

# **The Effects of International Trade on Wages in Developed and Developing Countries**

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# **The Effects of International trade on Wages in Developed and Developing countries**

## **Abstract**

In this paper, I provide theoretical and empirical views on how international trade affects wages in developed and developing countries. Following traditional trade theorems, trading with developing countries will hurt low-skilled workers in developed countries. By contrast, low-skilled workers in developing countries would benefit from trade liberalization. In reality, many empirical studies seem to contradict the predictions of the traditional trade theorems. Some studies rather find in developed countries a modest increase on relative wage of low-skilled workers and an increase in unemployment after trade liberalization. The results of studies on developing countries are mixed and more complicated. Recently, the literature focuses on other potential explanations of these empirical observations like the flow of technology and the mobility of capital and labor. However, explanations of these studies are partial and challenged.

# **The effects of international trade on wages in developed and developing countries**

## **1. Introduction**

Over the post-war period, the process of trade internationalization has developed rapidly and steadily, as trade tariffs were gradually reduced, transportation costs fell and communications and investment increased. With the expansion process, income has been inequitably distributed, the unemployment rate has sometimes risen, and the wage gap between high-skilled workers and low-skilled workers has increased in many countries.

At the same time, new debates about international trade came out. As we know, during the 1960s, no developed countries worried about the negative effects of international trade, even though a large discrepancy in income might have been regarded as unfair. On the contrary, developing countries were concerned about the impact of trade liberalization and feared competition with developed countries. But the views changed during the 1980s and 1990s with further import penetration and the arrival of emergent players on the international scene, particularly Asian countries. Many developing countries got more and more benefits due to the elimination of trade barriers and effective economic reforms. However, there is a trend that some developed countries are getting progressively concerned about international trade, because they believe that importing from developing countries brings about adverse economic effects and “level down wages of low-skilled workers globally towards a

world average below the standards to which even the poorest presently industrialized countries have become accustomed.” (Thygesen, Kosai and Lawrence, 1996: p. 3)

Labor demand structure is one of the main reasons affecting unemployment and wage inequality between high-skilled and low-skilled workers. However, the controversial points are whether international trade is one of the main causes reflecting the structure of labor demand and if yes, how does international trade affect the structure of labor demand and to what extent? The standard international trade theorems of Heckscher and Ohlin (H-O) and Stolper and Samuelson (S-S) are basic theoretical tools to explain the relationship between international trade and wage inequality and unemployment.

There is less attention paid to developing countries. According to traditional international trade theorems, it is assumed that wage inequality will decrease in developing countries if wage inequality in developed countries increases. However, in reality, the cases of developing countries are more complicated. Some developing countries (like some East Asian countries) have experienced decreasing income inequality after trade internationalization, while income inequality of other developing countries (like some Latin American countries) increases. What are the reasons behind the phenomenon? Are standard international trade theorems still valid for developing countries?

By reviewing standard international trade theorems and empirical studies, in this major paper, I intend to clarify associations between international trade and wage inequality of high-skilled and low-skilled workers in developed and developing

countries respectively.

The rest of this paper is organized as follows. Section 2 presents basic facts of international trade and labor markets in developed and developing countries respectively. Section 3 presents standard theorems of international trade. Section 4 reviews empirical papers on issues of international trade relating to wages in developed and developing countries. Section 5 discusses other explanations for wage inequality. Finally, section 6 offers some concluding remarks.

## **2. Facts about international trade and labor markets in developed and developing countries**

### **2.1 International trade and labor markets in developed countries**

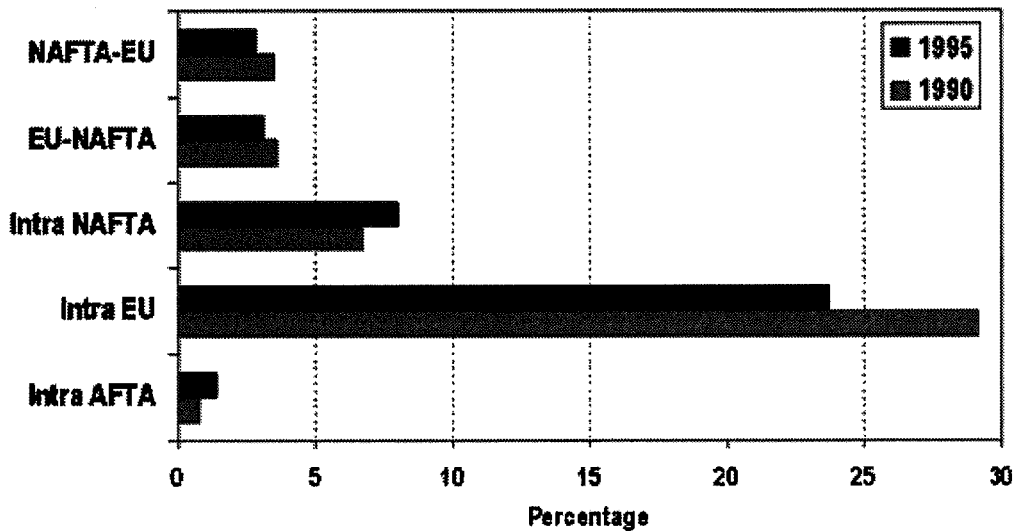
#### **2.1.1 International trade**

Rapid flows of international trade have occurred in many developed countries since World War II. According to Krugman (1995) and Irwin (1996), the dramatic increase in trade flows is due to easing trade tariffs and quotas, technological advances, efficient communication and falling transportation costs.

Although import products from developing countries are to be found in all developed countries, this doesn't mean importing from low cost countries is a threat that will destroy economic performance in developed countries. In fact, developed countries continue to keep a large share of global trade, i.e. the number was above 70% from 1970 to 2000<sup>1</sup>. Most of the international trade takes place within and

between the EU (European Union) and NAFTA (North American Free-Trade Agreement), which jointly account for 31.7% of all trade in 1995.<sup>2</sup>

Table 1 Trade by major Economic Bloc



Source: based on WTO. <http://people.hofstra.edu/geotrans/eng/ch5en/conc5en/ch5c2en.html>

(AFTA: Asian free trade agreement)

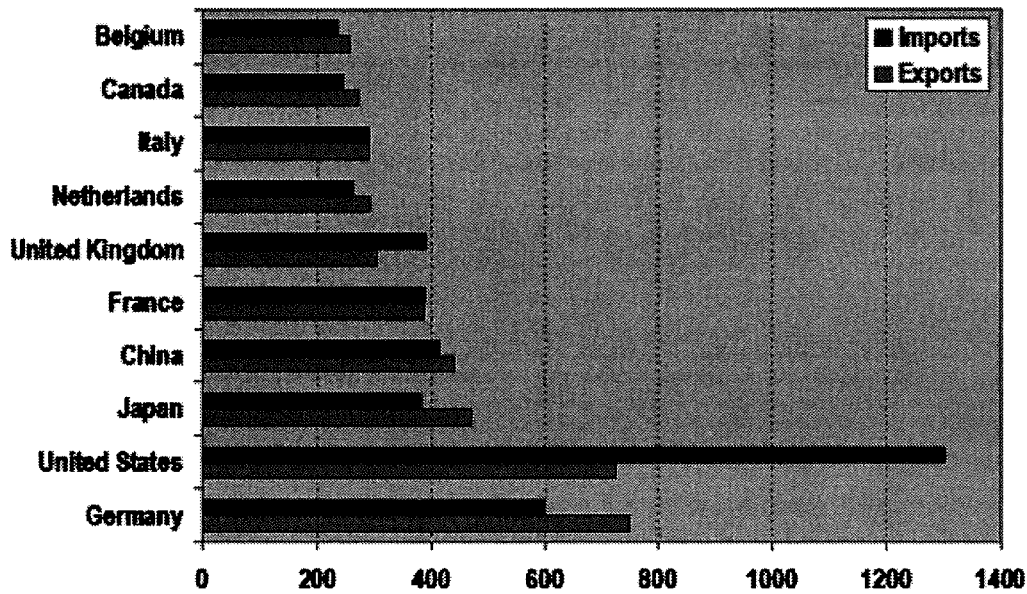
Of the 2003 world ten largest exporters, developed countries take up most of them. Table 2 shows that, on one hand, some developed countries have significant trading deficits, notably the United States and the United Kingdom, which are due to a relocation of labor-intensive production activities to lower cost locations. On the other hand, other developed countries, like Germany, Japan, Canada, keep export-oriented trade structure and gain a positive trading balance. In addition, it is notable that “more and more output in developed countries consists of largely nontradable services:

<sup>1</sup> and <sup>2</sup> Data from Transport Geography website

<http://people.hofstra.edu/geotrans/eng/ch5en/conc5en/ch5c2en.html>

education, government, finance, insurance, real estate, and wholesale and retail trade.”(Slaughter and Swagel, 1997a: p 2)

Table 2 World 10 largest exporters and importers in 2003 (billions of US dollars)



Source: based on WTO. <http://people.hofstra.edu/geotrans/eng/ch5en/conc5en/ch5c2en.html>

### 2.1.2 Labor market

Labor markets in developed countries have experienced an important shift in labor demand from low-skilled workers to high-skilled workers. Since the late 1970s, the average real wage in the U.S. climbed up slowly after adjusting for changes in the consumer price index and “wages of low-skilled Americans have fallen dramatically relative to high-skilled. The precise timing and magnitude of the changes differ

somewhat with the measure of skill, but all show dramatic changes.” (Slaughter and Swagel, 1997b: p. 8) According to Freeman (1995) estimation, in the US, real wages of male high-school dropouts have declined 20% since the early 1970s. Obviously the wage inequality between low-skilled and high-skilled workers has been expanding.

In the rest of the OECD developed countries, the results seem to be mixed. The UK experienced a rise both in wage inequalities and unemployment. The experience of Australia and New Zealand are similar to the UK despite less wage inequalities. France, Germany, and Italy suffer a little in wage inequality, but the unemployment rate of the low-skilled workers increased greatly. Unemployment in the Netherlands fell in the 1990s with a small rise in wage inequality. Austria and Sweden experienced similar phenomenon as the Netherlands. (Slaughter 1999: p. 7) As Bhagwati (1995: p. 42) argues, “Adverse trend for the low-skilled workers has not been mitigated during the 1990s to date”. Generally, wage rigidity in these OECD countries is widely considered as the explanation of the mixed results in labor markets.

## **2.2 International trade and labor markets in developing countries**

### **2.2.2 International trade**

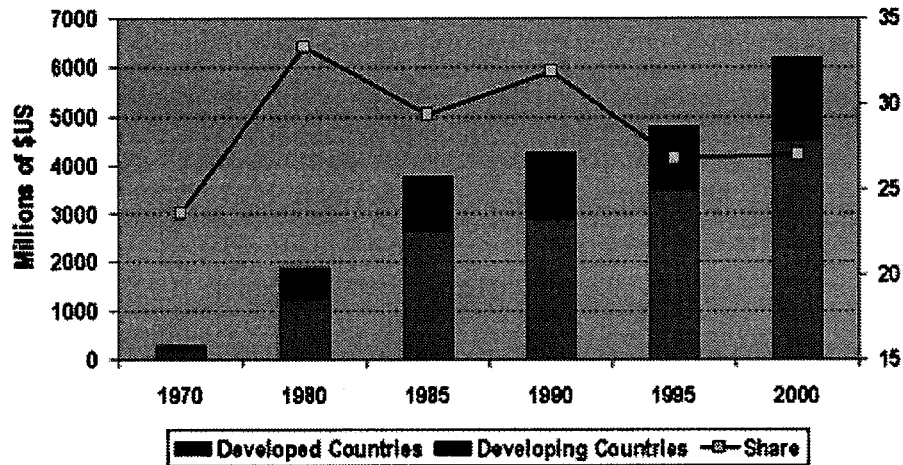
There is a rapid growing trend of international trade in developing countries since the late 1980s, coinciding with the general movement toward trade liberalization. The share of developing countries in trade value grew from 24% in 1970 to 32% in 1993. From 1990, with the oil counter-shock and the decreasing price of petroleum, the share decreased to 27-30%<sup>3</sup>. Increased international trade is becoming an attribute

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<sup>3</sup> Data from Transport Geography website. Notice that the rise of China as an exporter is remarkable in recent year. In year 2000, it was the seventh largest in the world, and it was in 2003

in developing countries.

Table 3 International trade, developing and developed countries, 1970-2000



Share: The share of developing countries in international trade value

Source: based on WTO

<http://people.hofstra.edu/geotrans/eng/ch5en/conc5en/ch5c2en.html>

### 2.2.2 Labor market

Generally speaking, wages are moving up either in developed countries or developing countries. Majid (2004) estimates that median real wages increased 6.12% overall in developing countries across the 1980s and the 1990s while they increased 36.2% in the developed countries.

However labor markets of developing countries vary across countries and regions. According to Arbache (2001), wage inequality in East Asian countries declined after trade openness, which is consistent with previous analysis of Wood

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already the third largest. (Transport Geography website)

(1994 and 1999) on South Korea, Taiwan and Singapore. However, in some Latin American countries, including Chile, Columbia, Costa Rica, and Uruguay, evidence of wage dispersion and relative wage of high-skilled workers is found to be going up. (Robbins, 1996)

### 3. Standard theorems of international trade

The theory of comparative advantage is perhaps the most important concept in international trade theorem. Before discussing the traditional trade theorems, it is worthy to distinguish comparative advantage from absolute advantage. I give below an example. Assuming there are only two countries (A and B) with homogenous goods (cheese and wine) across firms and countries. Labor is homogenous within countries but heterogeneous across countries, and each economy is at full employment and has no transportation cost.

**Table 4                      Unit Labor Requirements**

	Cheese	Wine
A	1 hour per pound	2 hours per gallon
B	2 hours per pound	3 hours per gallon

Obviously noticing from the table 4, A has lower unit labor requirements to produce cheese and wine as compared to B. This is called that A has absolute advantage in producing cheese and wine. However, based on the example in table 4, A has 1/2 opportunity cost of producing cheese in terms of wine, while the opportunity cost of

cheese in B is  $2/3$ . Hence A has a comparative advantage in producing cheese since the opportunity cost of producing cheese in terms of wine is lower than it is in B, and B has a comparative advantage in producing wine since B has  $3/2$  opportunity cost of producing wine in terms of cheese compared with 2 opportunity cost of wine in the A. Both countries will gain from trade if they specialize in the production in which they have comparative advantage.

In traditional trade theorem, Ricardian model is the first model introducing the concept of comparative advantage. Ricardian model is a one-factor (labor) of production model and “a country’s production pattern is determined by comparative advantage.” (Krugman and Obstfeld, 2000: p.34) The Ricardian model also shows that “trade is beneficial even if foreign industries are competitive only because of low wages.” (Krugman and Obstfeld, 2000: p.34)

### **3.1 Heckscher-Ohlin Theorem (H-O Theorem)**

However, Ricardian’s demonstration is only true under extremely unrealistic assumptions. Moreover, it doesn’t tell us what is the impact of international trade on income distribution since there is only one factor of production (labor) in the model. H-O theorem is an improvement based on Ricardian’s model and extends to two production factors, high-skilled labor and low-skilled labor. “H-O theorem assumes international differences in factor endowments and differences between commodities in the intensities with which they use these factors.” (Jones, 1986: p. 14) Then according to H-O theory, international differences in factor endowments, the size of various national incomes and the direction of demand shift determine the structure of

international trade. When international trade occurs, the price of relatively abundant factors tends to rise while the price of relatively scarce factors tends to fall. Hence, a country has comparative advantage in the good with a relatively abundant factor. For example, developing countries with a relatively large supply of low-skilled labor should specialize in the production of low-skilled labor-intensive goods; on the contrary, developed countries with relatively large supply of high skilled labor should specialize in the production of high-skilled labor-intensive goods.

### **3.2 The Stolper-Samuelson Theorem (S-S theorem)**

Starting from the H-O theorem, Stolper and Samuelson first come up with explanations of the effects of international trade on income distribution among production factors. The following explanation brings out what is the effect of changes in the prices of goods, caused for example by protectionism, on the prices of factors of production. Suppose one sector exports high-skilled labor-intensive goods and the other is import-competing sector producing low-skilled labor-intensive goods. When protectionism or trade tariff raises the relative price of the import-competing sector's output, obviously, this sector will expand. Since the economy is assumed at full employment of both factors, this expansion will inevitably hurt the export sector. Then there will be an upward shift of aggregate demand for low-skilled labor relative to high-skilled labor due to expansion of the relatively low-skilled labor-intensive sector and contraction of the relatively high-skilled labor-intensive sector. Clearly the wage in relative low-skilled labor-intensive sector will go up. As the price of exports is given, the higher wage for low-skilled labor puts a downward pressure on the return

to high-skilled labor. It also implies that wages for low-skilled labor should increase more than the price of imports. In one word, an increase in the relative price of the low-skilled labor-intensive good will increase the wage rate of low-skilled labor relative to both commodity prices and reduce the relative price of high-skilled labor-intensive good relative to both commodity prices.

Thus someone gains and someone loses. International trade will narrow wage inequality in developing countries since they have abundant low-skilled labor. On the other hand, developed countries will suffer from widened wage inequality because of their abundant high-skilled labor.

### **3.3 Factor-price equalization theorem (FPE theorem)**

Samuelson extends S-S theorem and establishes the FPE theorem. FPE theorem sets these main assumptions: identical consumer tastes, the same technologies and production functions across countries, perfect factor mobility across industries within each country, and free movement of goods among countries and no transportation cost. Under the certain conditions, each country exports goods with abundant factors and imports goods with scarce factors. Finally free trade brings about an increase in the relative supply of each country's scarce factors while bringing about a decline in prices. Meanwhile the relatively decreasing supply of the abundant factors results in increased prices. Since factor prices in the countries come to converge, in equilibrium, their factor prices will actually be equal, as long as both countries continue to produce both goods with free trade.

If factor price equalization is achieved between developed and developing

countries, wages among these countries will tend to be equal. In other words, the wage in developed countries will decrease and the wage in developing countries will increase, until the wage of both countries converges to an intermediate point.

### **3.4 The Rybczynski theorem (Ryb theorem)**

Rybczynski develops from the H-O theoretical structure and examines how changes in one of two production factors affect output of goods when full employment is maintained. The theorem is useful in analyzing capital investment, and migration within the H-O model.

Rybczynski demonstrates that at constant prices, an increase in one factor endowment, keeping constant the supply of the other factor endowment, will result in a greater production of the good using this factor intensively and will reduce the output of the other good. These changes will lead to a price reduction of the good endowing the more abundant productive factor and a price rise of the good endowing scarce productive factor. According to Ryb theorem, when developed countries trade with developing countries, there will be an absolute increase in low-skilled labor supply in the international market due to the entry of developing countries. In developed countries, low-skilled labor-intensive industries will expand and high-skilled labor-intensive industries will contract, which means a decline in the relative wage of low-skilled workers and an increase in relative wage of high-skilled workers.

The Rybczynski theorem shows that wage differential is affected by the absolute change in the supply of the production factor.

### **3.5 Summaries**

The central results of the standard theorems on international trade and wage inequality are summarized as:

#### ***Developed countries***

International trade changes the relative prices of goods to affect the prices of factors. Namely, the relative prices of low-skilled labor-intensive products go down and the relative prices of high-skilled labor-intensive products go up. Consequently, the wage of low-skilled workers should absolutely decrease and more than the reduction of the prices of low-skilled-intensive goods. On the contrary, the relative wage of high-skilled workers should increase.

Wage differentials of low-skilled and high-skilled workers should be widening.

#### ***Developing countries***

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Wage differentials of low-skilled and high-skilled workers should be narrowed.

## **4. Empirical evidences of international trade and wages**

### **4.1 Evidence for developed countries**

#### **4.1.1 Views from trade economists: the effect of import prices on wage**

Trade economists follow the price evidence to study the relationship between trade, prices and wage differentials.

Krugman (2000: p.15) finds that “North–South trade has lowered the relative price of low-skilled labor-intensive products by less than 1 percent, and the relative wage of low-skilled workers by less than 3 percent.” So trade from developing countries affects the rising wage differential significantly but the impact is small. Sachs and Shatz (1994) study the trade and jobs in U.S manufacturing by dropping computer price from the sample. After adjustment, however, the result is still the same that the association is negative but small between price changes and skill intensity for the U.S.

Revena (1992) investigates the effect of increasing import competition on employment and wages in U.S manufacturing industries. He finds the sizable and statistically significant correlation between increased import competition and declining employment and wages in manufactures through changes of goods prices. He argues that the changes of technique account much more for the correlation. Beladi and Batra (2004) explore the effect of trade on the wage inequality between traded-goods sectors and nontraded-goods sectors in the U.S with a generalized version of the S-S model that includes a tradable and a non-tradable sector. High-skilled workers are employed in traded-goods sector, while low-skilled workers are employed in nontraded-goods sectors. (Beladi and Batra, 2004) The Authors show that the price changes of traded goods affect relative and absolute wages. They find

that the relative wage of low-skilled workers decreases if the nontraded goods sectors contract, while the relative wage of high-skilled workers increases if importables are low-skilled labor-intensive relative to exportables. In their model, trade has a bigger impact on wage inequality.

Haskel and Slaughter (1999) study the case in the UK. The evidence presents that the wage inequality has worsened in the last two decades, just like in the U.S. They find that trade pushes the price to decline in the low-skilled-intensive sector; the opposite evidence is found for high-skilled-intensive sector. Then the changed price leads to widened wage gaps. Haskel and Slaughter (1999) admit that the association in the UK between increased trade and widened wage gaps is not “quantitatively significant” except in the 1980s where price changes are the major reason behind the rising wage inequality.

Neven and Wyplosz (1996: p. 3) explore the study of trade and European labor markets by “using evidence on relative commodity prices and intra-sectoral skill levels for the four large EC countries.” As a result, it shows that wages and employment in Germany suffer most by the import competition from developing countries, while wages in Italy and the UK are more negatively affected by import competitive pressure from developed countries rather than from developing countries and France is a neutral case. Although there are differences among the results of the four European countries, Neven and Wyplosz could not identify that the relative import prices significantly fall in low-skilled labor-intensive sectors because of import competition over time.

Similarly, other economists do not find out clear and strong evidence relating the changes of price to wages and unemployment. According to Freeman (1995), the prices of low-skilled-intensive goods drop only slightly after adjusting prices for total factor productivity in the U.S.

Overall, most trade economists believe that import competition only has a modest impact on wage inequality and unemployment of low-skilled workers in developed countries, while they consider technology changes as the main reason. This can be explained by the small share of import from developing countries and the vast majority of low-skilled workers employed in non-import-intensive sectors. In the U.S, for example, only 30% of total imports come from developing countries representing 4% of the GNP and 2% combined of GDP in OECD countries. (Arbache, 2001 and Krugman, 2000). According to Griswold (1999), 85% of the low-skilled workers in the U.S are employed in non-tradable sectors where import competition has little adverse effects. Even in the manufacturing sector, which is vulnerable to import competition, there is only 12% of the low-skilled worker employed in import-intensive manufacturing sectors. Griswold (1999: p. 1) believes that it is “technological change and other non-trade factors account for most of the workers displaced from their jobs each year”.

#### **4.1.2 Views from labor economists: the effect of trade volumes on wage**

Labor economists use factor content analysis to test the impact on wages and unemployment by trade volumes. This methodology treats exports as demand-driven power and imports as the force of increasing the supply of productive factor.

In the research of Borjas, Freeman, and Katz (1992), they focus on the high-skilled and low-skilled labor embodied in U.S exports and imports manufactures. Because the U.S is abundant in high-skilled labor and scarce in low-skilled labor, net importing from developing countries augments the supply of low-skilled labor. The increased supply leads to a decline of the relative wage of low-skilled workers, however, the adverse effect is slight. They find that a 6% annual increase of the implicit labor supply in the manufacturing sector is due to trade deficit in manufactures from 1980-1985. But less than a 4 percentage point decline in the weekly relative wage of low-skilled labor, which could have contributed to the trade deficits from 1980 and 1988. And wage inequality narrowed because of the well-behaved trade balance in the late 1980s years.

In a more recent research, Rabbani (2005) presents the analogous result that the wage inequality in the manufacturing sectors is weakly related to the trade deficit in the U.S. He believes that the trade deficit shifts workers from manufacturing production<sup>4</sup> sectors to non-manufacturing production. Subsequently, he finds the relative supply of high-skilled labor has been slowing down in the last two decades, which leads to the relatively increased wage of high-skilled labor. As a result wage inequality “has been rising over time and also in the industries that have experienced higher trade deficit.” (Rabbani, 2005: p. 20) Unfortunately, the coefficient of the wage inequality is positive but statistically insignificant in his trade-wage regression. It implies that trade gap only has a weak association with the rising wage inequality in

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<sup>4</sup> It is assumed by the author that low-skilled workers are employed in manufacturing production sector, while skilled worker are in non-manufacturing production sector.

developed countries.

Slaughter and Swagel (1997a) consider imports as a channel to increase labor endowment of the recipient country and reduce labor endowment of the shipping country. According to the authors, trade with developing countries leads to 15% rise in the wage inequality in the U.S during 1980-85, but that effect diminished in later years. Katz and Murphy (1992) set up a simple supply and demand regime to estimate changes in the U.S wage structure. According to them, the changes of labor content do not help interpret the wage inequality as a whole but only in part.

Wood (1994) analyzes several developed countries rather than solely in the U.S. He argues that the standard factor content analysis understates the negative impact of trade on labor markets in developed countries. Therefore, he makes two important assumptions in his framework to correct the price bias and concludes that the fall of the demand for low-skilled workers is 20% related to the import competition.

In sum, factor content analysis indicates that “trade can account for 10-20 percent of the overall fall in demand for low-skilled labor need to explain rising wage differentials in the U.S or rising jobless in Europe.” (Freeman, 1995: p. 25) So there must be other factors primarily responsible for the changes of labor markets in developed countries.

#### **4.1.3 Summaries and Comparisons**

Either trade or labor economists find a similar relation between trade and wage inequalities in developed countries.

However, trade economists concern that import competition from developing

countries will lower wages of low-skilled workers through affecting the product prices. The S-S theorem is a mechanism widely used by trade economists. As we know, there are only two tradable goods and two non-tradable factors of production in the S-S theorem and no strong conclusions can be driven without restrictive assumption, but the S-S theorem gives a basic intuition to the real world research about how international trade affects labor demand and wages through the changes of factor prices. According to trade economists, developed countries' importing from developing countries lowers the domestic prices of low-skilled labor-intensive products, which drives domestic firms toward more profitability industries, namely high-skilled-intensive industries. Not surprisingly, the demand for high-skilled worker is rising and the demand of low-skilled worker is declining. With fixed domestic labor supplies, the demand of labor will change the price of labor. So the relative wage of the low-skilled workers is moving down and, alternatively, the relative wage of the high-skilled workers is moving up.

It seems that the factor price approach used by trade economists, is an appropriate channel through which trade affects labor markets nationally in terms of the traditional trade theory. But the practical problem is that the price data of imports and the wages of low-skilled labor are hard to measure. Moreover, this approach "ignores potential determinants of changes in sectoral prices and potential reasons for the proportion of low-skilled workers in a sector to be correlated with changes in prices, save for trade." (Freeman, 1995: p. 29)

Totally different from trade economists who use the S-S theorem, labor

economists pay much attention to factor content rather than factor prices. They consider quantity of trade as a measure of intensity of import competition. They believe that the effect of trade on wages is *via* factor supplies, instead of factor demands (Slaughter, 1995). According to labor economists, if developed countries import low-skilled labor-intensive products from developing countries and export high-skilled-intensive products, the relatively domestic supply of low-skilled labor is shifting up and *vice-versa* for high-skilled labor. Then the increase supply of low-skilled labor reduces relative wage of low-skilled labor and raises wage of high-skilled labor. Labor economists also believe that the trade volume data contains more information. But selecting trade quantities data results in another problem that it understates how changes in goods prices may affect product demand.

In general, the conclusions driven by both trade economists and labor economists show that there is a small but positive effect of international trade on widened wage inequality and rising unemployment in developed countries. The result is far from the expectation, which according to traditional theory, impacts of trade on wage inequality should be relative large and positive.

The main reason for this difference is that both trade economists and labor economists have problems to identify variations of factors and to include these variations in the models. In the real world, many other factors like technological progress and human capital affect factor supplies and demands rather than international trade. Separation of these factors is arguable and problematic. (Neven and Wyplosz, 1996)

Although it is not decided yet, whether analysis of factor prices or factor content is more correct, both analyses provide a clue as to how to measure the effect of trade on labor markets. And the small role played by international trade in labor markets will continue to motivate economists to find out the full story.

## **4.2 Evidence for the developing countries**

It is worth examining the connection between international trade and labor markets for developing countries. This is because a higher proportion of trade/GDP is to be found within developing countries, which are characterized by frequent trade policy reforms. The following part presents related perspectives based on empirical research on both overall developing countries and specific developing countries.

### **4.2.1 Research results on overall developing countries**

Majid (2004) sets up a model relating trade openness<sup>5</sup> with wages covering the periods from the 1980s to the late 1990s and verifies the facts that “wages slowly increase in developing countries though wage inequality grows” (p. 9) due to globalization. According to Majid, labor supply in developing countries is not fixed since a lot of low-skilled workers are underground and outside the wage regime. Thus, when demand for low-skilled workers increases due to trade openness, many from the low-skilled labor force enter the market, which only results in a decrease in the unemployment level, but no promotion of wages of low-skilled workers. On the contrary, the wage of high-skilled workers increases and wage inequality becomes a

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<sup>5</sup> “Because globalization is taken to be synonymous with openness”, Majid uses trade/GDP ratio as the indicator of trade openness. See Majid , 2004, p. 1

more serious problem. These increase in wage inequality are significant but temporary and will decline over time. Unfortunately, the recovery generated by economic growth is not huge enough to amend the initial damages in the long run. So Majid (2004) argues that wage inequality is exacerbated as a consequence of the direct effect of trade openness for developing countries.

In the estimations of Rama (2002), there is the similar temporary negative effect on wages due to trade openness, which will “only take a few years for the effect to change the sign” (p. 25) for developing countries.<sup>6</sup> He also finds that wage inequality between high-skilled and low-skilled workers increases though not greatly, since high-skilled workers benefit more than the low-skilled workers from trade liberalization.

By contrast, Desjonqueres, Machin and Reessen (1999) claim unexpected mixed results of wage differential in manufactures are found in their small sample of developing countries<sup>7</sup>. Wage differential in the non-manufacturing production/manufacturing production sectors rises in Chile and Pakistan, falls in Colombia and stays largely unchanged in Brazil and India.

All of the above research results are drawn from cross-country regressions. But in studying impacts of international trade on wage inequality, cross-country regressions may not be the best tool. Srinivasan and Bhagwati (1999, pp. 32-33) point out that “cross-country regressions...are not the best tools for analyzing...the linkage

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<sup>6</sup> The developing countries are implicated those who “do integrate with the rest of world.” See Rama (2002)

<sup>7</sup> The sample developing countries are Brazil, Chile, Colombia, India and Pakistan.

between trade and growth,” and “the most compelling evidence on this issue can come only from careful case studies...” Therefore, studies on individual countries or regions are necessary.

#### **4.2.2 Research results on specific developing countries**

Instead of a general picture, specific views are extended in this part referring to individual developing countries, i.e. South Korea, Taiwan, Hong Kong, Singapore, Mexico, Costa Rica, Chile, Columbia, Argentina and Brazil.

The improvement in wage inequality of high-skilled and low-skilled labor in the East Asian countries during 1960s-1970s coincides with the prediction of conventional theory. Accordingly, Wood (1994, 1997) selects South Korea, Taiwan, Hong Kong and Singapore as representatives of export-oriented industrialization. He finds trade liberalization shifts up the demand for low-skilled workers and lessens the wage inequality in all regions except Hong Kong<sup>8</sup> during the 1960s-1970s. However, in the latter decade, the competitive pressure of exports from other East Asian countries with lower wages tends to reduce the wage of low-skilled workers in these four regions. (Wood, 1994)

In the following study, Wood (1997) puts forth the evidence from Latin America for the period 1985-1990s that conflict the conventional theorem. The selected Latin American countries experience a widen wage inequality due to increased trade openness. Wood contributes to this trade-wage study by comparing the interaction across developing countries. He argues that the entry of large low-income exporters in

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<sup>8</sup> The widened wage differential of Hong Kong was “probably caused by a simultaneous and more-than-offsetting increase in the relative supply of unskilled labor”. See Wood (1994), p. 242

international trade, namely East Asia with low wages, drives a low-skilled labor demand downward shift in an open economy. Inevitably the relative wage of low-skilled labor in other open developing countries decreases through the S-S mechanism. These open developing countries produce both low-skilled labor-intensive and other goods, as in the case of Latin America.

In Mexico<sup>9</sup>, Hanson and Harrison (1999) focus on the role of trade and technological change on wage and employment after trade reform during 1980-1990. The authors find a dramatic increase in the wage inequality caused by trade liberalization without significant change of employment. They challenge the S-S theorem since they don't find the "positive correlation between high skill intensive and relative product price changes during the 1980s". (Hanson and Harrison, 1999: p. 286) They also believe that competition with other developing countries abundant in low-skilled labor put a decreased pressure on the wage of low-skilled workers in Mexico. The findings by Wood (1997) and Hanson and Harrison (1999) seem to be in contradiction with traditional trade theorems; this may be just because these countries have complex differences in the international trade during different periods.

Looking farther, Esquivel and Rodriquez-Lopez (2003) first use the "mandated-wage"<sup>10</sup> equation to test the effect of trade on the wage inequality of

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<sup>9</sup> Mexico is assumed by the authors to be abundant in high-skilled labor relative to low-skilled labor. Although its reserve of high-skilled labor is far behind the U.S, it may exceed relatively the reserve of high-skilled labor in China.

<sup>10</sup> It is suggest by Leamer (1998) to separate out the effect of trade and technology on the evolution of real high-skilled and real low-skilled wages in Mexico. See Esquivel and Rodriquez-Lopez (2003)

high-skilled and low-skilled workers in Mexico's<sup>11</sup> manufacturing industry for the periods 1988-1994 and 1994-2000<sup>12</sup> respectively. In his empirical results, trade liberalization reduces the wage inequality<sup>13</sup> *via* the S-S regime in the first period, however, this effect is "offset by the large negative impact of technological progress on the real wage of low-skilled workers." (Esquivel and Rodriguez-Lopez, 2003, p. 543) Surprisingly, in the latter period, the effect of trade liberalization on the wage inequality is close to zero, while technological progress drives a slight spread on the wage gap. The contribution of this study supports the hypothesis that technological progress affects the wage in developing countries.

Atiola (2005: p. 2) estimates "transition effects of trade liberalization on wage inequality in Latin America can differ from the long-run outcome based on the HOS<sup>14</sup> theory." In his estimation the rising wage inequality occurs in the short run but tends to decline in the long run. He argues that temporary adverse effect is a result of "asymmetries in the speed of contraction in the import sector relative to export sector and capital-skill complementarity in production." (p. 2)

Robbins and Gindling (1999) measure the changes in relative wages and in relative supply and demand for high-skilled labor in Costa Rica before and after trade liberalization. Applying a disaggregated, nonparametric method, they find increased

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<sup>11</sup> Mexico is assumed by the authors to be abundant in low-skilled labor compared with its trade partners. See Esquivel and Rodriguez-Lopez (2003)

<sup>12</sup> 1988-1994 refers to pre-NAFTA, 1994-2000 refers to post-NAFTA. See Esquivel and Rodriguez-Lopez (2003)

<sup>13</sup> Reduced wage inequality means the increasing wage of unskilled workers and decreasing wage of skilled workers. See Esquivel and Rodriguez-Lopez (2003)

<sup>14</sup> HOS theory is Heckscher-Ohlin-Samuelson theory and similar to H-O and S-S theory.

relative wages are induced by the relative demand of high-skilled labor rather than the relative supply after liberalization. The case of Chile by Arbache (2003) and Robbins and Gindling (1999) turns to be against the HO theorem again. Trade liberalization reform in Chile entailed an increasing demand for high-skilled labor and thereby led to an increase in the relative wage. Analogous evidence is to be found in Colombia by Attanasio, Goldberg and Pavcnik (2003). A widened wage gap during 1980s and 1990s is attributed to skill-biased demand shifts that are closely related to rising manufacturing exports shares and rising ratio of imported machinery to GDP.

Machado and Frederico (2002) investigate the impact of trade openness on wages in tradeable and nontradeable sectors in Brazil during 1981-1999 periods. The authors find the increasing demand shifted toward low-skilled labor after trade liberalization. For high-skilled labor, the demand shift only occurs among the same sectors contrary to the traditional theorem<sup>15</sup>. Moreover, it is difficult for authors to “define the prevalence the labor demand shifts between tradeables or nontradeables sectors”. (p. 7)

#### **4.2.3 Summaries**

In fact, the cases for developing countries are complex and mixed. Although the H-O and S-S theorem predict that international trade decreases the relative demand of skilled workers and then improves the wage inequality for developing countries, there is growing empirical studies in developing countries conflicting the international trade theorem. The receptiveness of wage is greater than employment to international trade.

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<sup>15</sup> The traditional trade theorem predicts the shift should occur among or between all the sectors. See Machado and Frederico G. J. (2002)

Most results from overall developing countries show wage inequality increases due to trade liberalization, while individual countries' studies provide mixed results.

However, whether it is from an overall analysis or from individual case studies, the explanation for the phenomena is partial and "requires a more sophisticated theoretical treatment than the available models." (Arbache, 2001: p. 11) The reasons could be the followings:

1. Data limitations: For most developing countries, there are lack of fund and shortage of necessary techniques to obtain data.
2. Non-trade factors: It is very hard for foreign researchers to have a perfect understanding of non-trade influences on developing countries' labor market. These factors could be culture differences, political systems and government policies. Moreover, it is also hard to control changes caused by these non-trade factors in the model.

## **5. New explanations of the relation of international trade and wage inequality**

The previous sections address how international trade directly affects wage inequality and unemployment of low-skilled workers. Most authors mentioned above admit in their studies that there are other factors beside that may impact on how trade affects labor markets in developed and developing countries, such as technology changes, capital mobility. The new growth theory argues that international trade indirectly affects labor markets through the channels of inducing increased research

and development, reallocation employment and technology flows. This section provides only a brief summary of the linkages between wages and technology flows, capital mobility and labor mobility across countries.

### **5.1 Technology flows**

Technology flows across countries affect wages through the effects on factor productivity. An inflow of technology can increase the productivity of capital or labor and then raise the wage differential.

Foreign investment and R&D spillover are presumed to be transfer of technology to the host country. Aitken, Harrison and Lipsey (1996) investigate the relationship between foreign investment and wages in Mexico, Venezuela and the U.S. They find higher wages in these three countries are accompanied by higher levels of foreign investment. In Mexico and Venezuela, significant wage inequality exists between foreign-owned and domestic firms that are consistent with higher human capital formation in foreign-owned firms and lower turnover. So higher foreign investment lead to higher wages only for foreign-owned firms and wage spillovers do not boost wages for domestic firms. On the other hand, in the U.S, the evidence is favorable for smaller wage differentials between foreign-owned and domestic firms. According to the authors, a large part of the wage differential disappears after considering the fact that foreign-owned firms are larger and more capital intensive than their domestic counterpart.

Coe, Helpman and Hoffmaister (1995) examine the extend to which developing countries are affected by technology flows, namely foreign R&D. Based on estimates

from 77 developing countries from 1971-1990, the authors find “a developing country’s total factor productivity is larger the greater is its foreign R&D capital stock, the more open it is to trade with the industrial countries, and the more educated is its labor force.” (p. III) They conclude that “R&D spillovers from developed countries to developing countries are substantial.” (p. 23)

## **5.2 Capital flows**

Since 1970 capital flows are growing rapidly across borders. The change of a country’s capital stock relative to labor potentially attributes to the variation of factor prices. For developed countries, “outflows of capital lowered wages, as multinational firms establish-and/or expand overseas affiliates, to which the firms then “export” or “outsource” jobs” (Slaughter and Swagel, 1997b: p. 22). Feenstra and Honson (1995) show the process of outsourcing generates the change in relative wages of high-skilled labor with the different capital stock in developed countries relative to developing countries. In their theoretical model, outsourcing enhances the relative demand for high-skilled labors in both countries and thereby increases the relative wage in both countries. Although the wage of low-skilled labor in both countries may decline superficially, the reduction will be recovered by the increasing supply in developing countries through international trade. Feenstra and Honson find that “ the rising import share over 1979-1987 explains 15-33% of the shift towards high-skilled labor in the U.S manufacturing.” (p. 4) Since the outsourcing to developing countries is small, the effect of outsourcing to these countries seems to be much smaller. Further, the authors argue that technology-driven factor of labor demand accounts more for

wage inequality in the U.S than the combined trade flows and capital flows. Slaughter (1995) restricts the definition of outsourcing to multinationals and their affiliates. He explores that outsourcing induces increasing demand for high-skilled labor within the U.S manufacturing. Contrary to Feenstra and Honson, the effect of outsourcing on the rising wage inequality in the U.S is negligible during the 1980s. The conclusion is driven by the two facts discovered by him. First, he finds that “a set of stylized facts about the employment, investment, and production patterns of these firms are mostly inconsistent with widespread outsourcing.” (p. 2) Second, he finds that “home and foreign production labor at best seem to be weak substitutes and in fact maybe price complements.” (p. 2)

Totally different from the case in the U.S, Anderton and Brenton (1998) find a significant effect of outsourcing to developing countries on the decline of the relative wage and employment of low-skilled workers in the UK. They disaggregate UK imports according to individual supplying countries and construct import penetration terms for different groups of countries. Subsequently, imports from developing countries explained 40% of the wage increase of high-skilled workers in the UK textiles and 30% of their increased employment during 1970-1983.

### **5.3 Labor mobility**

Labor mobility across countries also affects wages. This issue is mostly debated in developed countries since there are more immigrants flowing into these countries. Although immigrants can raise the flexibility of the job market and facilitate the competitiveness in developed countries, immigrants with lower education or skills are

blamed for lowering the relative wage of low-skilled workers domestically.

Empirically, there is no strong evidence found in the U.S. Borjas, Freeman and Katz (1991) assess that immigrants flow have a modest negative effect on the wage inequality only in the local American cities with sizable immigrant residents during the 1980s. As the authors realize, the estimation only focuses on the local job market rather than on a national widespread base.

The immigration problem seems more serious in Europe than in the U.S. The reasons are a) slower speed of job market adjustment to economic differences, b) persistence of unemployment and labor market imperfections, c) different view of culture variety and social networks. (Zimmerman, 1996) Zimmerman finds that immigration in Germany significantly worsened the wage differentials, because the wage of low-skilled workers decreased as compared to increased wage and employment of high-skilled workers. He also argues that any adverse effect in the European labor market seemed to endure a longer time than the U.S due to possibly wage rigidity. As stated by Slaughter and Swagel, "recent immigrants to most advanced economies have had on average lower levels of human capital than natives, suggesting that economy-wide growth effects from recent flows of immigration will be less immediate." (Slaughter and Swagel, 1997b: p. 24)

## **6. Conclusions**

In this paper, I provide theoretical and empirical views on how international trade affects wages in both developed and developing countries. In traditional trade theories, trading with developing countries should widen the wage inequality in

developed countries. By contrast, wage inequality should narrow in developing countries from trade liberalization. Empirical studies in developed countries and developing countries offer different views. For developed countries, most studies find that trade with developing countries plays a small role in increasing wage inequality. For developing countries, the findings are mixed and complex.

Recently, noticing that the magnitudes of the direct effect of international trade on wage inequality are modest in both developed and developing countries, many economists struggle to find out other plausible explanations. The consensus seems to be that trade changes indirectly play an important role in wage inequality within both developed and developing countries through a channel for technology flow, mobility of labor and capital.

However, there are some shortcomings of these empirical studies. First, most empirical studies are preliminary and partial so far. Since the conditions of countries are not identical, it is problematic to generalize a picture based on a limited number of countries. Second, the research results above between the relationship of trade and wages in developed countries and developing countries are seldom driven from long-term studies, particularly, for developed countries.

In my opinion, **wage inequality in developed countries will increase in the long term**, because:

First, developed countries are very competitive in high value-added industries, because they control most of the advanced technologies. It is known that the marginal profits are much higher than low value-added industries. For example, according to a

Wall Street Journal article “We think, they sweat” (Kessler, 2004), the sale price of Apple’s iPod is 265 US dollars and Apple Computer earns 65 US dollars profit per iPod, while the company located in China, which does the assembling work, earns only 4 US dollars.

The huge profit margin not only gives firms incentives to invest in R&D, but also provides the necessary fund for research projects. Therefore, firms from developed countries would obtain more innovations and more advanced technologies. New products will be introduced to the market. Through this process, developed countries enhance and enlarge technology advantages over developing countries, eliminate potential competitors and capture more market share. Thus more skilled workers are needed and wages of high-skilled workers increase.

Second, as more and more enterprises enter high value-added industries, domestic demand for low-skilled workers will decrease in developed countries. In addition, in the long run, the cheap goods imported from developing countries will hurt domestic low value-added industries and further reduce demand for low-skilled workers in developed countries. So, in developed countries, relative wages of low-skilled workers will decrease in the long run. Therefore, wage inequality in developed countries will eventually increase, which is consistent with the traditional H-O trade model.

**For developing countries, I believe that wage inequality will decrease in the long run.** On one hand, developing countries have competitive advantages in labor intensive or low value-added industries. Through the process of globalization, in

developing countries, resources are shifting from other industries to labor intensive industries. Thus, there will be more demand for low-skilled workers and wages for these low-skilled workers will increase. On the other hand, the low profit margins of low-skilled labor-intensive industries, together with other factors, such as lack of accumulation of technology and insufficient fund, cause slow technological progress in developing countries. The enlarging technology differences between developed and developing countries makes it almost impossible for developing countries to compete with developed countries in high value-added industries. As globalization process going deeper and deeper, with technology advantages, developed countries will capture more and more the share of value-added industries in developing countries. Therefore, in the developing countries, domestic demand of high-skilled workers will decrease, which causes the decline of the relative wage rate of high-skilled workers. So, in the long run wage inequality will decline in developing countries.

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