Factor Price Equalization and The Demand for Skilled and Unskilled Labor
--An Empirical Analysis of U.S. Trade--

I. Introduction

This paper contributes empirically to the recent debate over the application of the factor price equalization (FPE) theorem to recent US trade and wage conditions. Has increased competition from low-wage developing countries during the past two decades had an important impact on the US labor market? According to the FPE, substantial relative price declines for unskilled labor-intensive products and services made in the U.S. could occur. These price reductions then influence the labor demand curve, dictating lower real wages for unskilled workers and widening the wage gap between skilled and unskilled labor in the U.S. The analysis includes linkages between foreign product markets and domestic factor markets and has its conceptual basis in the Heckscher-Ohlin (H-O) factor endowment model of U.S. trade. This linkage exists because H-O theory assumes technology to be given and assumes a fixed functional relationship between outputs of goods and inputs of factors. One step further, as a corollary of H-O, we use the factor price equalization theorem to link between output prices and income distribution or returns to skilled and unskilled labor.

The aim of this paper is twofold. We first examine empirically the effects of trade on the demand for skilled and unskilled workers. This involves determining how much skilled and unskilled labor a country uses in producing its exports and how much labor would have been used had its imports been produced domestically. The difference between skilled and unskilled employment needs of exports and imports provides our measure of the impact of trade on the demand for skilled and unskilled workers. Second, we investigate the linkage of product prices to

the factor prices. The factor price equalization (FPE) theorem predicts that if goods sell for the same price regardless of where they are produced, then workers who produce them will earn equal wages. Thus, with presumed increased imports of unskilled-labor-intensive goods from developing countries we would expect to observe downward pressure both on the prices of U.S. produced goods subject to competition from these imports and on the wages of the unskilled U.S. workers. We estimate the separate impacts of trade and technology on factor costs and factor costs are then compared with actual wages. If the estimated impacts of trade correspond adequately to actual wages, we will argue that this provides an accurate explanation of the trend in wages consistent with the FPE theorem.

II. Measuring The Factor Content of Trade and Domestic Use

Wood [9 and 10] has been a strong advocate of trade as the main cause of the widening wage gap between skilled and unskilled. He points out that "the main cause of the deteriorating situation of unskilled workers in developed countries has been expansion of trade with developing countries,"[10: p.57]. He also argues that there are causal links between technical change and trade, accepting many economists' view that technical change is important. Thus, "trade" and "technology" have been isolated for special attention among the various candidate causes of inequality between skilled and unskilled workers. Leamer [7] also argues that most of the changes in equilibrium earnings of low-wage workers are due to sectoral biased product prices (globalization) but income inequality is driven mostly by sectoral biased technological change [p.312]. Joining with Leamer are Berman, Bound, and Machin [1] who argue that pervasive skill-biased technological change rather than increased trade with the developing world is the principal culprit . Richardson [8: p.35] argues that most measures of national openness to the world

economy have also been rising along with inequality. He views trade as a moderate contributing source of income inequality; it may not overshadow other sources, but it cannot be shrugged off. Thus, among the various candidate causes, "trade" and "technology" we previously identified for special attention, he indicates that increased inequality can be seen as a multiplicative interaction of the effects of trade and sector-specific technological change.

Krugman and Lawrence [4] dismiss the argument that the widening wage gap in the 1980s was due to imports from developing countries because these imports were quantitatively small. Lawrence and Slaughter [5] and Bhagwati and Kosters [2] also dismiss the notion that international trade has played more than a minor role in pushing down the relative wages of less-skilled U.S. workers. They argue that the rising earning inequality in the U.S. and other industrialized countries is mainly the result of technological change rather than pressure on unskilled workers's wages from foreign competition. Thus, the debate on the widening wage gap highlights the prominent role played by the relative factor endowment model of international trade. The purpose of this paper is to build upon previous studies on the wage gap and empirically test skilled and unskilled labor content of trade and domestic use.

The idea behind factor-content-of-trade calculations seems straightforward when applied to relative wages. We estimate the amount of skilled and unskilled labor that is embodied in a nation's exports and then estimate the amount of skilled and unskilled labor that would be needed to produce domestically the goods that are imported. The skilled and unskilled labor embodied in exports represents an addition to the domestic demand for those classes of labor while labor embodied in imports represents a subtraction from domestic demand. The influence of trade on relative wages of skilled and unskilled labor can then be verified by calculating the net differences

in demand for labor by skill level that results from imports and exports. Finally, adding labor use for domestic use accounts for the total employment in the US economy in a given year.

One method of calculating the factor content of international trade relies upon Leontief's input-output (I/O) model. The Leontief-type of empirical estimation continues to be a standard method for analyzing the H-O factor endowment model of U.S. trade. In an open I/O system, equilibrium output of each sector of the economy can be calculated for a given set of final demand of goods and services. The system can be expressed in a matrix form, by:

$$\mathbf{X = AX + F.}$$

In our empirical analysis, **X** is an 80 by 1 vector of sectoral output, **A** is an 80 by 80 I/O direct requirement matrix, and **F** is an 80 by 1 vector of aggregate final demands consisting of exports, imports, and domestic use. The equilibrium output levels required to satisfy final demand **F** are obtained by,

$$\mathbf{X= [I - A]^{-1} * F}.$$

The equilibrium output to satisfy net trade can be obtained by

$$\mathbf{X_t = [I -A]^{-1} *Nt,}$$

where **Nt** (**Ex-Im**) is the vector of net trade and **Ex** and **Im** are vectors of export and import levels respectively[1] and labor demands for net trade are estimated by,

$$\mathbf{L_{nt} = dl*X_t},$$

Where ***dl*** is an 80 by 80 diagonal matrix of labor coefficients, showing amounts of labor required per unit of output in each industry. Similarly, labor content of domestic use can be estimated by,

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[1]. This is similar to Borjas and Ramsey's [4: p.1094] method except that they use employment coefficients as employment/shipment while ours is employment/output per sector

$\mathbf{L_d} = \boldsymbol{dl}*\mathbf{X_d}$,

where X_d is domestic household consumption, inventory change, gross private investment, and government purchases of goods and services.

Thus, $\mathbf{L_{nt}} + \mathbf{L_d}$ is the total labor employment in the U.S. economy for a particular year.

We estimate the skilled and unskilled labor demand for a given component of final demand using the nine major occupational categories of U.S. workers as classified by the Bureau of Labor Statistics (BLS)[2]. The nine occupational categories are then grouped into skilled and unskilled labor for our analysis. Our estimation allows us to determine the importance of the net trade effects for the demand for skilled vs. unskilled labor compared to the labor demand by domestic use in the economy. Our estimates are the amounts of skilled and unskilled labor embodied in U.S. exports and the estimates of the amount of skilled and unskilled labor that would be needed to produce domestically the goods and services imported. The skilled and unskilled labor embodied in exports represents an addition to the domestic demand for those classes of labor; labor embodied in imports represents a subtraction from domestic demand for labor services. The influence of trade on demand for skilled and unskilled labor can then be inferred by calculating the net differences in demand for the two classes of labor embodied in

[2]. BLS [15] reports nine occupational groups. They are; 1. Executive, administrative & managerial, 2. Professional Specialty, 3. Technicians and related support, 4. Sales occupations, 5. Administrative support, incl. clerical, 6. Precision production, craft & repair, 7. Service occupations, 8. Operators, fabricators & laborers and 9.Farming, forestry, & fishing. We combined occupational categories and defined categories 1 through 3 as high-skilled, categories 4 through 6 as medium-skilled, and categories 7 through 9 as low-skilled. Also note that we use the terms "skilled and unskilled" in the text while our estimation contains high, medium, and low skilled. "Skilled" refers to the high-skilled category while "unskilled" refers to the low-skilled category.

imports and exports.

This estimation will show how the factor content of trade and domestic use changes over time under different labor productivity, I/O technology, and final demand scenarios. The resulting estimation reflects an interactive effect of labor productivity, direct requirements, and final demand. Data availability influenced the selection of the years: 1972, 1977, 1982 and 1987 are years for which BEA constructed benchmark I/O tables. The 1993 table is an updated version of the 1987 I/O table.

III. Empirical Analysis of Factor Content of Trade and Domestic Use

We estimate the high, medium, and low skilled labor content of trade and domestic use and we focus on the high and low skill categories. All calculations are made in 1987 prices and Tables 1A through 1E show each years's (1972, 1977, 1982, 1987, and 1993) labor requirement needed to satisfy trade and domestic use. The tables contain labor requirements for the top ten (out of eighty) sectors of imports and exports based on the ratio of labor use for net trade to total labor used in the sector. We also analyze the ratios of the skilled and unskilled labor requirement for imports and exports to examine different configurations of skilled vs. unskilled labor for import and for exports.

In 1972 (Table 1A), for example, two sectors' (sugar crops and refined sugar) net trade loss of employment was 24,700 and 16,800 which was more than 50%(-0.508 and -0.503) of the 48,600 and 33,400 workers of total civilian employment in sugar crop and refined sugar sectors respectively. The tenth most affected sector is the apparel industry where the net trade loss of employment was 158,500 workers, 10.6% (-0.106) . The subtotal of the top ten sectors shows net trade loss of 513,100 workers, which is 14.6% of the 3.5 million subsector total employment.

The net trade loss of high skilled workers was 53,800 and 398,200 unskilled jobs were lost. For the top ten exports in 1972 (middle of Table 1A), oilcrops show 41% (53,800) of total sector employment (131,100) generated by net exports. This was followed by 37% (39,900) for foodgrains (107,700) to 7.8% (12,600) in coal mining (162,300). The subtotal of the top ten sectors shows a net trade gain of 182,900 employment (18.3% of 998,700 total employment) of the ten subtotal sectors. Output for total U.S. exports required 3.65 million workers compared to the 3.81 million implicit job loss due to total imports (row of US Total). The net trade loss of employment was 163,200 which was only two-tenths of one percent (-0.2%) of the 84.7 million civilian workers employed in 1972. Net trade resulted in a slight gain (23,200) for skilled employment (0.1%) but a loss of 353,900 (-1.1%) in unskilled labor employment. Outputs for U.S. exports required 3.65 million workers compared to the 3.81 million implicit job losses due to imports (row of US Total). The net trade loss of employment was 163,200 which was only two-tenth of one percent (-0.2%) of total 84.7 million civilian employment in 1972. For the United States as a whole, exports used a higher ratio of high-skilled over low-skilled labor (.33) compared to imports (.27). This means that in 1972, export-related employment for high-skilled labor was 33% of export-related employment of unskilled labor while it was 27% for imports-related employment.

In 1977 (Table 1B), the first post-OPEC year analyzed, two sectors' (Crude petroleum and Fishing[4]) loss of net trade were more than 80% of total labor required to satisfy net trade and domestic use followed by more than 50% of sugarcrop and refined sugar. The ranking goes down

[4]. 1977 was the first year BEA included a separate fishing sector. In 1972, fishing was part of Forestry and Fishing Products.

to 40 % for metal mining products and to 8.9% for products of petroleum refining. The subtotal of ten ranking sectors shows a loss of more than 1 million workers due to net trade, 26.6% of subsector total employment. Over 300 thousand of the nearly 500 thousand increase in job losses from 1972 occurred in the Crude Petroleum sector. The net trade loss of employment was 170 thousand for high skilled and 693 thousand for unskilled workers. For 1977 among the top ten export sectors (middle of Table 1B), foodgrains show 46% of total sector employment generated by net exports followed by 42% in oilcrops, to 15% for grass seeds. The subtotal of the top ten shows a 290 thousand gain in employment due to net trade, 25% of total employment of those ten sectors. Outputs for U.S. exports required 5.55 million workers compared to the 5.29 million implicit job losses due to imports (row of US Total). The net trade employment was positive, 261 thousand, but the gain was small, only two-tenths of one percent (0.2%) of the total 93.2 million civilian employment. The net trade employment effect for skilled workers was also positive, 55,300 but small, only two-tenth of one percent (0.2%) of the total 20.4 million but it was negative, a loss of 211 thousand (-0.7%) for unskilled workers. For the U.S. as a whole, exports used a higher ratio of high-skilled to low-skilled labor (.34) compared to imports (.30).

A similar situation prevailed in 1982, a recession year. However, in 1987 (Table 1D), after the economy recovered and boomed, the net trade deficit soared and the effects on employment were all negative (row of US total); losing 2.25 million jobs, a significant (2%) loss of the total 114 million civilian employment. Net trade resulted in a loss of 328 thousand for skilled employment (-1.3%) and a loss of 1.86 million (-5.3%) unskilled labor employment. For the U.S. as a whole, exports used a higher ratio of high-skilled to low-skilled labor (.48) compared to imports (.37). Among the top ten import sectors, the Leather and Fishing sectors show losses due to net trade of

more than 100% of total labor required to satisfy net trade and domestic use, followed by a 56% loss by crude petroleum and 46% by apparel products. The ranking goes down to 38% for metal mining and to 21% for fish and seafood products. The subtotal of ten ranked sectors shows a loss of more than 2.1 million jobs due to net trade, 37% of these ten sectors' total employment. The net trade loss of employment was 292 thousand for high skilled and 1.6 million for unskilled workers. Among 1987 top ten exports (middle of Table 1D), oilcrops show 43% of total sector employment generated by net exports followed by 40% of food grains, to 8.7% of feed grains. The subtotal of the top ten shows a 344 thousand gain in employment due to net trade, 18.5% of total employment in these ten sectors. In 1993 (Table 1E), the situation reversed from 1987. Net trade contributed 1.05 million workers to total employment demand , almost one percent (0.9%) of the total 117 million civilian employment in 1993. Net trade resulted in a gain of 221 thousand for skilled employment (0.8%) and a loss of 627 thousand (-1.8%) for unskilled labor employment. For the U.S. as a whole, exports again used a higher ratio of high-skilled to low-skilled labor (.46) compared to imports (.37) .

A common result, throughout the five years examined, is that across the economy the employment impact of net trade is small. However, individual sectors did experience large losses. The largest percentage loss of employment during the five years considered were leather products (in 1987 and 1993) with more than 100% loss. The largest loss of levels of employment occurred in the apparel industry (527 thousand and 444 thousand in 1987 and 1993 respectively). However, the net trade affect on U.S. employment as a whole was minimal, less than one percent.

The unskilled labor share of total employment in the U.S. has declined slightly from 36.8% (30.9 million of total 84.7 million employment) in 1972 to 34.5% (32.1 million of total 93.1

million) in 1977, 32.3% (32.8 million of total 101.6 million) in 1982, 30.8% (35 million of total 113.8 million) in 1987, and 29.1% (34 million of total 116.8 million) in 1993. The domestic use effects dominated the net trade effects on unskilled labor demand. Occupational distributions changed during the period of the analysis as well. First, as discussed above, the unskilled share of the labor force declined and the skilled labor share increased over time. However, the small rate of change illustrates the relatively steady evolution of the US occupational distribution during the period considered. If import growth was an important influence on the differential labor demand by skill level, the employment related to the 1972 to 1993 import surge should have been concentrated in low skill industries. As imports gained market share, we would also expect to observe falling employment share in affected industries. In deed this has happened in the leather and leather products sector. For example, leather and leather products employed 299 thousand in 1972 (three-tenths of one percent of total employment) which declined to 147 thousand (one-tenth of one percent) in 1977, and to 120 thousand (one-tenth of one percent) in 1993. Second, the sectoral compositions of U.S. exports and imports have not changed much over these periods. For example, exports by the agriculture and services sectors in 1972 and 1977 were listed in top ten and contributed positively to employment. On the other hand, other agricultural processing (such as leather apparel and textiles), and forestry and mining sectors (including crude petroleum) listed in the top ten imports sectors and showed the biggest employment vulnerability to imports throughout this period. Third, net trade accounted for only five percent of total labor use while the domestic consumption sector accounted for 95 percent. Thus, the role of trade in shifting employment away from production-labor-intensive industries is small. The existence of large sectors producing nontraded consumer services muffles the effects of trade on labor demand

and thus on wage inequality among skilled compared to unskilled labor. Continued growth in the service sectors would make the economy-wide reduction in the demand for unskilled workers proportionately smaller than the trade-induced reduction in the demand for such workers in manufacturing.

IV. Measuring Factor Price Equalization

We start with an I/O model consisting of standard I/O equations. The first set contains the market-clearing equations. These require that each producing sector's output be equal to the sum of interindustry demand plus exogenous final demand (Fi). All measures are in value terms.

$p_i \sum_j a_{ij} X_i + p_i F_i = p_i X_i$

In matrix terms,

$\mathbf{D_p A X} + \mathbf{D_p F} = \mathbf{D_p X}$

We may also treat prices as variables and calculate equilibrium prices as well as equilibrium output levels. Then each sector will price its product in an amount just equal to average cost plus profit. Mathematically, the price of product *i* in the n-sector economy can be written as,

$p_i = p_1 a_{li} + p_2 a_{2i} + \ldots + p_n a_{ni} + p^l_i L_i + p_i r$

where the first n terms on the right-hand side indicate the cost of inputs purchased from other producing sectors. The term $p^l_i L_i$ indicates the cost of labor input and term $p_i r$ indicates the amount of profit if the profit rate is fixed at *r*. In matrix terms,

(1) $\mathbf{P} = \mathbf{A'P} + \boldsymbol{w} + \mathbf{I}_r \mathbf{P},$

where $\mathbf{P}$ = n by 1 vector of sector prices,

$\mathbf{A'}$ = n by n transposed matrix of technical coefficients $\mathbf{A}$

$\boldsymbol{w}$ = n by 1 vector of $p^l_i L_i$

$\boldsymbol{l}$ = n by 1 vector including the direct labor input of L_i

$\mathbf{I}_r$ = r * **I,** where **I** is a diagonal matrix with one's,

Then we have,

(2) $\mathbf{P} = [\mathbf{I} - \mathbf{A'} - \mathbf{I}_r]^{-1} \boldsymbol{w}$.

In the open I/O system, the wage and profit rates are both regarded as autonomous and the equilibrium price structure is determined by the above equation and can only be altered when wages or profits change. Leamer argues that a crucial step in the attempt to separate the effects of "trade" from "technological change" is the division of the observed product price changes into components separately associated with these two sectors [Leamer: 6: p.22]. He also argues that the best way to think about the impact of technological change in diversified economies is to differentiate the zero-profit condition applicable to the industries [Leamer: 7: p.310]. So when there are only changes in wage rates and assuming zero profit rate, equation ***(2)*** becomes

(3) $\mathbf{P} = [\mathbf{I} - \mathbf{A'} -]^{-1} \boldsymbol{w}$.

And, total differentiation of equation ***(3)*** yields:

(4) $d\mathbf{P} = [(\mathbf{I} - \mathbf{A'})^{-1} * d\mathbf{A'} * (\mathbf{I} - \mathbf{A'})^{-1}] * \boldsymbol{w} + (\mathbf{I} - \mathbf{A'})^{-1} * d\,\boldsymbol{w}$.

This equation is similar to Leamer's [Leamer:6: p.23] where he considers direct unit cost of output and zero profit rate. In order to make headway in disentangling the trade effects from the technological effects we will need to get a handle on that portion of the product price change that is due to technological change with no changes in factor costs. Therefore, equation **(4)** will serve as a foundation for separating the impacts of trade and technology on output prices. This is done by putting $d(\mathbf{w}) = 0$;

(5) $d\boldsymbol{w} = d\mathbf{A'} * (\mathbf{I} - \mathbf{A'})^{-1}] * \boldsymbol{w}$. Likewise, the trade effects can be handled by putting $d\mathbf{A'} = 0$

in the equation ***(4)***;

(6) $d\boldsymbol{w} = \mathbf{(I - A')} * d\boldsymbol{P}$.

Based on 524 industries I/O data , we estimate this equation and interpret the changes in wages (d***w***) as the "mandated" changes in factor cost that are needed to keep zero profit condition operative in the face of changes in technology and product prices. This "mandated" change can then be compared with actual wage changes. The first part of equation **(4)** can be considered as the effects of technological change on the output prices and the second part of the equation can be considered as the trade on the output prices.

V. Empirical Analysis of Factor Price Equalization

The results of equations ***(5)*** and ***(6)*** appear in Table 2. The table presents estimates of the effects of technological change and globalization on real wages by industry over the period 1972-1993. The industries included are those that had the greatest degree of import penetration as shown in Tables 1A-1E. The column labeled "Technology Effects" measures how much wages would be expected to change given changes in the technical requirements matrix over the period 1972-1993. The effect of technology was to lower wages for some industries, from six-tenth of one percent in fish and seafood industry to five percent in textiles and petroleum industries and to increase wages for some other industries, from 1.4 percent in treenuts industry to 11.1 percent increases in computer industry.

The next column measures the separate impact that globalization would be expected to have on each industry. Despite the fact that these industries were most vulnerable to import competition, the overall effect of globalization on wages (due to price changes) in these industries was in most cases positive. The "mandated" increases in wages ranged from 9 percent in metal

mining to 396 percent in the crude petroleum industry. The only industries for which this was not true were tree nuts, miscellaneous crops, apparel, and computers. And in the case of tree nuts and apparel, the negative effects were small (-2.9 percent and -6.3 percent respectively).

The last two columns present the actual changes in real wages in the selected industries and the globalization effects on wages as a fraction of the actual wage changes. Twelve of the eighteen industries shown in the table experienced real wage decline over the period. Wage decline ranged from 8 percent in the treenuts industry to 85 percent in the sugarcrop. The biggest gain in real wage is shown in the crude petroleum indstry (94 percent) followed by 77 percwent increase in fishing industry.

Turning to the effects of globalization relative to actual wage changes, we see widely divergent estimates across the selected industries. Wages fell in nine of eighteen industries despite the positive impact of globalization. In contrast, for apparel industry, wage rose despite the negative impact of globalization on wages. In the other industries most affected by import penetration, the effect of globalization was positive and real wages rose. For example, in fishing industry, the globalization effect was equal to 167 percent of the increase in wages and in textiles the globalization effect was equal to 97 percent of the increase in wages. In some industries the impact of globalization more than accounted for the increase in wages. For example, in the mother manufacturing industry the effect of globalization was seven times the actual wage increase; in crude petroleum and computer industries it was four times as large. The widely divergent estimates of globalization's effects on real wages in table 2 lead to the following conclusion. Of the eighteen industries most vulnerable to import penetration during the period 1972-1993, there is little evidence that globalization has resulted in factor-price equalization.

VI. Summary and Conclusions

We have found that changes in trade have not been the major contributor to changes in demand for skilled vs. unskilled labor during the period we examined. We have found that any negative effects of net trade-related unskilled employment was offset by the unskilled labor demand for domestic use. This suggests a minimal role for imports in the loss of unskilled labor in the economy. Thus, our analysis has shown that trade has played a very small role in changing the demand for skilled vs. unskilled workers. Accordingly, because it had just a small effect on employment levels, it is difficult to conclude that the widening wage gap between skilled and unskilled labor is due primarily to trade.

The ratio of high-skilled to low-skilled workers was higher for exports than imports and has risen over time. This indicates that the U.S. has moved toward more skilled-labor intensive exports. Thus, sector-specific technology is important when explaining this issue. The changing factor content of trade shifted the demand for labor against unskilled U.S. workers and in favor of skilled workers but once again the shift is dominated by the employment effect of domestic use. There is only very limited evidence that technological change has accelerated enough in the past 25 years to induce substantial skilled labor demand. However, a further empirical analysis is needed to assess a possible acceleration in technical change and labor productivity since they are interactive in the sense that technological change and labor productivity go in hand and hand.

Generally, this analysis shows that trade makes a minimal contribution to widening the wage gap between skilled vs. unskilled labor. The more we import textile and leather products, the more unskilled labor is likely to lose employment relative to skilled labor. Conversely, the more we export other services, the more unskilled labor will be employed. So, skilled vs. unskilled labor

use by imports vs. exports could have an offsetting impact on the economy. Furthermore, as indicated above, gains or losses will be sector-specific. Finally, for the five years examined the U.S. experienced negative trade balances. Thus, the effect on both skilled and unskilled labor employment was negative. U.S. employment was mostly generated by nontraded goods, including domestic consumption rather than net trade. So, it is difficult to conclude that trade was a major cause of lost employment for low-skilled workers.

Turning to the possibility that trade has negatively affected the wages of low-skilled workers by lowering the prices of import-competing goods, we find little evidence supporting this view either. No clear pattern emerges between estimated globalization effects and the actual changes in wages during the period 1972-1993 for the industries most affected by import penetration. Thus whether through direct changes in the demand for labor or through indirect price effects, we find little evidence that trade has played a significant role in reducing the wages of low-skilled workers. Further empirical analysis is needed to assess a possible acceleration of the factor-prices are equalization theorem.

VII. References

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Table 1A Top 10 sectors of imports and exports, based on the ent/ettl rankimg							
	imports	esex72q	esim72q	ent72q	edom72q	etotal 72q	ent/etotal
13 Sugarcrp		1.3	-26	-24.7	73.3	48.6	-0.50823
32 SugarPrc		0.9	-17.7	-16.8	50.2	33.4	-0.502994
19	Forestry	1.8	-7.2	-5.4	18.7	13.3	-0.406015
21	Metlmini	18.5	-52.4	-33.9	119	85.1	-0.398355
41	Leather	8.5	-82.1	-73.6	372.8	299.2	-0.245989
23	Crudepet	24.4	-80.2	-55.8	333.1	277.3	-0.201226
11	Treenuts	6.6	-11.4	-4.8	31.7	26.9	-0.178439
52	Metalmft	181.1	-319.1	-138	1366.2	1228.2	-0.11236
14	Miscrops	1.9	-3.5	-1.6	16.2	14.6	-0.109589
40	Apparel	21.8	-180.3	-158.5	1646.9	1488.4	-0.10649
	Subtotal	266.8	-779.9	-513.1	4028.1	3515	-0.145974
	h-skilled	32.8	-86.6	-53.8	381.5	327.7	-0.164175
	m-skilled	31.2	-92.6	-61.4	473.2	411.8	-0.149102
	l-skilled	202.5	-600.7	-398.2	3173.4	2775.2	-0.143485
	ratio (hs/ls)	0.1619753	0.1441651	0.135108	0.1202181	0.1180816	

	exports	esex72q	esim72q	ent72q	edom72q	etotal 72q	ent/etotal
15	Oilcrops	59.9	-6.1	53.8	77.3	131.1	0.4103738
6	Food grn	42.5	-2.6	39.9	67.8	107.7	0.3704735
5	Cotton	39.6	-16.6	23	132.6	155.6	0.1478149
56	Computer	61.4	-28.1	33.3	219.1	252.4	0.1319334
47	Agchemis	3.6	-1.9	1.7	12.7	14.4	0.1180556
33	Oil mill	9	-3.8	5.2	41.3	46.5	0.111828
46	Fertiliz	8.4	-3.8	4.6	38.5	43.1	0.1067285
38	Tobaccom	8.8	-0.9	7.9	67	74.9	0.105474
8	Grasseed	2.3	-1.4	0.9	9.8	10.7	0.0841121
22	Coalmini	25.7	-13.1	12.6	149.7	162.3	0.077634
	Subtotal	261.2	-78.3	182.9	815.8	998.7	0.1831381
	h-skilled	46.3	-18.8	27.5	168.1	195.6	0.140593
	m-skilled	30.1	-10.6	19.5	104.6	124.1	0.1571313
	l-skilled	184.9	-48.7	136.2	543.1	679.3	0.2005005
	ratio(hs/ls)	0.2504056	0.386037	0.201909	0.3095194	0.2879435	
	US Total	3648.6	-3811.8	-163.2	84862.4	84699.2	-0.001927
	h-skilled	632.3	-609.1	23.2	17983.6	18006.8	0.0012884

	m-skilled	1082.7	-915.1	167.6	35633.6	35801.2	0.0046814
	l-skilled	1933.7	-2287.6	-353.9	31245.2	30891.3	-0.011456
	ratio(hs/ls)	0.3269897	0.2662616	-0.065555	0.5755636	0.5829085	
	Subt im/Ttl	0.0731239	0.2046015		0.0474663	0.0414998	
	Subt ex/Ttl	0.0715891	0.0205415		0.0096132	0.0117911	

Table 2. Technology and Globalization Effects on Wage Changes in Industries with Greatest Import Penetration: 1972-1993				
	Technology Effects	Globilization Effects	Wage Change	Globalization's Share of Wage
Sector	(Percent)	(Percent)	(Percent)	(Percent)
13 Sugarcrp	-4.0	43.8	-84.9	-51.6
32 SugarPrc	2.9	51.8	-16.7	-310.2
19 Forestry	16.0	127.7	-23.1	-552.8
21 Metalmini	8.6	9.1	-26.8	-34.0
41 Leather	1.6	80.6	-15.8	-510.1
23 Crudepet	2.9	396.4	94.0	421.7
11 Treenuts	1.4	-2.9	-8.0	36.3
52 Metalmft	2.4	73.8	-11.7	-630.8
14 Miscrops	10.8	-74.8	-63.9	117.1
40 Apparel	-1.0	-6.3	5.6	-112.5
18 Fishing	-2.1	127.7	76.7	166.5
36 Fishsfd	-0.6	39.4	32.1	122.7
49 Petroref	-5.0	200.0	-57.2	-349.7
58 Motoveh	6.7	58.4	-24.4	-239.3
39 Textiles	-5.0	15.6	16.1	96.9
57 Elec equip	1.6	18.2	-17.6	-103.4
56 Computer	11.1	-147.1	-35.5	414.4
61 Other mft	-2.4	69.4	9.0	771.1