the extent that they are a reasonable indicator of the patterns of overall protection, the data suggest that a trade liberalization aimed at lowering and harmonizing tariff rates would make labor intensive industries relatively less profitable than before. In other words, the implications of trade liberalization on employment could be the converse of what conventional wisdom would predict. (Note that the apparel industry had the second largest number of employees in 1986.)

With average tariff rates both declining and displaying lower variance between 1988 and 1995 (mean average tariff rates came down from 32.10 to 24.13; the variance in average tariff rates came down from 110.78 to 92.02), how exactly did employment and average wages behave? A casual look at the columns relating to employment and wages shows that both increased almost always. Clearly, there is much more than just tariff rates that drive these variables. Nevertheless, as the scatter plots in Figure 5 reveal, there is some (weak) evidence indicating that industries with the largest declines in tariff rates registered the lowest growth in employment and average real wages.

The scatter plots also show one reason that may have been responsible for pressure on employment and wages: the largest declines in tariff rates also seemed to lead to the largest increases in import penetration ratios (imports/total domestic output). Thus these scatter plots are consistent with a scenario whereby tariff reductions have induced greater import competition for domestic industry and put downward pressure on wage and employment growth. Of course, the scatter plots suffer from obvious defects. They are simply bi-variate associations and take no account of the influence of other factors on employment and real wages. They also are not matched in terms of timing. As such they are especially lacking in

any causal interpretation to the relationships. To alleviate this problem we now turn to the estimates of the reduced form equations for employment and wages.

4.2b. Employment and Real Wage Elasticities

Tables 10 and 11 present results from estimation of reduced form equations for employment and real wages, respectively (equations 1 and 2 above). Openness is measured in terms of trade shares (imports and exports separately as well as added together) and UNCTAD average tariff rates. Both measures are introduced contemporaneously since lagging them by one year did not seem to make much qualitative difference to our results. In those models where a time trend is included it is possible to include real GDP and the working age population (POP1564). If time dummies are used instead, then it is not possible to include these two variables as regressors.

Focusing on the three OLS estimates of employment equations, it can be seen that an greater openness, whether defined in terms of higher import penetration ratios or lower tariff rates, worsens employment. The coefficient on K/L is negative for all three models, significantly so for the first two and indicates, not surprisingly, that more capital intensive industries employ fewer workers. Oddly, the coefficients on GDP and POP1564 are negative. Thus these two factors – commonly believed to raise equilibrium employment (via shifts of the labor demand and labor supply curves, respectively) – lead to lower employment. The coefficients are rarely significant though.

Including industry fixed effects does not alter the equations using trade shares much. In particular, increases in import penetration rates continue to lower employment. However, the magnitudes involved don't appear to be too large: a ten percentage point increase in import penetration rate is associated with a 0.02 percent drop in employment. But the coefficient on tariff rates now loses its significance (and turns negative). This pattern repeats when year dummies are used instead of a time trend.

Turning next to the wage equations, we see that capital labor ratios enter positively and significantly across all specifications. Not only do industries with higher capital labor ratios pay more, an increase in capital labor ratio within an industry is likely to result in higher wages. This is not too surprising given that an increase in capital intensity is likely to raise the productivity of workers. As for the openness related variables, industries with lower tariffs have higher wages – as seen from the OLS estimates. This effect is probably driven by the fact that industries with high capital labor ratios tend to have higher wages. However, a reduction in tariff rates within industries seems to lower wages – significantly so in the estimates with year dummies. But again the effect is not of large magnitude: A ten percentage point drop in tariff rates is associated with a 0.05 percent drop in average wages. Meanwhile, import penetration rates don't seem to affect wages much. However, increases in the proportion of domestic output exported does lead to higher wages.

In summary, this analysis indicates that increases in import penetration rates within industries lead to a decline in employment but tend to leave wages relatively unchanged. Reductions in tariff rates on the other hand, tend to lower wages but leave employment unchanged. The two results are a bit difficult to reconcile with one another. For instance the effects of tariffs alone could perhaps be justified by appeal to rent sharing agreement between firms and workers whereby tariff reductions put down ward pressure on wages such that there is little need to adjust employment. However, this story doesn't seem compatible with the effects of greater import penetration which tends to be associated with job loss but relatively unchanged wages.

Without recourse to finer data – say firm level data – and data on labor market regulations as they apply across industries and over time, it is very difficult to make major headway in this analysis. However, one thing this analysis does reveal is that the effects of trade and trade liberalization have had weak effects on total employment and average wages. This is especially true if one compares our estimates to those of similar studies for other

countries. Revenga (1997), for example, finds that a 10 percent drop in nominal protection rates in Mexico led to a decline of 1.5 to 1.8 percentage points in real wages.

Of course, the weak overall effects we find may mask important changes if workers are heterogeneous. Our next exercise focuses on tackling this heterogeneity by using labor force data which allows us to distinguish between workers as either skilled or unskilled. Also, because the labor force data captures workers in all sectors of the economy, it enables us to carry out an analysis which is much more general equilibrium in spirit.

5. Trade and Wage Inequality in the Philippines: Analysis of Labor Force Surveys

As mentioned in the introduction to this paper, a common argument made by proponents of trade liberalization is that openness to trade should present new and significant opportunities for relatively unskilled workers in developing countries. The argument is based on the compelling logic of the Heckscher-Ohlin and Stolper-Samuelson theorems (HOS) whereby opening to trade benefits a country's abundant factor. 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 (Section 2).

With scores of developing countries having undertaken significant amounts of trade liberalization over the last two decades it is fair to ask what the evidence on trade and relative wage inequality is. Wood (1997) presents a comprehensive survey of the evidence. As he notes, the data suggests an importance difference on the effects that trade has had on relative wages depending on whether one is examining the case of the "early liberalizers" (the East Asian Newly Industrialized Economies in the 1960s and 1970s), or the more recent liberalizers in Latin America and elsewhere. While the time-series data on relative wages in

the cases of Hong Kong, Taiwan, and other NIEs seems to be consistent with the predictions of the HOS model, the evidence from a number of recent liberalizers is not. In particular, the work of Robbins (1996) and Robbins and Gindling (1999) on numerous Latin American countries, including Argentina, Chile, Costa Rica, and Venezuela among others indicates that relative wage inequality – i.e., the wage gap between skilled and unskilled workers - widened subsequent to trade liberalization in these countries.[7]

Robbins notes that one reason for his finding of increasing wage inequality subsequent to trade liberalization may be technical change. If trade liberalization has resulted in the flow of new technology and this technology is either concentrated in sectors which use skilled workers intensively or the technology is biased in favor or skilled workers (skill biased technical change or SBTC; see Section 2 for details) then trade would be associated with increased wage inequality.

Yet another explanation for the increased wage inequality subsequent to trade is put forward by Wood (1997). In this explanation, the recent findings of increased wage inequality is argued to be completely consistent with the HOS model. The point made by Wood is that the sample of early liberalizers differs in an important way from the sample of recent liberalizers that have been studied. While the former were genuinely abundant in unskilled labor, the latter are not. In particular, many Latin American countries – the ones most intensively studied – can be legitimately considered to be abundant in unskilled labor if the comparison is between them and the developed countries. However, the label is difficult to apply when one compares the Latin American countries them to the recent liberalizers from Asia. Asian countries, including the Philippines, tend to be the most labor abundant countries in the world. Put differently, if the predictions of the HOS model regarding trade

[7] Robbins (1996) also examines the case of the Philippines. However, his results are more tentative in this case because as he notes, his data on Philippines does not extend into the 1990s – the period when the Philippines was significantly more open to trade.

liberalization and declining wage inequality should hold anywhere, it should be in Asian countries that have liberalized their trade.

In this context, the more liberal trading environment and the rapid increase in trade shares in the Philippines economy since the mid-1980s present an opportunity to examine the behavior of wage inequality in a liberalizing, labor abundant economy. Our efforts toward this end are the subject of the remainder of this paper. Section 5.1 outlines our approach and the data we use for examining relative wages. Section 5.2 presents some descriptive statistics relating to the behavior of wages and supplies across various demographic and educational groups. Section 5.3 describes the movements in relative wages and relative supply. Finally Section 5.4 details our estimates of the relative demand for skilled workers and provides an analysis of the trade related correlates of relative demand.

5.1 Empirical Framework and Data

In this context, the more liberal trading environment and the rapid increase in trade. Our empirical framework is based on the seminal work of Katz and Murphy (1992). This framework relies on individual level data from labor force surveys and uses a largely non-parametric approach to construct economy-wide measures of relative wages, relative supply, and ultimately relative demand for workers (skilled relative to unskilled). By comparing the behavior of relative demand with indicators of trade we can shed light on whether the data show a tendency for trade to either raise the relative demand for skilled workers, as in the SBTC story, or raise the demand for *unskilled* labor, as in the conventional HOS model.

Our measures of relative wages and relative supplies are constructed directly from the individual level information contained in the Philippines Labor Force Surveys (LFS). While the LFS is a quarterly survey, only the survey for the third quarter asks information on wages.

The sample size of these LFS surveys is quite large and can cover about 100,000 individuals per year. Among other things, these surveys provide detailed information on various demographic characteristics of each individual surveyed, educational attainment in terms of highest grade attained, and information on job/business including type of work (i.e., whether wage earner, self-employed, etc.), salary/wages and net receipts from the job/business, and hours worked. All of the information on the job/business is for the reference period which is the quarter running from July 1 to September 30. For those without a job in the reference period information is provided on whether the person wanted a job, whether he/she looked for a job, etc.

We were able to obtain four years of LFS data spaced three years apart: 1985, 1988, 1991, and 1994.[8, 9] We use this data to obtain our measures of relative wages and relative supplies as follows (the construction of relative demand will be explained later):
We adopt the techniques of Katz and Murphy (1992) to construct our time-series of relative wage and relative supply. First, we use the LFS data to make two separate samples. One is the wage sample. The other is the count sample. While the wage sample is used to determine wages for various categories of workers over time (for example, males and females; uneducated/unskilled and college educated/skilled; etc.), the count sample is used to measure the total quantity of labor of various types available in the economy.

The wage sample consists of all individuals who were 15 years or older, worked in the reference quarter, and whose primary job entailed work for a (i) private employer; (ii) a government corporation/agency; or (iii) the own-family operated farm or business (with

[8] We are most grateful to Andy Mason and Emily Cabegin for providing us with the LFS data.
[9] We have been told that the LFS data prior to 1985 is stored in magnetic tape and very difficult to access. Additionally, the LFS data for 1997 has not yet been made available for public use.

payment for labor services). The wage sample is used to measure hourly wages for the primary job.

The count sample includes all those in the wage sample, plus those individuals (15 years and older) who were employed in their own business/enterprises or worked without pay for the family-operated business/farm. This sample also includes those individuals who were unemployed in the reference quarter, wanted to be employed, and either looked for a job or did not look because they were either discouraged or temporarily ill/disabled. The count sample thus corresponds closely to the definition of the total labor force.

Second, in both the wage and count samples we distinguish between workers in terms of their (i) sex (2 categories), (ii) education (either 5 categories or 3 categories), and (iii) age (5 categories).[10] This breakdown leads sample individuals to be assigned to either one of 50 distinct labor groups or cells (2*5*5) when education is broken into 5 categories or 30 distinct labor groups when education is broken into 3 categories (2*3*5).

Relative wages: Using the wage sample we construct relative wage series on the basis of the following steps:

1. We compute the total quarterly wages/earnings (cash + kind) from the primary job of each individual in the wage sample. These wages are deflated by a region-specific cost-of-living index (CLI; National Capital Region (Metro Manila) in 1997=1). This is then divided by our total hours worked on the primary job in the quarter:

$$W_{ijt} = \frac{(cash + kind)}{CLI * \{[full\ days\ worked] * [normal\ hours\ per\ day] + [less\ than\ full\ days\ worked] * [avg\ hours\ worked\ on\ less\ than\ full\ days]\}}$$

[10] The five education categories are: (i) below primary graduate; (ii) primary graduate; (iii) some high school; (iv) high school graduate; and (v) some college and above. When we consider three categories, we do so by collapsing (i)-(ii) together and (iii)-(iv) together. The

2. Mean hourly wages by labor group/cell for each year are then:

$$MW_{jt} = \frac{\sum_i W_{jit}}{[Total\ employment\ in\ cell\ _j, year\ _t]} \qquad j = 1,\ldots, K \text{ and } t = 1,\ldots,T$$

where i indexes individuals, j indexes labor groups/cells, and t indexes time.

3. Next, we compute share of employment by labor/group/cell for each year:

$$n_{jt} = \frac{Total\ employment\ in\ cell\ \ j, year\ t}{Total\ employment\ in\ \ year\ t}$$

4. The average employment share by labor group/cell:

$$N_j = \frac{\sum_t N_{jt}}{T} \qquad j = 1, \ldots, K$$

We can then compute what Katz and Murphy (1992) call "relative" wages, but what we prefer to call <u>normalized wages</u>, by labor group/cell and year as:

$$NW_{jt} = \frac{MW_{jt}}{\sum_j N_j * MW_{jt}}$$

6. Aggregate normalized wages by education categories (E) can then be computed as:

---

five age categories are proxies for different categories of experience. They pertain to: (i) 15-24 years; (ii) 25-34 years; (iii) 35-44 years; (iv) 45-54 years; and (v) 55 years and above.

$$NW_{jt}^{E} = \sum_j NW_{jt} * \left[\frac{N_j}{\sum_j N_j} \right] \qquad \textit{where j is an element of E and E=1, ..., 5}$$

7. Relative wages are then derived as ratios of the normalized wages for different educational categories.

Relative Supplies: The count sample is used to construct the time-series of supplies. Note that we create two measures of relative supplies. One is simply the fraction of total hours of labor units available in each labor group/cell (where the fraction is in terms of total hours supplied in the particular year across all groups/cells); the other which measures fraction of hours supplied in *efficiency* units. The steps in creating these are as follows:

1. Construct total hours (primary job and "other" job) supplied for each individual in the count sample:[11]

$$H_{ijt} = \left[\textit{total hours worked on primary job} + \textit{total hours worked onother job} \right]_{ijt}$$

2. Sum these hours by cell and year and express these as a fraction of total hours worked in the year to get what we call for consistency with the wage measure, normalized supply:

$$NH_{jt} = \frac{\sum_i H_{ijt}}{\sum_i \sum_j H_{ijt}} \qquad j = 1, \ldots, K \text{ and } t = 1, \ldots, T$$

3. To measure this quantity in terms of *efficiency* units we deflate the above by:

$$ENH_{ji} = \frac{NH_{jt}}{\sum_j NW_j * NH_{jt}} \qquad j = 1, \ldots, K \text{ and } t = 1, \ldots, T$$

where $NW_j = \sum_t NW_{jt} / T$

4. Labor supplied to the various educational categories can then be computed as:

$$NH_{jt} = \sum_j NH_{jt} \qquad \textit{where j is an element of E and E=1, ..., 5}$$

Or, if labor supplied is measure in efficiency units then:

$$ENH_{jt}^{E} = \sum_{j} ENH_{jt} * NW_{j} \qquad \text{where } j \text{ is an element of } E \text{ and } E=1, \ldots, 5$$

5. Relative supplies are then derived as ratios of the normalized supplies (in efficiency units or not) for different educational categories.

5.2 Real Wages and Labor Supply

Table 12 describes the movements in real hourly wages for the third quarter for various years over a nine year period. In addition to aggregate real wages (first row), data are also presented by various demographic groups and by education category. The movement in aggregate real wages shows a decline in real wages between 1985 to 1988, a recovery over the next three years, and then yet another decline from 1991 to 1994. One feature of the data that is fairly striking is the fact that while the decline in real wages between 1991 and 1994 was fairly widespread (many demographic and educational groups suffered declines), the decline in real wages between 1985 and 1988 was almost completely driven by declines in the real wages of men with some college education or higher.

We turn next to the supply of different types of labor, or more accurately normalized supply (i.e., total hours per group/cell expressed as a fraction of total labor supply available for the year), detailed in Table 13. There are several interesting features of the table. First, there has been a steady decline in the fraction of the labor force composed of workers with only primary education or less. In contrast, the fraction of workers who are high school graduates have increased dramatically. Workers with some college education or more have also become a larger part of the workforce though their increase has not been as dramatic. Second, women have grown particularly fast among the category of workers with a high

[11] For those individuals for whom we are missing the hours worked information (essentially those who were unemployed but belonged to the labor force) we impute values which are equal to the group/cell specific mean total hours supplied for that individual

school degree or more education. Table 14, which expresses supply in terms of efficiency units also shows a similar pattern.

The finding that the supply of more highly educated workers has increased relative to other workers is important. It suggests that any story which tries to explain the behavior of real wages in the Philippines economy as a purely demand side phenomenon (for example, due to trade or shocks to economic activity) needs to be complemented in an important way with the trends in the relative supply of education.

5.3 Relative Wages and Relative Supply

Since our interest is in examining trends in relative wages – i.e., real wages of skilled workers relative to those of unskilled workers, we now turn to an examination of these. Table 15 details real (normalized) wages by education groups. For the most part, these are similar to the real wages described in Table 12. The more interesting numbers are to be found in Table 16 which represents wages of the various educational groups relative to workers with some college education or more. In all cases, there was a large decline in relative wages of college educated workers between 1985-1988. In comparison to the least educated group of workers, the relative wage of college educated workers continued to decline for the entire period up to 1994.

Tables 17 and 18, which present supply by education group in both real and relative (normalized) terms, respectively, suggest that increasing supply of educated workers in the Philippines economy may have been responsible. For instance, this is most clearly seen in the first two columns of Table 18. The ratios of college educated workers to those with only primary education or less increased steadily over the 1985-1994 period. The trends are even

more pronounced in Tables 19 and 20 which report labor supply by educational groups expressed in terms of efficiency units.

A formal test of the possibility that changes in relative wages were driven by changes in relative supply can be carried out Katz and Murphy's inner product test.

The intuition for this test is as follows: If relative demand for the different types of labor is unchanged so that relative wages are driven completely by changes in relative supply, then the following vector multiplication should result in a non-positive number:

$$[NW_t - NW_s]' * [NH_t - NH_s] \leq 0$$

where NW represents the vector of normalized real wages over the various labor groups/cells, NH represents the vector of normalized real supply over the various labor groups/cells, and t and s represent two different time periods.

Tables 21 and 22 report the results of these inner product tests for our two measures of normalized supply (i.e., in simply normalized terms and in normalized, efficiency units). The inner products reveal that pure supply shifts have the *potential* to explain all changes in real wages for all periods except the 1985 to 1988 changes. For the 1985 to 1988 changes, no purely supply side story can explain the changes in wages. Some demand side phenomena affecting real wages needs to be introduced. However, because the wages of the most educated workers declined while wages of all other workers increased over this period (Tables 12 and 15), the demand side story, if it were to be linked to trade, would have to be in line with the HOS model. In other words, with Philippines' exports and imports both increasing from 1985 and 1988 after a period of some stagnation, the effects of this increased trade on relative wages, if any, would have to have reduced the relative demand for the most highly educated workers in the economy.[12] This would be consistent with the HOS

[12] If the Philippines' imports were dominated by skill-intensive imports, then the rise in overall imports should reduce the relative demand for the most skilled workers. Similarly, if

predictions that trade benefits a country's abundant factor – in this case, the relatively less educated workers.

5.4 Estimating Relative Demand

In the last sub-section we have noted that shifts in relative supply have the potential to explain most of the changes in relative wages, the one exception being the relative wage changes between 1985 and 1988. This leaves open the possibility, at least for the post 1988 period, that relative demand shifts did take place and that these changes favored skilled workers as found by Robbins for various Latin American countries. To remove any ambiguity in interpretation simply looking at relative wages and relative supply movements is not enough. We need concrete estimates of relative demand.

In this sub-section we derive estimates of relative demand. Once again we follow the approach of Katz and Murphy (1992). Assuming that an aggregate production function for the Philippines economy exists and can be represented by a two factor CES production function (where the two factors are skilled (1)and unskilled (2) labor), the relationship between relative wages, relative supply and relative demand can be expressed as:

$$\log\left(\frac{w_1(t)}{w_2(t)}\right) = \left(\frac{1}{\sigma}\right)\left[D(t) - \log\left(\frac{x_1(t)}{x_2(t)}\right)\right],$$

where W represents real wages, X represents supply, σ is the elasticity of substitution between skilled and unskilled labor, and D represents the relative demand for these two factors. Rearranging the above, we can write relative demand as a function of the elasticity of substitution, relative wages, and relative supplies:

Philippines' exports were dominated by unskilled-intensive goods, then a rise in overall exports should lead to an increase in the relative demand for unskilled labor.

$$D(t) = \sigma_0 \log(w_1(t)/w_2(t)) + \log(x_1(t)/x_2(t)) .$$

Armed with a range of plausible estimates for the elasticity of substitution we can derive estimates of the implied shifts in relative demand.

To operationalize this approach, we need to carry out an important prior step: We need to go from having five categories of workers to two categories of workers – skilled and unskilled. We do this as follows. First, we repeat the exercise of Sections 5.1 and construct normalized real wages and normalized real supply using three rather than five educational categories. These categories are (i) primary gradate or below (unskilled); (ii) some high-school or high-school graduate (medium skilled); and (iii) some college or college graduate (skilled).

The relative wages of group (iii) workers to group (i) workers can be taken as the relative wages of skilled to unskilled workers. As for relative supplies, one option would be to simply ignore the supply of medium skilled workers and take the ratio of skilled to unskilled workers as the measure of relative supply. Another option would be to find some way of allocating the supply of medium skilled workers to the unskilled and skilled worker categories. We choose to follow Katz and Murphy and perform this allocation. In particular, we regress the wages of medium skilled workers on the wages of skilled workers and unskilled workers.[13, 14] The estimated coefficients are in the proportion of 0.94 (for unskilled workers) and 0.06 (skilled workers). Thus we allocate 0.94 of medium skilled worker supply to the unskilled worker category and 0.06 to the skilled worker category. Note that this system of allocation assumes that the labor services of medium skilled workers are a linear combination of the labor services of skilled and unskilled workers. If workers are paid

[13] The regression does not contain an intercept term.

[14] To carry out this regression in a meaningful way, we were forced to interpolate the series of wages for the three types of workers in between the years 1985, 1988, 1991, and 1994. The interpolation increased the number of wage-year observations from four to a more reasonable ten observations.

their marginal products, the movements of the wages of the medium skilled workers will then track the wages of skilled and unskilled workers in the proportion that medium skilled workers provide skilled and unskilled labor services.

Figure 6 describes the log of relative demand for skilled workers over time. Figure 7 converts these estimates into percentage change in relative demand over 1985-1988, 1988-1991, and 1991-1994. We can see that a decrease in the relative demand for skilled workers is consistent with the wide range of elasticity of substitution considered by us for the 1985-1988 period. In contrast, the 1991-1994 period reveals an unambiguous increase in the relative demand for skilled workers.

How do the trends in relative demand for skilled workers vary with trade? In view of the fact that we have only four estimates of relative demand, answering this question in a rigorous way is very difficult. Nevertheless, it is possible to carry out a relatively informal exercise at examining correlations of these estimates with various variables of interest. [15, 16] In particular, we first interpolate our series on estimated relative demand to get 10 observations – one for each year from 1985-1994. We then consider the correlations of the interpolated estimated relative demand series on shares for merchandise imports and exports in GDP and GDP per capita.

The results of these correlations are interesting. First, the correlation coefficients vis-à-vis GDP per capita are always negative, regardless of which elasticity of substitution we assume for estimating our relative demand for skilled workers (Tables 23a and 23b). We suspect that this is on account of the fact that the period over which GDP per capita increased consistently over the ten years we consider is that from 1985 to 1990/1991. This overlaps

[15] With more data on relative demand we would have been able to follow the approach of Robbins and Gindling (1999) who use a regression framework to examine the correlates of relative demand. With ten data points, however, we prefer to examine Pearson and Spearman Rank correlation coefficients.

significantly with the one three year period in which all our measures of estimated relative demand for skilled workers show a decline.

Second, we find what is potentially an important pattern of results for the correlations between relative demand and the shares of merchandise imports and exports in GDP.[17] Not surprisingly, with a very low elasticity of substitution between skilled and unskilled labor (0.5) we find the individual trade shares to have little significant correlation with relative demand. With an elasticity of substitution of 1.5 or 4, however, patterns are quite different. Not only to the correlation coefficients tend to be negative and large. In addition, they are often statistically significant at the ten percent level or lower. The pattern is thus one where imports and exports decrease the relative demand for skilled workers. In other words, these correlations are consistent with the notion that an increase in trade has led to greater opportunities for relatively unskilled workers in the manner that proponents of the HOS model would argue.

6 Concluding Remarks

This paper has been concerned with examining the linkages between trade and labor market outcomes in the Philippines economy. These linkages have been examined in two separate empirical exercises. A first exercise has focused on analyzing industry level data from the manufacturing sector with a view to determining the overall patterns in manufacturing sector employment and average wages. This industry level analysis indicates that increases in import penetration rates within industries has led to some decline in employment but has tended to leave average wages in the manufacturing sector relatively

[16] The discussion of this exercise is aided by also examining Figures 8 and 9 on the time series of GDP per capita and imports and exports.

[17] All variables including relative demand for skilled labor enter in logarithms.

unchanged. While there are some puzzles – the patterns of change when tariff rate changes are used to measure liberalization are somewhat different – one thing this analysis does reveal is that trade has had relatively weak effects on total employment and average wages in the manufacturing sector when compared to similar studies for other developing countries.

Of course, the weak overall effects we find may mask important changes if workers are heterogeneous. Thus we put more emphasis on our second exercise which tackles this heterogeneity directly by using labor force data which allows us to distinguish between workers as either skilled or unskilled. Also, because the labor force data captures workers in all sectors of the economy, it enables us to carry out an analysis which is much more general equilibrium in spirit.

The results of this second exercise, the thrust of which is focused on determining the role of demand and supply shift factors on wages, are both interesting and important. First, our analysis makes clear that the expansion of education can be an important factor in driving wage inequalities down – or at least in putting downward pressure on them if they are tending to rise for other reasons. In the case of the Philippines, our results indicate that the expansion of education – as witnessed through a steady decline in the fraction of the labor force composed of workers with primary education or less and a corresponding increase in the fraction of workers with high school degrees or greater levels of education – has played an important role in putting downward pressure on wage inequality, especially in the 1988-1994 period. Second, we find some evidence consistent with the notion that trade has led to an increase in the relative demand for unskilled workers. This is in contrast to the findings of Robbins and Gindling (1999) and Robbins (1996) for Costa Rica and other Latin American countries.

Clearly much work remains to be done. In particular, access to more labor force surveys is a necessity before firmer conclusions about the correlates of relative demand can

be made. We are hopeful that new labor force survey data (post 1995), which is expected to be released by the Philippines National Statistics Office later this year, will be a big help in this direction. In addition, work of this nature but using data from other labor abundant Asian countries, such as Indonesia which is known to have good labor force survey data, would be in order.

References

Alburo, F and G. Shepherd (1986). Trade Liberalization Experience in the Philippines, 1960-84. *Philippine Institute for Development Studies Discussion Paper Series* No. *86-01.*

Cororaton, C. and J. Cuenca (2000). An Analysis of Philippine Trade Reforms in 1995-2000 Using 1994 APEX model. *Philippine Institute for Development Studies Discussion Paper Series* No. *2000-36.*

Edwards, A. C. and S. Edwards (1994). Labor Market Distortions and Structural Adjustment in Developing Countries. In Susan Horton et al edited, *Labor Markets in an Era of Adjustment, Volume 1*, EDI Development Studies, The World Bank, Washington DC.

Gerson, P. (1998). Poverty, Income Distribution, and Economic Policy in the Philippines. *IMF working paper WP/98/20.*

Haskel, J. and M. Slaughter (1998). "Does the sector bias of skill-biased technical change explain changing wage inequality?" *NBER Working Paper 6565*.

Harrison, A. and G. Hanson (1999). "Who gains from trade reform? Some remaining puzzles." *Journal of Development Economics*, vol. 59, 125-154.

Hasan, R (forthcoming). The Impact of Trade and Labor Market Regulations on Employment and Wages: Evidence from Developing Countries. In Rana Hasan and Devashish Mitra edited, *The Impact of Trade on Labor: Issues, Perspectives, and Experiences from Developing Asia*. To be published by Elsevier Science.

Jurado, G. and M. Sanchez (1998). Philippine Employment and Industrial Relations Policies: An assessment. *Philippine Institute for Development Studies Discussion Paper Series* No. 98-10.

Kambhampati, U., P. Krishna and D. Mitra (1997). "The effect of trade policy reforms on labor markets: evidence from India," *Journal of International Trade and Development*, 6:2 pp. 287-297.

Katz, L. and K. Murphy (1992). "Changes in Relative Wages, 196301987: Supply and Demand Factors," *Quarterly Journal of Economics* 107, pp: 35-78.

Manasan, R. and R. Querubin (1997). Assessment of Tariff Reform in the 1990s. *Philippine Institute for Development Studies Discussion Paper Series* No. *97-10.*

Medella, E. (1990). Assessment of the Trade and Industrial Policy, 1986-1988. *Philippine Institute for Development Studies Discussion Paper Series* No. *90-07.*

Nicita A. and M. Olarreaga, (2001). "Trade and Production, 1976-1999". World Bank working paper.

Ravenga, A. (1997). "Employment and wage effects of trade liberalization: The case of Mexican Manufacturing." *Journal of Labor Economics*, vol. 15, no. 3, part 2.

Roberts, M. and J. Tybout (1996). "The decision to export in Colombia: An empirical model of entry with sunk costs." *American Economic Review*, vol. 87, no. 4.

Robbins, D and T.H. Gindling (1999). "Trade Liberalization and the Relative Wages for More-Skilled Workers in Costa Rica," *Review of Development Economics*, 3(2), pp: 140-154.

Robbins, D. (1996). "HOS hits facts: Facts win; Evidence on trade and wages in the developing world." Development discussion paper number 557, HIID.

Rodriguez, F. and D. Rodrik (2000). "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence," Working Paper.

Rodrik, D. (1999). Globalization and Labor, or: if Globalization is a Bowl of Cherries, Why Are There So Many Glum Faces Around the Table? In R. Baldwin et al edited, *Market Integration, Regionalism, and the Global Economy*, Center for Economic Policy Research.

Suryahadi, A., P. Chen, and R. Tyers (1999). "Openness, Technological Change and Labor Demand in Pre-Crisis Indonesia." Working Paper 377, Australian National University.

Tan, E. (1994). Trade Policy Reforms in the 1990s: Effects of EO 470 and the Import Liberalization Program. *Philippine Institute for Development Studies Research Paper Series* No. *94-11*.

Wood, A. (1997). "Openness and wage inequality in developing countries: the Latin American challenge to East Asian conventional wisdom," *The World Bank Economic Review*, vol. 11, number 1.

Tables and Figures

Table 1: Average EPRs by Major Grouping, 1985-1995

	1985	1988	1990	1995
Agriculture and Primary	9	5	4	3
Manufacturing	73	55	51	45
All Sectors	49	36	33	29
Exportable	-7	-4	-8	-6
Importable	102	75	69	61

Source: 1985 and 1988 from Medalla (1990); 1990 and 1995 from Tan (1994) (cited in Manasan and Querubin, 1997).

Table 2: Effective Protection Rates

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Effective Protection Rates	27.86	27.56	32.2	29.08	27.09	21.91	25.43	23.26	20.35	18.58	17.95
Agriculture, Fishery & Forestry	23.63	23.18	24.32	23.76	22.94	22	22.19	20.73	18.91	18	17.58
Agriculture	26.42	26.62	26.39	26.34	25.92	25.6	28.7	26.48	25.65	24.29	23.67
Fishery	17.86	18.11	23.84	21.48	19.3	16.46	10.9	10.99	6.16	6.15	6.15
Forestry	18.31	11.79	11.52	11.63	11.52	10.64	4.66	4.66	3.18	3.18	3.18
Mining	1.67	1.4	1.68	1.11	1.24	1.43	0.3	0.36	0.08	0.11	-0.16
Manufacturing	31.02	30.77	36.99	32.75	30.18	23.09	28.15	25.57	22.1	19.9	19.16
Food Processing	40.4	41.1	57.98	48.76	42.88	32.31	51.61	45.99	42.34	36.7	36.22
Beverages & Tobacco	51.93	51.99	49.21	48.77	48.29	48.28	26.37	27.78	16.36	17.75	17.75
Textile, Garments & Footwear	25.35	24.41	24.25	22.2	22.22	13.33	13.55	8.54	8.48	8.41	5.16
Wood & Wood Products	33.81	20.44	20.46	20.11	20.16	16.38	22.64	22.7	11.98	11.99	12.02
Furniture & Fixtures	21.32	27.18	22.74	19.23	15.2	13.19	15.01	15.81	10.63	10.7	10.95
Paper, Rubber, Leather & Plastic Products	32.37	32.03	28.85	26.41	25.16	20.66	20.27	20.17	12.97	12.98	13.05
Chemical & Chemical Products	23.5	18.5	18.26	17.88	17.99	11.27	11.89	10.55	7.71	7.66	6.86
Non-metallic Mineral Products	10.59	13.09	15.29	15.37	16.68	11.91	5.3	5.76	5.73	5.74	4.88
Basic Metal & Metal Products	23.15	20.4	20.28	19.64	18.98	15.48	14.16	14.03	10.56	8.92	8.84
Machinery	24.22	23.73	22.29	19.81	16.36	11.32	10.67	10.77	8.91	8.7	7.92
Miscellaneous Manufactures	20.58	19.26	17.85	16.75	14.59	10.29	10.53	10.4	6.73	6.51	6.5

Source: Manasan and Querubin (1997)

Table 3: Average Nominal Tariff Rates

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Average Nominal Tariff Rates	33.33	33.38	38.94	35.31	33.02	26.82	28.11	25.71	22.07	20.32	19.52
Agriculture, Fishery & Forestry	33.16	34.83	38.2	36.56	34.78	32.44	29.28	27.64	23.47	22.42	22.01
Agriculture	36.73	39.88	39.61	39.4	38.77	38.25	36.92	34.5	30.92	29.35	28.75
Fishery	29.24	29.94	45.3	38.81	33.1	24.86	17.6	17.55	10.48	10.46	10.44
Forestry	18.21	12.19	12.09	12.17	12.06	11	4.96	4.96	3.51	3.51	3.51
Mining	11.77	9.74	10.06	9.49	9.58	9.18	3.93	3.94	3.33	3.33	30.14
Manufacturing	34.66	34.23	40.92	36.36	33.73	25.73	29.1	26.26	22.64	20.52	19.55
Food Processing	41.44	42.05	60.15	50.67	45.02	34.49	49.53	44.74	40.57	35.4	35.07
Beverages & Tobacco	49.22	49.68	48.89	48.1	47.31	46.52	29.7	28.66	19.74	19.54	19.5
Textile, Garments & Footwear	46.35	44.88	44.71	41.75	41.72	25.3	25.29	17.06	16.42	16.34	9.84
Wood & Wood Products	43.82	28.06	28.13	27.85	27.79	24.32	23.78	23.77	14.17	14.17	14.16
Furniture & Fixtures	49.72	49.75	44.62	39.73	34.77	29.74	29.74	29.74	19.83	19.83	19.83
Paper, Rubber, Leather & Plastic Products	35.55	34.24	31.5	28.68	27.39	21.66	21.07	20.51	13.26	13.23	13.16
Chemical & Chemical Products	20.56	16.74	16.45	15.91	15.86	10.29	10.2	8.86	6.73	6.64	5.84
Non-metallic Mineral Products	12.3	14.65	17.28	17.11	17.94	13.44	5.9	6.12	5.84	5.84	5.37
Basic Metal & Metal Products	21.93	19.52	19.45	18.88	18.13	14.44	12.7	12.4	9.22	7.93	7.84
Machinery	29.83	29.12	25.42	22.8	19.37	13.03	12.34	12.28	10.19	9.93	9.08
Miscellaneous Manufactures	39.94	36.94	34.09	31.5	27.82	19.86	19.87	19.1	12.57	12.32	11.92

Source: Manasan and Querubin (1997)

Table 4: Labor Force Status, 1987-1996 (Thousand)

Year	Labor Force	Employed	Unemployed	Unemployment Rate (percent)
1987	22,880	20,795	2,085	9.1
1988	23,451	21,497	1,954	8.3
1989	23,858	21,849	2,009	8.4
1990	24,525	22,532	1,993	8.1
1991	25,246	22,979	2,267	9.0
1992	26,180	23,917	2,263	8.6
1993	26,882	24,443	2,379	8.9
1994	27,483	25,116	2,317	8.4
1995	28,040	25,698	2,342	8.4
1996	29,637	27,442	2,195	7.4

Source: Jurado and Sanchez (1998)

Table 5: Distribution of Employment by Class, 1987-1996 (Percent)

Year	Wage and Salary Workers	Own-Account Workers	Unpaid Family Workers	All Classes of Workers
1987	44.08	39.23	16.70	100
1988	45.79	38.42	15.79	100
1989	45.20	39.66	15.14	100
1990	45.70	38.28	16.01	100
1991	45.43	40.11	14.45	100
1992	44.34	40.44	15.23	100
1993	43.92	39.94	16.14	100
1994	45.57	39.50	14.92	100
1995	45.61	39.16	15.23	100
1996	47.65	37.52	14.75	100

Source: Jurado and Sanchez (1998)

Table 6: Real Wages in Agriculture and Non-Agriculture (1992 Pesos)

	Daily Real Wages	
Year	Agriculture	Non-Agriculture
1987	53.71	108.52
1988	55.71	110.65
1989	59.28	120.89
1990	63.55	125.96
1991	62.32	127.32
1992	65.16	124.38
1993	67.85	123.01
1994	68.55	129.41
1995	73.06	126.99

Source: Jurado and Sanchez (1998)

Table 7: The Number of Overseas Contact Workers and Total remittances, 1987-1996

Year	Total Overseas Workers	Total Remittances (million US$)	Average Remittances (US $)
1987	496,854	791,902	1,594
1988	477,764	856,803	1,793
1989	522,984	967,026	1,849
1990	598,769	1,181,075	1,972
1991	701,762	1,628,274	2,320
1992	723,594	2,202,382	3,044
1993	738,958	2,229,582	3,017
1994	760,091	2,940,272	3,864
1995	662,294	4,877,513	2,365
1996	667,669	4,243,641	6,356

Source: Jurado and Sanchez (1998)

Table 8: Philippine Index, 1987-1995 (1992=1.00)

Year	Average Labor Productivity (h)	Real Wage (w/p)	Unit Labor Cost (w/h)	Share of Labor in GDP (w/ph)
1987	0.99	0.85	0.50	0.86
1988	1.02	0.86	0.55	0.84
1989	1.06	0.96	0.63	0.91
1990	1.06	1.00	0.75	0.94
1991	1.04	1.00	0.89	0.96
1992	1.00	1.00	1.00	1.00
1993	1.00	1.00	1.07	1.00
1994	1.02	1.05	1.21	1.03
1995	1.04	1.06	1,29	1.02

Source: Jurado and Sanchez (1998)

Table 9: Basic Statistics of Industry Level Data

ISIC code	Product	Tariff rate, %			K/L			M/Q		
		1988	1995	% change	1986	1996	% change			% change
		UNCTAD	UNCTAD	1988-1995	00,000s		1986-1996	1986	1996	1986-1996
311	Food products	35.74	28.37	-20.6%	1.6	2.3	44.1%	0.102	0.205	101.2%
313	Beverages	47.14	40.48	-14.1%	2.5	6.8	174.3%	0.029	0.036	24.0%
314	Tobacco	43.33	42.50	-1.9%	2.1	1.2	-41.6%	0.049	0.063	28.1%
321	Textiles	38.68	26.79	-30.7%	0.7	1.2	75.8%	0.420	0.925	120.5%
322	Wearing apparel, except footwear	49.73	30.51	-38.7%	0.2	0.2	8.6%	0.006	0.042	650.6%
323	Leather products	33.30	30.72	-7.7%	0.3	0.1	-57.8%	1.130	1.649	45.9%
324	Footwear, except rubber or plastic	47.00	48.00	2.1%	0.3	0.2	-42.8%	0.078	0.264	240.5%
331	Wood Products, except furniture	37.21	27.55	-25.9%	0.7	0.7	-5.0%	0.005	0.474	8873.3%
332	Furniture, except metal	50.00	29.13	-41.7%	0.3	0.3	6.9%	0.013	0.147	1069.5%
341	Paper and products	32.31	19.21	-40.5%	1.3	4.4	232.8%	0.295	0.528	79.2%
342	Printing and publishing	27.41	20.00	-27.0%	0.5	1.2	157.6%	0.150	0.219	45.7%
351	Industrial chemicals	15.35	11.34	-26.1%	8.2	2.8	-65.8%	1.372	1.879	37.0%
352	Other chemicals	23.75	17.46	-26.5%	2.3	4.1	79.4%	0.223	0.261	17.1%
353	Petroleum refineries	15.87	7.74	-51.2%	15.5	110.3	613.3%	0.050	0.086	71.9%
354	Misc. petroleum and coal products	20.00	17.88	-10.6%	0.7	0.5	-31.6%	1.198	0.604	-49.6%
355	Rubber products	29.05	23.32	-19.7%	0.6	1.8	187.3%	0.171	0.478	180.1%
356	Plastic products	41.75	29.41	-29.6%	1.0	2.9	183.6%	0.100	0.379	279.1%
361	Pottery, china earthenwear	40.71	33.57	-17.5%	0.5	0.7	43.2%	0.128	0.226	76.8%
362	Glass and Products	34.94	20.93	-40.1%	3.3	6.3	89.1%	0.122	0.556	356.4%
369	Other non-metallic mineral products	33.69	27.03	-19.8%	0.7	11.3	1553.5%	0.059	0.216	263.6%
371	Iron and Steel	16.29	14.88	-8.7%	7.4	10.5	41.3%	0.384	0.781	103.2%
372	Non-ferrous metals	20.63	15.29	-25.9%	0.8	4.6	447.5%	0.150	0.377	150.6%
381	Fabricated metal products	31.05	25.07	-19.3%	0.9	1.1	12.9%	0.701	0.906	29.2%
382	Machinery, except electrical	21.65	12.56	-42.0%	0.5	2.1	320.2%	4.388	7.436	69.5%
383	Machinery, electric	29.81	17.93	-39.8%	2.1	3.6	77.2%	0.558	1.822	226.5%
384	Transport equipment	24.59	15.30	-37.8%	1.2	3.4	194.8%	0.910	1.198	31.7%
385	Professional and scientific equipment	20.03	16.86	-15.8%	0.4	1.1	207.8%	1.944	6.016	209.5%
390	Other manufactured products	37.83	25.83	-31.7%	0.4	0.7	79.5%	0.524	0.474	-9.6%

Table 9 (Continued): Basic Statistics of Industry Level Data

ISIC code	Product	X/Q			Real Annual Wage			Employment		
				% change	in 1995 LCU		% change	number of employees		% change
		1986	1996	1986-1996	1986	1996	1986-1996			1986-1996
311	Food products	0.273	0.163	-40.4%	62430	79741	27.7%	120800	173681	43.8%
313	Beverages	0.004	0.006	34.8%	83534	138323	65.6%	26650	27495	3.2%
314	Tobacco	0.027	0.027	0.4%	58981	85790	45.5%	12300	12777	3.9%
321	Textiles	0.236	0.523	121.1%	46306	64272	38.8%	70500	66886	-5.1%
322	Wearing apparel, except footwear	0.630	1.067	69.4%	51471	58329	13.3%	91200	161325	76.9%
323	Leather products	1.244	2.883	131.8%	32329	56649	75.2%	2200	7051	220.5%
324	Footwear, except rubber or plastic	0.705	0.854	21.2%	36973	41712	12.8%	8400	15946	89.8%
331	Wood products, except furniture	0.982	0.656	-33.2%	43372	48592	12.0%	44440	27706	-37.7%
332	Furniture, except metal	0.861	0.757	-12.1%	36879	46128	25.1%	21600	24410	13.0%
341	Paper and paper products	0.034	0.098	185.7%	63496	88470	39.3%	11500	18823	63.7%
342	Printing and publishing	0.005	0.017	250.1%	62050	84457	36.1%	16200	25509	57.5%
351	Industrial chemicals	0.440	0.209	-52.5%	89713	135301	50.8%	8800	12595	43.1%
352	Other chemicals	0.042	0.044	4.8%	148952	210474	41.3%	24400	33827	38.6%
353	Petroleum refineries	0.027	0.050	85.8%	282519	518523	83.5%	2400	2844	18.5%
354	Misc. petroleum and coal products	0.403	0.018	-95.5%	65197	87401	34.1%	400	792	98.0%
355	Rubber products	0.019	0.052	170.2%	61819	85044	37.6%	18600	23909	28.5%
356	Plastic products	0.302	0.240	-20.8%	48787	71964	47.5%	12100	26710	120.7%
361	Pottery, china earthenwear	0.388	0.510	31.3%	55591	72024	29.6%	2900	10047	246.4%
362	Glass and glass products	0.066	0.073	11.0%	101836	115281	13.2%	4400	5793	31.7%
369	Other non-metallic mineral products	0.027	0.013	-51.7%	57777	97078	68.0%	13500	21564	59.7%
371	Iron and steel	0.059	0.043	-27.9%	76820	103736	35.0%	15400	22746	47.7%
372	Non-ferrous metals	0.532	0.387	-27.2%	78481	126825	61.6%	2900	3994	37.7%
381	Fabricated metal products	0.144	0.288	100.8%	49495	63774	28.8%	17100	34934	104.3%
382	Machinery, except electrical	0.331	4.220	1174.1%	52235	73132	40.0%	12300	25177	104.7%
383	Machinery, electric	0.549	1.603	192.2%	76043	94206	23.9%	40000	119919	199.8%
384	Transport equipment	0.260	0.144	-44.7%	63571	101478	59.6%	11300	26199	131.8%
385	Professional and scientific equipment	0.205	4.234	1969.5%	61872	78624	27.1%	4100	7520	83.4%
390	Other manufactured products	1.177	0.994	-15.5%	48800	60253	23.5%	13700	28220	106.0%

Table 10: Employment Equations

OLS with Time Trend

Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat
Intercept	767.975	0.92	Intercept	760.946	0.92	Intercept	2049.569	2.35
M/Q	-0.002	-2.82	(X+M)/Q	-0.002	-3.78	Tariff	0.047	4.65
X/Q	-0.003	-1.23	ln(K/L)	-0.287	-4.49	ln(K/L)	-0.042	-0.57
ln(K/L)	-0.295	-4.11	ln(GDP)	-0.249	-0.06	ln(GDP)	-0.881	-0.21
ln(GDP)	-0.263	-0.06	ln(POP1564)	-43.781	-0.93	ln(POP1564)	-119.091	-2.4
ln(POP1564)	-44.168	-0.94	Time	1.346	0.96	Time	3.583	2.41
Time	1.358	0.96	R-Square	0.118		R-Square	0.145	
R-Square	0.118							

Industry Fixed Effects with Time trend

Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat
M/Q	-0.002	-3.76	(X+M)/Q	-0.001	-4.71	Tariff	-0.005	-1.42
X/Q	0.000	-0.6	ln(K/L)	-0.116	-2.93	ln(K/L)	-0.139	-3.34
ln(K/L)	-0.112	-2.84	ln(GDP)	-0.139	-0.21	ln(GDP)	-0.172	-0.24
ln(GDP)	-0.100	-0.15	ln(POP1564)	-38.453	-5.1	ln(POP1564)	-23.443	-2.26
ln(POP1564)	-39.122	-5.19	time	1.163	5.14	time	0.717	2.3
time	1.182	5.23	R-Square	0.98035		R-Square	0.978291	
R-Square	0.980563							

Industry Fixed Effects with Time Dummies (not reported)

Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat
M/Q	-0.001	-3.56	(X+M)/Q	-0.001	-4.96	Tariff	-0.005	-1.16
X/Q	-0.001	-1.01	ln(K/L)	-0.115	-2.9	ln(K/L)	-0.139	-3.29
ln(K/L)	-0.112	-2.83	R-Square	0.98078		R-Square	0.978406	
R-Square	0.980893							

Table 11: Average Wage Equations

OLS with Time Trend

Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat
Intercept	-11.782	-0.06	Intercept	-17.004	-0.09	Intercept	-165.179	-0.85
M/Q	0.000	0.95	(X+M)/Q	0.000	0.57	Tariff	-0.005	-2.21
X/Q	0.000	-0.64	ln(K/L)	0.351	24.93	ln(K/L)	0.329	20.03
ln(K/L)	0.345	21.88	ln(GDP)	0.486	0.52	ln(GDP)	0.544	0.59
ln(GDP)	0.476	0.51	ln(POP1564)	0.665	0.06	ln(POP1564)	9.343	0.85
ln(POP1564)	0.377	0.04	Time	-0.064	-0.21	Time	-0.323	-0.98
Time	-0.055	-0.18	R-Square	0.748		R-Square	0.753	
R-Square	0.749							

Industry Fixed Effects with Time trend

Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat
M/Q	0.000	0.61	(X+M)/Q	0.000	1.94	Tariff	0.003	1.48
X/Q	0.000	1.25	ln(K/L)	0.040	1.81	ln(K/L)	0.048	2.15
ln(K/L)	0.041	1.84	ln(GDP)	0.112	0.29	ln(GDP)	0.095	0.25
ln(GDP)	0.120	0.31	ln(POP1564)	1.564	0.37	ln(POP1564)	-5.083	-0.91
ln(POP1564)	1.431	0.34	time	-0.046	-0.36	time	0.152	0.91
time	-0.042	-0.33	R-Square	0.963		R-Square	0.963	
R-Square	0.963							

Industry Fixed Effects with Time Dummies (not reported)

Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat	Parameter	Coefficient	t-stat
M/Q	0.000	0.48	(X+M)/Q	0.000	2.18	Tariff	0.005	2.35
X/Q	0.000	1.62	ln(K/L)	0.042	1.91	ln(K/L)	0.054	2.46
ln(K/L)	0.043	1.96	R-Square	0.965		R-Square	0.966	
R-Square	0.966							

Table 12: Philippines Real Hourly Wage Changes, 1985-1994

	MeanWages	Log Wage Changes * 100		
Group	1985	1985-1988	1988-1991	1991-1994
All	26.80	-5.68	6.83	-2.24
Gender:				
Men	30.33	-11.52	7.00	-4.12
Women	20.98	6.97	6.49	1.40
Education				
Some Primary or none	13.88	6.67	10.22	-0.25
Primary	15.55	7.12	10.17	-4.49
Some High School	17.45	12.06	-2.89	3.82
High School	20.46	2.75	11.12	-4.77
Some college and above	47.31	-15.93	5.58	-2.17
Education and Gender				
Some Primary or none				
Men	15.87	4.14	12.73	-2.32
Women	9.74	14.83	2.15	6.47
Primary				
Men	18.28	8.99	6.61	-4.12
Women	10.54	0.94	21.57	-5.58
Some High School				
Men	20.25	12.92	-4.27	2.15
Women	11.08	8.39	2.88	10.34
High School				
Men	23.32	4.44	8.86	-7.67
Women	14.37	-3.29	19.10	4.39
Some college and above				
Men	59.53	-32.34	7.74	-4.38
Women	34.31	8.71	2.87	0.61

Table 13: Philippines Real Supply Changes in Hour Shares, 1985-1994

Group	Supply 1985	log Change in Supply * 100 1985-1988	1988-1991	1991-1994	1985-1994
Gender:					
Men	0.61	1.27	-0.13	0.17	1.32
Women	0.39	-2.00	0.21	-0.28	-2.07
Education					
Some Primary or none	0.24	-10.50	-7.80	-8.77	-27.07
Primary	0.23	-5.47	-1.61	-3.31	-10.39
Some High School	0.12	-3.72	4.04	0.05	0.37
High School	0.18	15.97	2.89	8.33	27.18
Some college and above	0.23	4.16	3.46	1.97	9.59
Education and Gender					
Some Primary or none					
Men	0.16	-9.40	-5.52	-9.65	-24.57
Women	0.08	-12.68	-12.53	-6.89	-32.10
Primary					
Men	0.14	-0.78	-0.76	-0.85	-2.39
Women	0.10	-12.48	-2.98	-7.43	-22.90
Some High School					
Men	0.08	-0.59	3.54	0.60	3.54
Women	0.05	-9.25	4.95	-0.96	-5.26
High School					
Men	0.11	14.89	2.27	6.78	23.93
Women	0.06	17.87	3.95	10.90	32.71
Some college and above					
Men	0.12	4.05	1.57	3.49	9.11
Women	0.11	4.28	5.62	0.25	10.14

Table 14: Philippines Real Supply Changes in Efficient Unit Shares, 1985-1994

	Supply	log Change in Supply * 100			
Group	1985	1985-1988	1988-1991	1991-1994	1985-1994
Gender:					
Men	0.68	0.09	-0.68	0.20	-0.38
Women	0.32	-0.20	4.74	-3.74	0.80
Education					
Some Primary or none	0.16	-12.10	-8.86	-11.49	-32.45
Primary	0.17	-5.16	-1.82	-3.21	-10.19
Some High School	0.10	-3.55	3.43	-0.19	-0.31
High School	0.16	12.57	2.26	6.27	21.10
Some college and above	0.41	1.91	1.70	1.57	5.18
Education and Gender					
Some Primary or none					
Men	0.12	-11.55	-7.13	-12.36	-31.04
Women	0.04	-13.77	-14.44	-8.66	-36.87
Primary					
Men	0.12	-2.13	-1.32	-2.12	-5.57
Women	0.05	-12.70	-3.15	-6.21	-22.06
Some High School					
Men	0.07	-1.66	3.09	-0.35	1.08
Women	0.03	-9.16	4.48	0.31	-4.37
High School					
Men	0.12	12.43	1.19	4.98	18.59
Women	0.04	12.96	5.03	9.45	27.44
Some college and above					
Men	0.25	0.66	0.16	3.34	4.15
Women	0.16	3.81	3.96	-1.02	6.74

Table 15: Real Normalized Wages By Education

Year	Below Primary Graduate (BPG)	Primary Graduate (PG)	Some High-School (SHS)	High School Graduate (HSG)	Some College and More (C+)
1985	0.52	0.58	0.65	0.76	1.77
1988	0.59	0.66	0.78	0.83	1.59
1991	0.61	0.68	0.71	0.87	1.57
1994	0.62	0.67	0.75	0.85	1.58

Table 16: Relative Wages By Education

Year	Ratio C+/BPG	Ratio C+/PG	Ratio C+/SHS	Ratio C+/HSG
1985	3.41	3.04	2.71	2.31
1988	2.72	2.42	2.05	1.92
1991	2.60	2.31	2.23	1.82
1994	2.55	2.36	2.10	1.86

Table 17: Real Normalized Supply By Education

Year	Below Primary Graduate (BPG)	Primary Graduate (PG)	Some High-School (SHS)	High School Graduate (HSG)	Some College and More (C+)
1985	0.24	0.23	0.12	0.18	0.23
1988	0.21	0.22	0.12	0.21	0.24
1991	0.20	0.22	0.12	0.21	0.25
1994	0.18	0.21	0.12	0.23	0.25

Table 18: Relative Supply By Education

Year	Ratio C+/BPG	Ratio C+/PG	Ratio C+/SHS	Ratio C+/HSG
1985	0.97	1.00	1.86	1.31
1988	1.13	1.10	2.01	1.16
1991	1.26	1.16	2.00	1.17
1994	1.41	1.22	2.04	1.09

Table 19: Real Normalized Supply By Education (Efficiency units)

Year	Below Primary Graduate (BPG)	Primary Graduate (PG)	Some High-School (SHS)	High School Graduate (HSG)	Some College and More (C+)
1985	0.16	0.17	0.10	0.16	0.41
1988	0.14	0.16	0.10	0.19	0.42
1991	0.13	0.15	0.10	0.19	0.43
1994	0.11	0.15	0.10	0.20	0.44

Table 20. Relative Supply By Education (Efficiency units)

Year	Ratio C+/BPG	Ratio C+/PG	Ratio C+/SHS	Ratio C+/HSG
1985	2.60	2.49	4.20	2.53
1988	3.00	2.68	4.43	2.27
1991	3.33	2.77	4.36	2.26
1994	3.79	2.91	4.43	2.16

Table 21. Inner Products: Changes in Relative Wages and Changes in Relative Supplies

	1985	1988	1991
1988	0.0028		
1991	-0.0016	-0.0005	
1994	-0.0138	-0.0026	-0.0036

Table 22. Inner Products: Changes in Relative Wages and Changes in Relative Supplies (Efficiency units)

	1985	1988	1991
1988	0.0028		
1991	-0.0027	-0.0007	
1994	-0.0160	-0.0031	-0.0037

Table 23a. Correlates of Relative Demand: Pearson Correlation Coefficients

	E=0.5	E=1.5	E=4
M/GDP	0.02701	-0.82118	-0.89006
	0.941	0.0036	0.0006
X/GDP	-0.0841	-0.85564	-0.9051
	0.8173	0.0016	0.0003
GDP per capita	-0.5184	-0.91037	-0.90212
	0.1248	0.0003	0.0004

Notes: X and M refer to merchandise exports and imports, respectively. All variables are in logs. Number below coefficients is P-value related to the null that the correlation coefficient is 0.

Table 23b. Correlates of Relative Demand: Spearman Correlation Coefficients

	E=0.5	E=1.5	E=4
M/GDP	0.13939	-0.58788	-0.7697
	0.7009	0.0739	0.0092
X/GDP	0.06667	-0.50303	-0.73333
	0.8548	0.1383	0.0158
GDP per capita	-0.56364	-0.80606	-0.6
	0.0897	0.0049	0.0667

Notes: X and M refer to merchandise exports and imports, respectively. All variables are in logs. Number below coefficients is P-value related to the null that the correlation coefficient is 0.

Figure 1

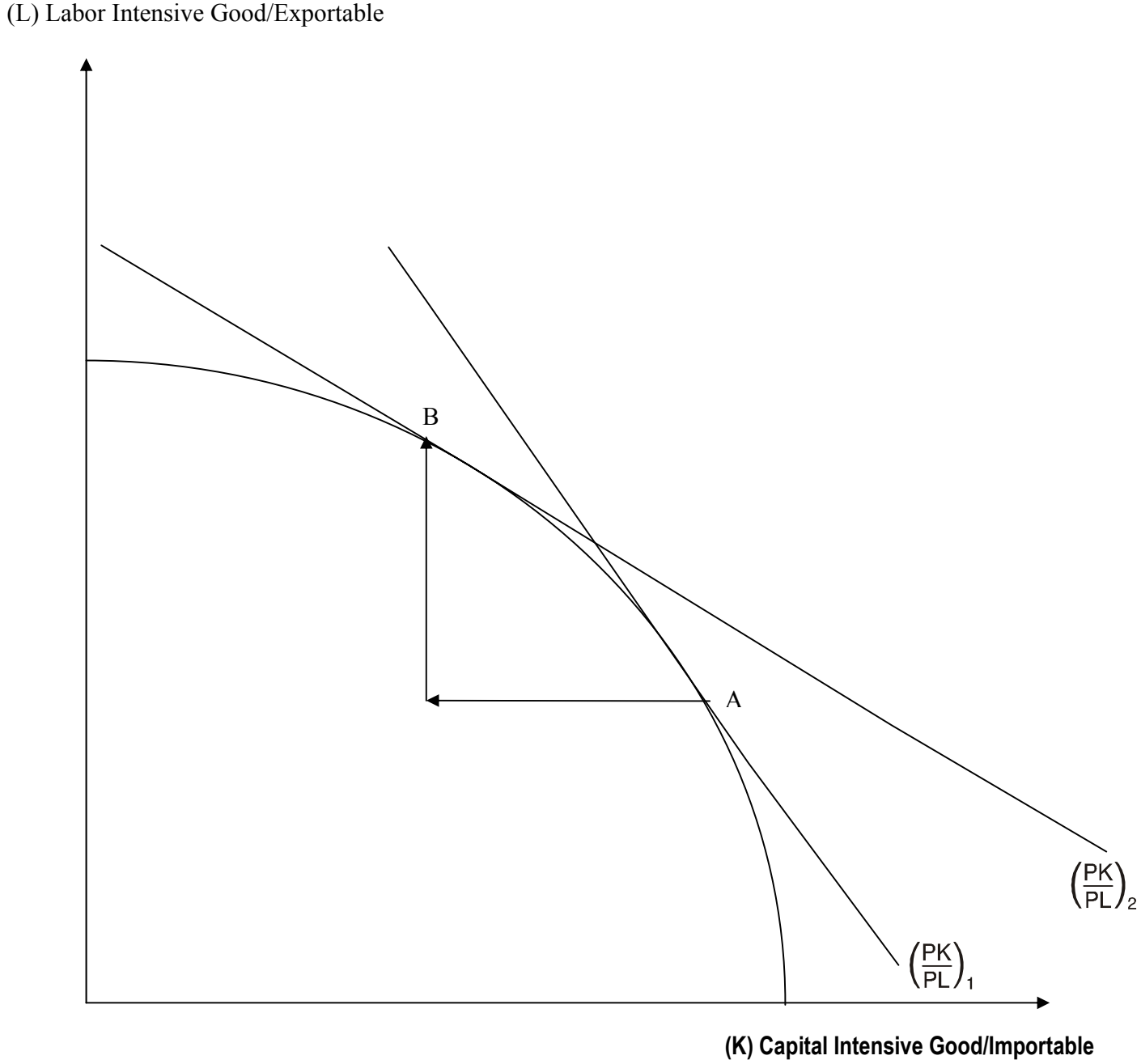

(L) Labor Intensive Good/Exportable
B
A
$\left(\frac{PK}{PL}\right)_2$
$\left(\frac{PK}{PL}\right)_1$
(K) Capital Intensive Good/Importable

Figure 2

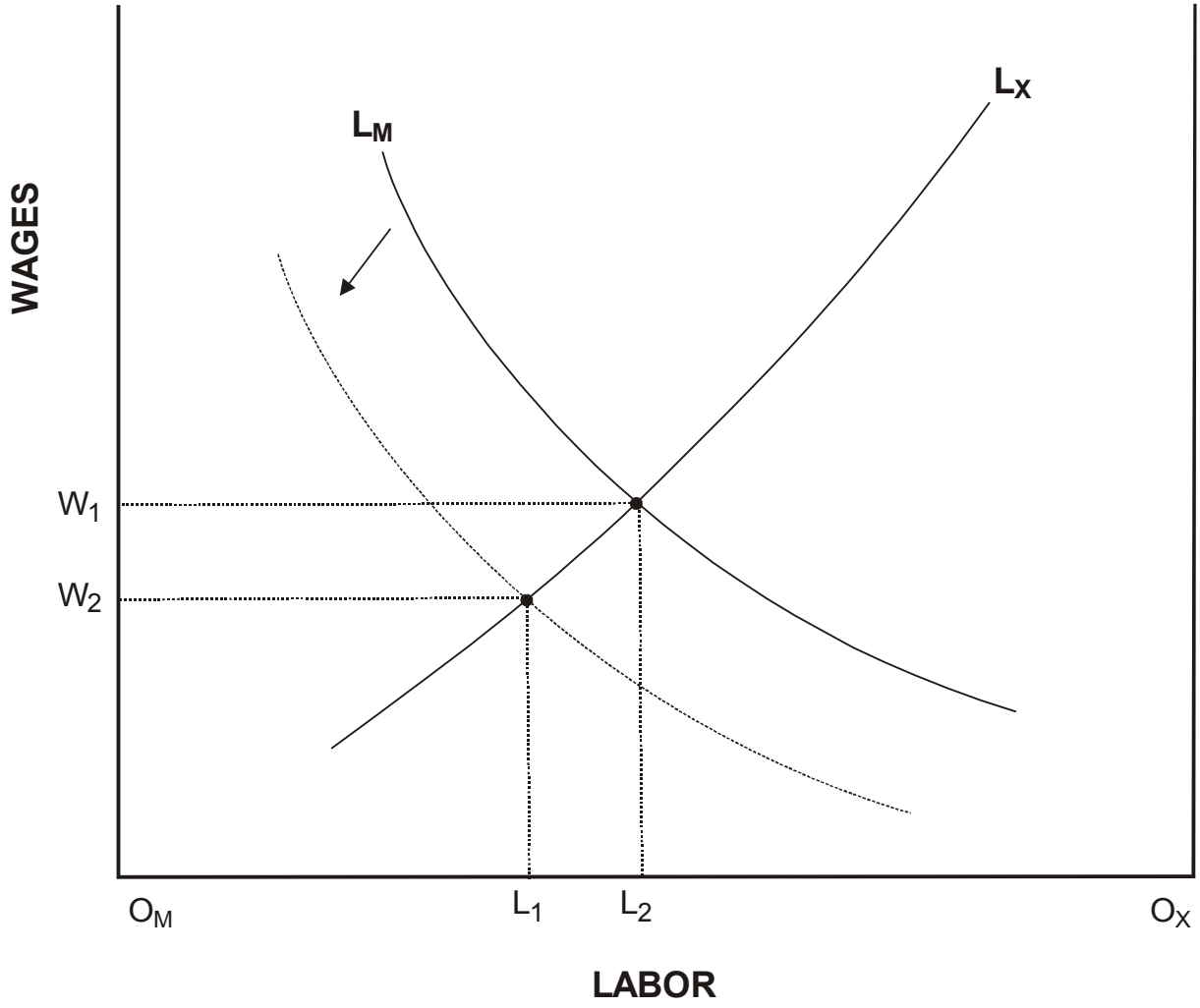


Figure 3

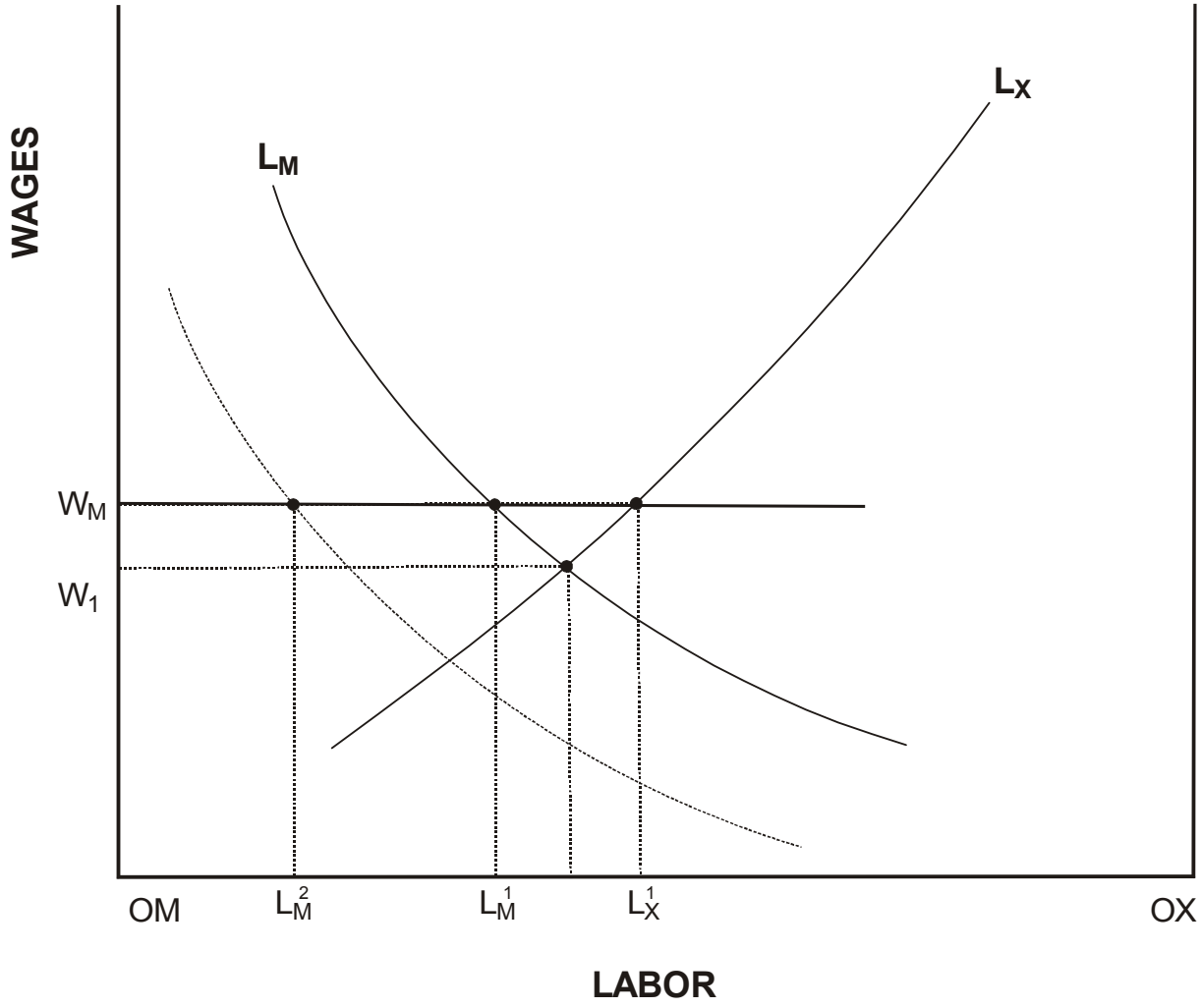
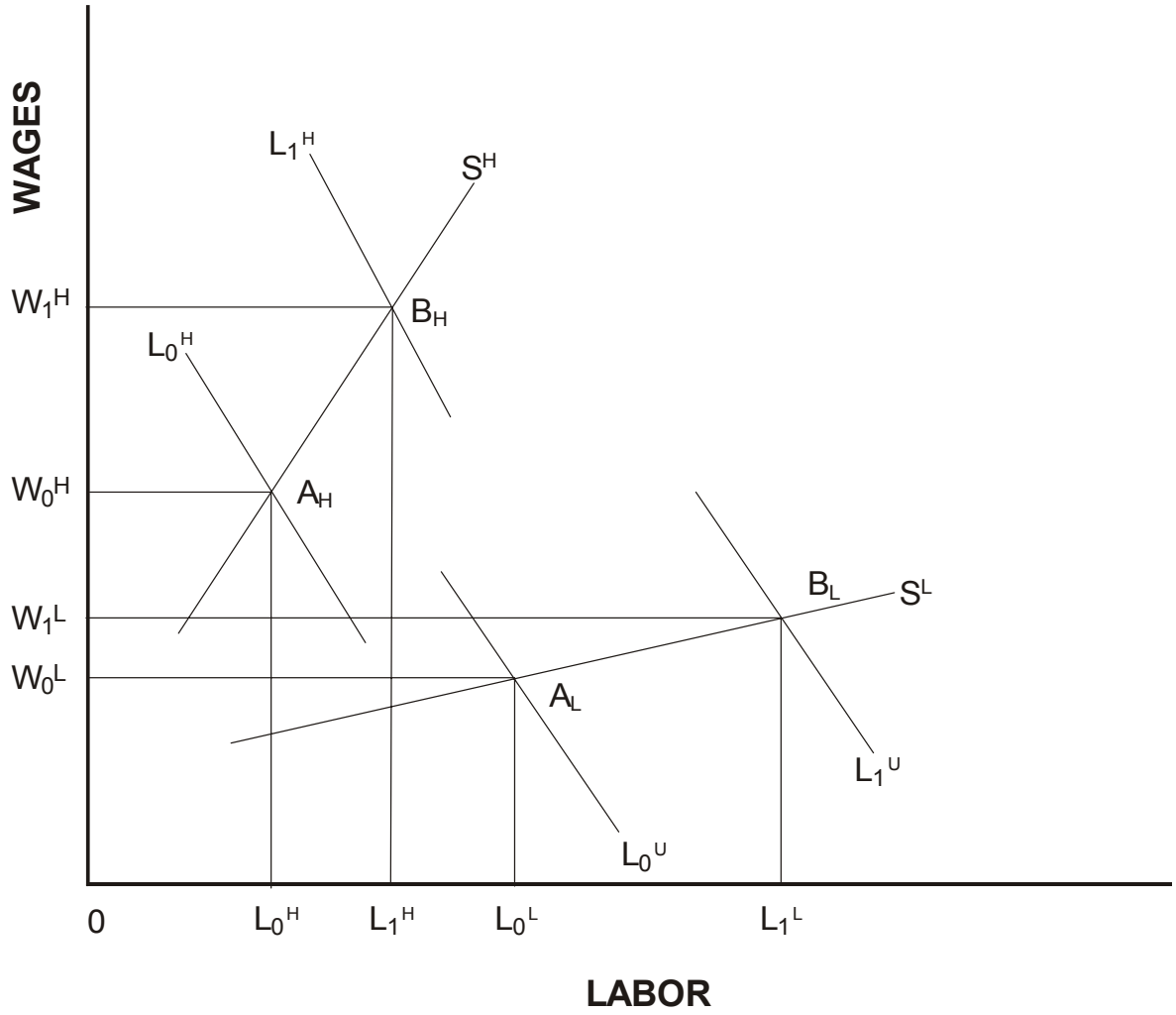
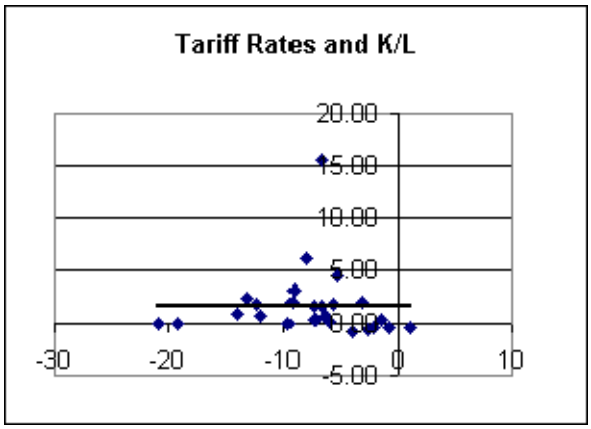


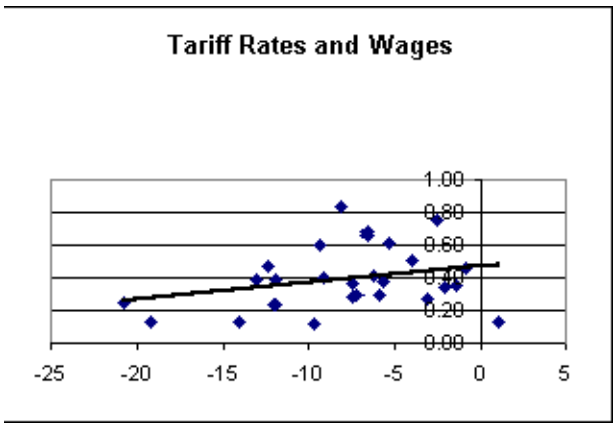
Figure 4
(Figure 1 of Suryamadi, Chen, and Tyers)

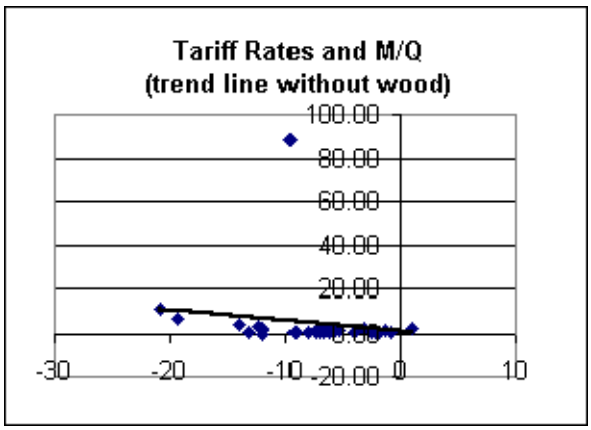


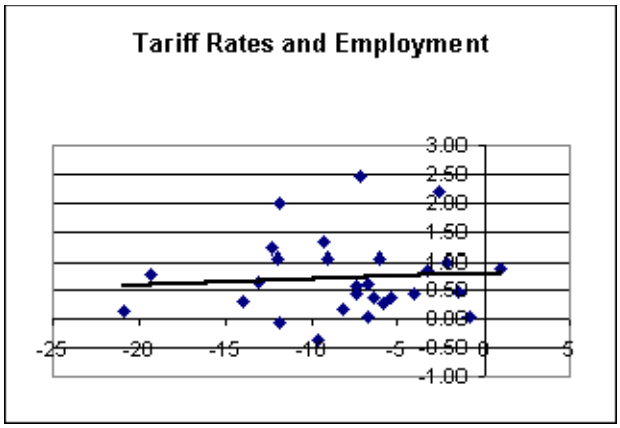
L = Labor demand
S = Labor supply
U = Unskilled
H = High skilled

Figure 5. Level Changes in Average Tariff Rates Versus Percentage Changes in Correlates (mid-1980s to mid-1990s)









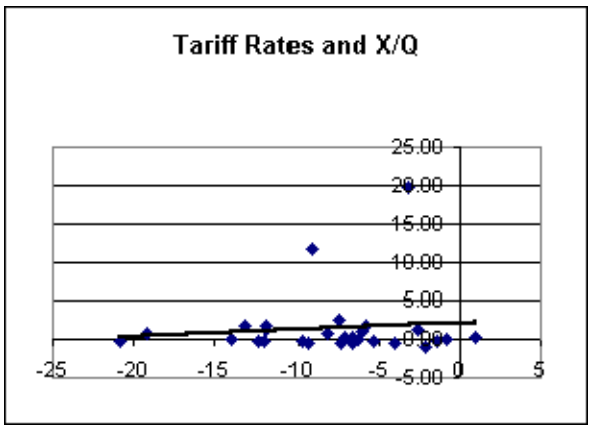


Figure 6. Log Relative Demand

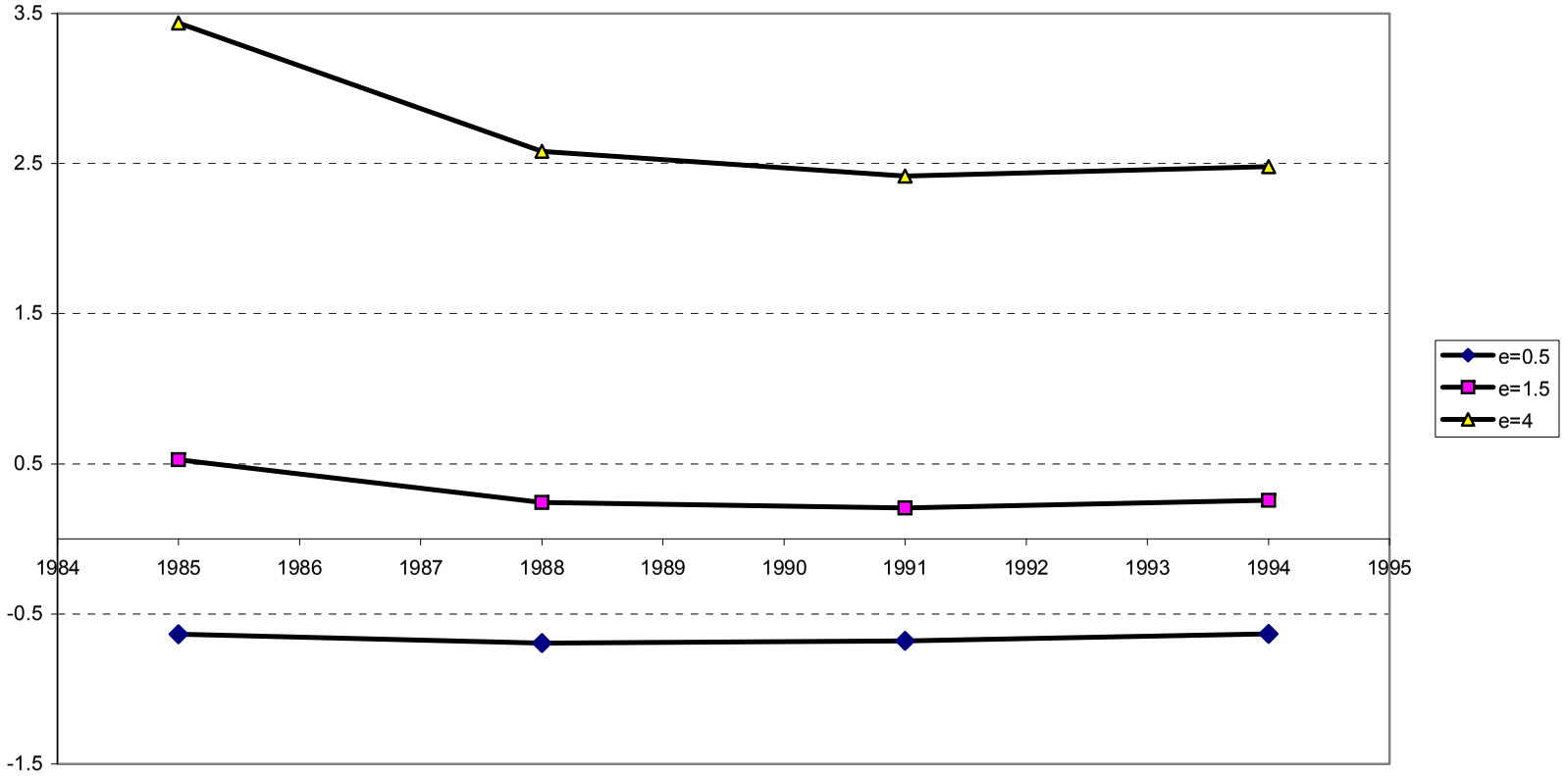


Figure 7. Percentage Change in Relative Demand

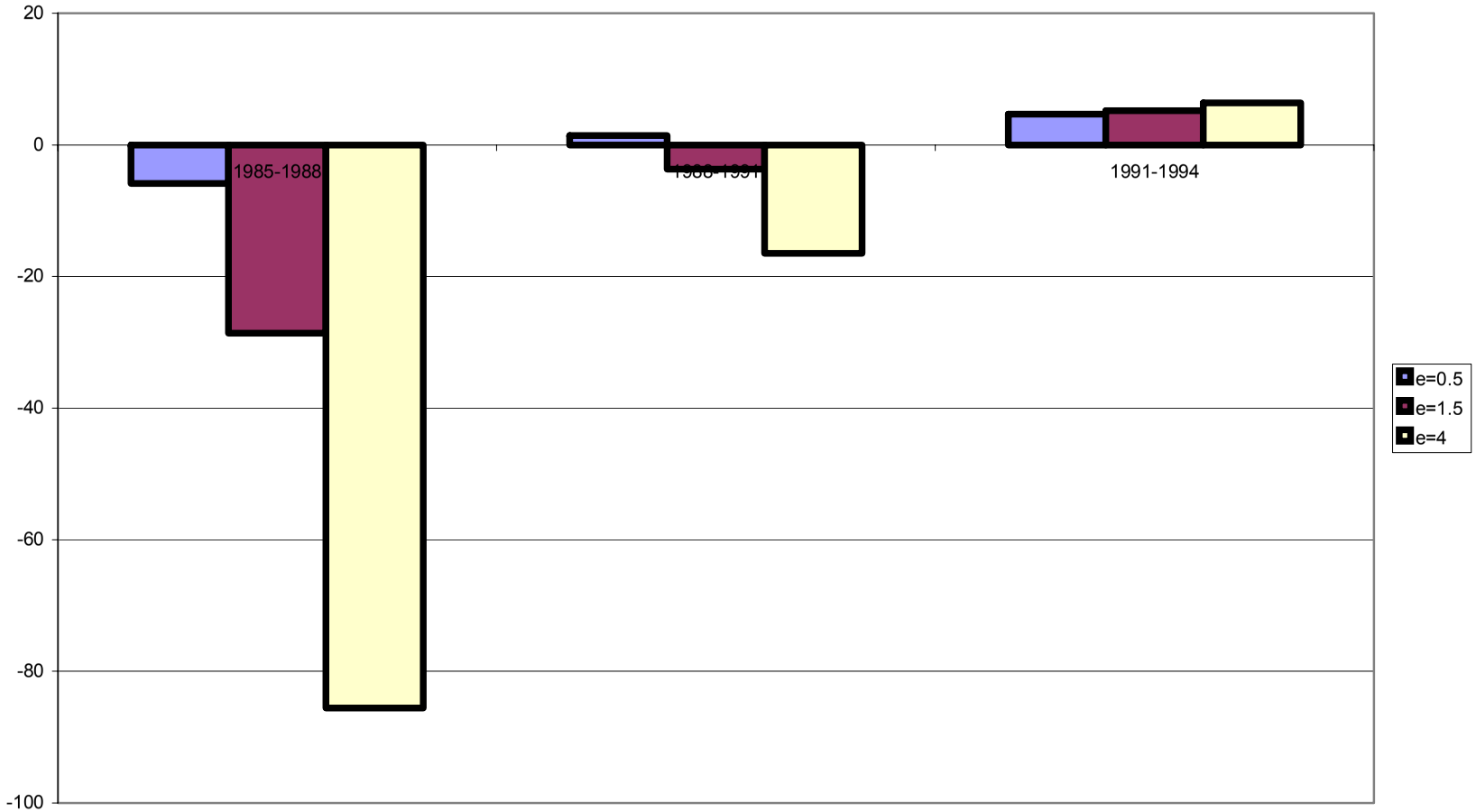


Figure 8. Real GDP Per Capita

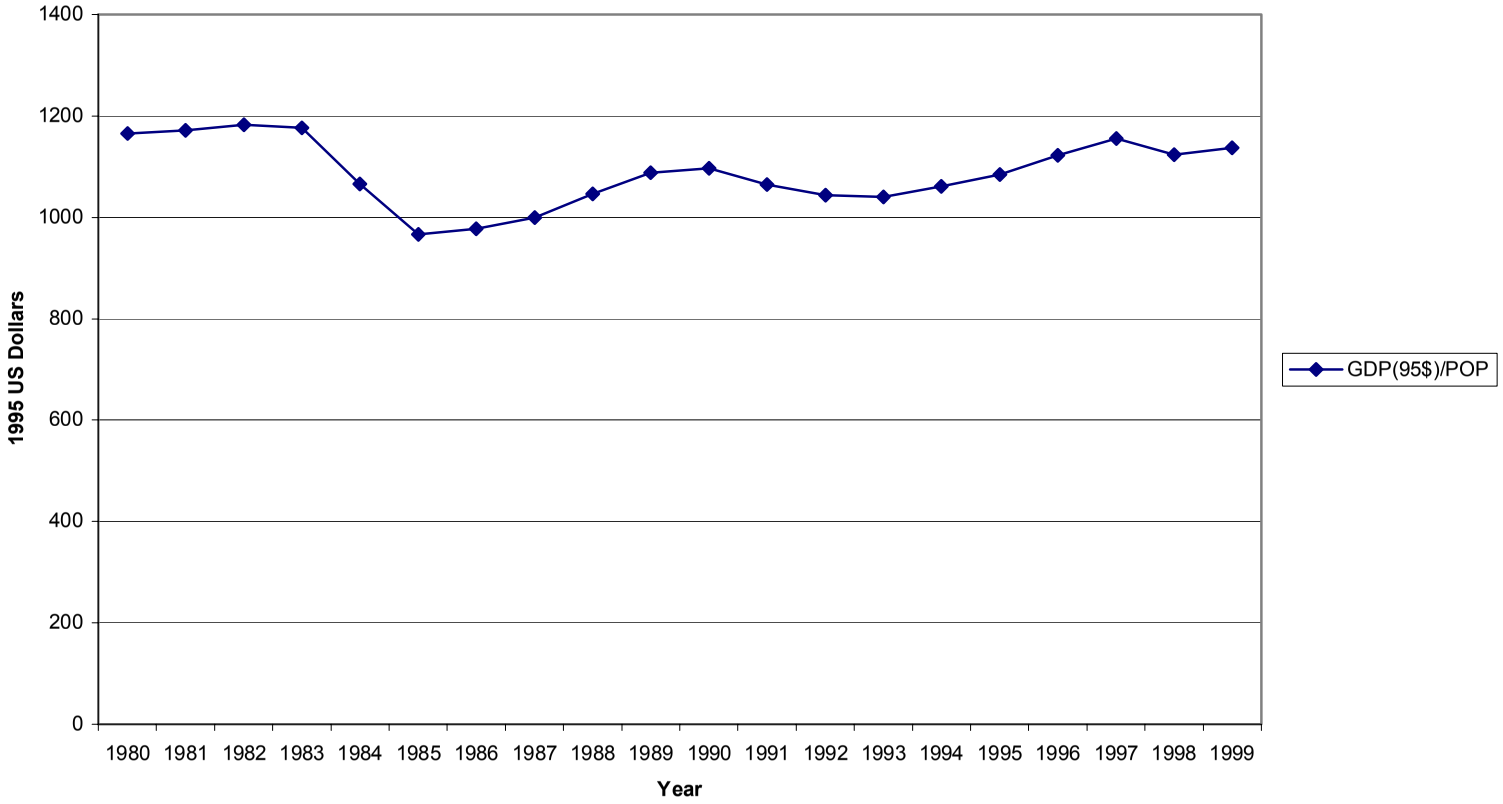


Figure 9. Merchandise Exports and Imports