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Trade with Low-Wage Countries and Wage Inequality

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I. Introduction

A large body of recent research has uncovered evidence of a decline in real wages of unskilled workers and a widening wage dispersion linked to labor skills in the United States and member countries of the European Union (EU) since, at least the early 1980s. These wage trends are accompanied by a decline in the share of the unskilled and a rise in the share of the skilled workers in total industrial employment. While these facts are generally undisputed, there is considerable disagreement as to their causes. As someone has remarked, the number of probable causes is as large as the number of suspects in the Murder on the Orient Express. Technological dislocations that reduce the demand for and wages of unskilled (or less skilled) workers have long been the prime suspects. But lately there has been a surge of writing on the possible connection between trade and rising inequality. In particular, the increasing trade with low-wage countries, in an implicit Stolper-Samuelson framework, is invoked as one of the major causes.

Most of these studies have employed partial equilibrium approaches. In a recent general equilibrium exercise, Richardson (1995) has shown that of a number of possible causes, all of which affect the production mix, the volume of trade, and other variables, only two of these, namely, the

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3 The decline in the relative position of unskilled and less skilled workers show up differently in the United States than in the EU. In the United States, the real hourly earnings of workers in the bottom decile have fallen rapidly. In the EU, on the other hand, the ratio of the employed to total industrial labor force, as well as hours worked per employee, has fallen. But, as pointed out in Freeman (1994) and Katz and Freeman (1994), the rise in joblessness in the EU is the flip side of the rise in wage inequality in the United States. The two reflect the same general phenomenon of a relative decline in the demand for unskilled labor.

opening of the economy to trade and a relatively faster total factor productivity growth in the investment goods sector can shift relative wages in ways that produce greater inequality.\textsuperscript{5} Richardson's model is useful because it narrows down the range of variables on which attention may be focused.

What has not been addressed to in the literature is that trade policies (protection and subsidies) in response to opening of trade had a significant bearing on sector-specific technological changes which affected employment and wage distribution. This is plausible if protection and lump-sum subsidies promote or accelerate the process of labor-saving technological change in import-stressed sectors and thereby cause a fall in the demand for unskilled labor. Berman, Bound and Griliches (1994) and others have highlighted the importance of technological change in all industries, including those intensive in the use of unskilled labor, during the 1979-89 period. Also, Sachs and Shatz (1994) report that during the 1978-89 period the rate of growth of total factor productivity in sectors of lower skill-intensity was higher than in sectors of higher skill-intensity. They do not explore the question further, but it is plausible that the productivity differentials they have observed could have been, at least partly, the result of trade policies themselves that induced distressed industries to restructure in a particular way.

The notion of trade "opening" itself needs to be looked at more realistically than is the case in many studies that purport to link trade with rising inequality. It is well-known that industrial country imports from low-wage countries are subject to substantially higher than average tariffs and quantitative limits from QRs and VERs. Furthermore, trade restrictions on imports from low-wage countries have the same duration as trade liberalization itself. In other words, trade barriers emerged as soon as low-wage imports started to put pressure on domestic import-competing industries. What is less known is that industrial country protection from low-wage imports has been supplemented since late 1970s with direct government subsidies to increase investment and productivity in labor-intensive industries. Any analysis linking trade with low-wage countries to rising wage inequality that is unable to control for the effect of trade barriers and subsidies misses important aspects of the problem.

The purpose of this paper is to introduce into the discussion the role protection and subsidies have played in inducing skill-augmenting technological developments in import-affected sectors and, hence, in reducing the demand for unskilled labor. The role of trade policy seems important in this connection because it combines the effect of trade opening with the effect of sectoral growth in productivity as an explanation of both unemployment of the unskilled and the widening wage dispersion.

\textsuperscript{5}According to Richardson (1995), only the variable rate sectoral growth in total factor productivity can cause a shift in relative wages, while factor-augmenting technological change has no effect.
The rest of the paper is organized as follows. Section II discusses the interaction of the opening of trade with factor use and wages in the absence of trade barriers. Wage and employment effects of trade barriers and subsidies are analyzed in Section III. Section IV discusses subsidy-led technological changes and their effects on employment and wage distribution. A final section offers some conclusions.

II. Trade, Factor Use, and Wages

The discussion in this paper revolves around a basic two-sector general equilibrium model that allows us to establish a unique relationship between trade, goods and factor prices, production patterns, and wages. While the model is clearly a simplification, it, nevertheless, is a useful framework to introduce discussion of some pertinent issues. The model underlines the way in which trade policies and direct subsidization of import-stressed industries can cause structural dislocations in factor use and affect employment and wage distribution.

A graphical version of the model is presented in Figure 1 (see appendix). The two production sectors which use two kinds of labor (shown on the axes) are (a) a sector producing a good intensive in the use of unskilled labor, uL, which bears the brunt of import competition from low-wage producers of the good abroad; and (b) another sector producing a good intensive in the use of a composite factor of skilled labor and capital, sL, which for the sake of simplicity are lumped together. Production functions are characterized by constant returns to scale.

The tangency of the pre-trade factor price ratio $F_1$ (the ratio of the two wage rates) with isoquants of the two goods (not shown in the diagram) determines the relative average factor-intensity of the two sectors as $R_1^x$ and $R_1^y$. The initial production equilibria and the allocation of unskilled and skilled labor (jointly with capital) can be determined by means of vector addition from the employment point E. These are shown as $q_1^x$ and $q_1^y$ for the uL and sL sectors, respectively.

Now, suppose that trade opening leads to a fall in the relative price of the uL-good in the domestic market. The change in terms of trade will lower the wage rate of unskilled labor with a "magnified" effect, in accordance with the Stolper-Samuelson theorem. The socially efficient outcome involves a transfer of labor from the uL-sector which shrinks and an increased production in the sL-sector. The long-run equilibria are shown at $q_2^x$ and $q_2^y$, with optimal factor relations given by rays $R_2^x$ and $R_2^y$ for uL and sL sectors, respectively. The changes in factor-intensity are in line with the falling real wage of unskilled labor.

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6Skilled labor and capital in this model are treated as complements. But they are jointly substitutable with unskilled labor in both sectors.
In the short run, unemployment of the unskilled labor (and possibly of the skilled as well) will result and may persist in a cyclical fashion throughout the adjustment to the long run. These hindrances would be more pronounced if both kinds of labor were "specific" to their initial employment. These sort of short-run effects on employment and earnings are probably what is captured in studies by Haveman (1993) and Kletzer (1994) from the U.S. Displaced Workers Survey for the years 1981-89.

But the incipient change in the goods price ratio can be negated by means of tariffs and quantity limitations on imports. If so, the one-to-one correspondence between goods and factor prices breaks down, and the connection between trade liberalization and wage inequality becomes tenuous. If domestic prices do not fall, any observed increase in the volume of imports or in trade deficit is not sufficient to depress the real wage of the unskilled. Increases in the volume of imports in a dynamic setting can arise from the growth of domestic demand (a right-ward shift in the demand schedule) and the unwillingness of the domestic industry to increase production. The initial fall in prices, if not offset by trade barriers, can cause wage inequalities, but a continuing rise in inequality requires a continuing fall in prices. This is a basic problem with all current studies using the implicit Stolper-Samuelson framework to link trade with inequality.

Bhagwati and Dehejia (1994) and Bhagwati (1995) have rightly stressed that arguments linking the fall in real wages to opening of trade require for their validity a fall in domestic prices of goods intensive in the use of unskilled labor. It is well-known that trade barriers can prevent a fall in the price of import-competing goods and may even increase it. The tendency of domestic prices to rise is almost certain in sectors subject to QRs and VERs, such as textiles, clothing, and footwear, where quality upgrading and higher export prices are a common observation.

Available empirical evidence suggests that domestic prices of labor-intensive goods have, in fact, risen as a result of protection. Hufbauer, Berliner and Elliott (1986, table 1.1, p. 3-5) provide detailed data on changes in U.S. prices of import-competing goods induced by tariffs or tariff-equivalents of "special protection" for 31 U.S. industries. The "coefficient of price response", i.e., the ratio of induced increase in the domestic price to the tariff-equivalent rate of protection, is positive for all 31 sectors, and ranges between 0.3 and 0.8. To take one example, the coefficient for textiles and clothing is 0.7, and the induced increase in domestic price is estimated to range between 16 and 24 per cent during different phases of the MultiFiber Arrangement (MFA). More recently, Lawrence and Slaughter (1994) and Krugman and Lawrence (1994) have observed that prices of goods intensive in the use of unskilled labor have either not fallen or have moved in the opposite direction.

\[\text{The dynamics of adjustment to the long-run are not explored in this paper. A recent discussion is available in Richardson (1995).}\]

\[\text{This estimate is remarkably different from the working assumption in Leamer (1995) which has falling textile and apparel prices.}\]
In the light of contrary information on prices, it is misleading to argue that any observed inequalities in wages are caused by trade with low-wage countries. Correlations between rising imports and falling earnings do not denote causality. Wages of the unskilled could still fall in a bowdlerized version of Stolper-Samuelson of which the possibility has been raised by Freeman (1995). Workers threatened by import penetration may agree to take a wage cut in order to keep imports out. In an indirect manner, unemployment and a fall in wages of the unskilled may also result from protection and subsidies, as we discuss below.

III. Trade Barriers, Subsidies, and Technology

Trade barriers provide substantial incentives for productivity-enhancing investment by ensuring a protected market and higher prices. In practice, however, there are behavioral constraints that may blunt these incentives. Firms are unlikely to undertake costly investment in production facilities if the tariff-induced price increase is perceived as transitory and of an uncertain life. To the risk attendant on any investment must now be added the additional risk of withdrawal of protection without which higher domestic prices cannot be sustained. Trade barriers are seen by the industry as inherently uncertain, being subject to vicissitudes of political market and international pressure, even though ex post protection has had a long duration in a number of sectors. This is probably the reason why high and prolonged trade barriers have failed to generate anything more than a modest investment activity in protected industries. Nonetheless, trade barriers are often used to coax the industry to reinvest its cash flow in upgrading production equipment.

By contrast, when firms are given lump-sum investment subsidies the uncertainties characteristics of trade barriers are eliminated altogether. A subsidy raises investment and output directly by financing or otherwise underwriting the investment, while trade barriers rely on raising investment indirectly by raising the profitability of production. Industrial countries have responded to import penetration from low-wage countries with a bewildering array of subsidies and other government aids to assist beleaguered domestic industries. Trade-related subsidies mushroomed in all industrial countries since late 1970s, with the U.S. ratio of subsidies to GDP being consistently the lowest of all industrial countries (Hufbauer and Erb 1994). Milner (1988) points out that government aids to industry, over and above high trade barriers, in individual EU countries arose initially to foster

9Detailed case studies of protected industries in the U.S. has led the Congressional Budget Office (1986) to conclude that high tariffs, VERs, and trigger price mechanism did not lead to more than a modest increase in investment.

10Under the U.S. Trade and Tariff Act of 1974, compulsory reinvestment programs were either directly financed or forced upon the industry as the "price" for granting "special" protection.

exports to each other before being directed exclusively to deal with rising levels of imports from poor
countries. The subsidies were justified as being necessary to mitigate pressure for further protection.

A common form of trade-related subsidy was the financing of capital expenditures in
industries with a deteriorating international trade position, as manifested in rising import levels and a
declining market share. Their purposes were variously described as "restructuring", "rejuvenation",
and "conquering the domestic market". The strategies themselves were an eclectic mixture of
investment in new and improved capital equipment, mechanization of labor-intensive segments,
computer-assisted design and manufacturing, new production processes - all with a bias toward
saving unskilled labor. Capital subsidies were, therefore, effectively a subsidy on employment of
skilled labor and leaned toward relatively capital-intensive operations. The rise in investment was
accompanied by mergers and acquisitions which raised industry concentration ratios in most
decreasing industries. At the same time, product-mix was shifting toward higher end of the market.

What lies behind the capital subsidies is the widespread perception that a large part of the
distress in labor-intensive industries in industrial countries is caused by lower-cost labor abroad which
needs to be offset by sufficiently large increases in labor productivity and technological innovations.
The underlying presumption shared by industry and governments was that the loss of international
competitiveness in many import-competing industries arose from past failures to invest in modern
equipment and technology. Productivity-enhancing investment, it was argued, would make the
production of labor-intensive goods feasible in high-wage countries.

IV. Subsidies, Factor Use, and Wages

Public subsidies (combined with trade barriers) that promote skill-biased technological
changes lead to structural dislocations that change relative productivities and earnings. They can
lead to both labor-shedding and lower wages of the unskilled. Reverting to Figure 1, a subsidy for
the use of skilled labor and capital in the uL-intensive sector results in a new factor-intensity ray
given by $R_3^+$ ($OR_3^+$ intersects the line segment $Eq_2^+$ at the vortex of $q_1^+$ with the horizontal axis). The
resulting allocation of factors corresponds to points $q_3^x$ and $q_3^y$. The uL-intensive sector becomes
relatively more intensive in the use of skilled labor in comparison with its factor-intensity before
opening of trade.

It is clear from the diagram that the post-subsidy equilibrium output of uL-intensive sector still
contracts, relative to the one before the change in terms of trade, while that of the sL-intensive sector
expands, and the direction of adjustment is, at best, correct. But there are significant implications for
employment, wages, and inequality. Capital subsidy has caused a fall in employment of unskilled
labor in excess of trade barriers which could have stabilized it at $q_1^+$. Measuring vertically, the fall in
unskilled labor employment is equal to the line segment $q_1^+q_3^+$. It is easy to see that unemployment
of the unskilled would be higher with a higher capital subsidy, i.e., a clockwise rotation of the $R_3^+$ ray.
Moreover, if the factor substitution process is accompanied by a rise in total factor productivity (a
downward shift of the isoquant with or without a skewness toward skilled labor) further unemployment would result.

Subsidized new investment has resulted in a marked increase in labor productivity in nearly all labor-intensive industries (particularly in textiles and clothing) - a conclusion shared by all industry analysts. There is probably also an increase in total factor productivity as a result of technological innovations, although the empirical evidence on this is sparse. But there is little doubt that while industries were shedding unskilled labor political support for continuing protection and further subsidies was garnered on grounds of preventing unemployment.

A detailed discussion of measurement of wage inequality is outside the scope of this paper. The change in the overall pattern of distribution of income over any given period is determined by changes in the structure of production and its interaction with institutional factors. It was argued in this paper that government policies to deal with import competition from low-wage countries have brought about certain dislocations in the pattern of production. These have definite implications for the distribution of income. Unskilled workers are clearly significant losers from technological changes in import-affected industries. By the same token, factor prices were nudged in favor of skilled workers. But there is no "magnification" effect here, since factor-price changes are not generated by goods-price changes. So, factor price effects are likely to be small. The fall in wages of the unskilled most likely worsened the distribution of income; the slope of the tangent from the origin of the Lorenz Curve would become flatter. To the extent that uL-intensive industries are concentrated in particular regions and metropolitan areas, the resulting inequality would have a geographic dimension as well.

The effects on wage dispersion are, however, not so straight-forward and would depend on indices used to measure them. The wage dispersion within the uL sector would clearly increase as a result of a rise in the wages of skilled workers. But, since the uL sector is protected by trade barriers profitability in the sector increases and with it the average wage. This would tend to reduce the wage disparity vis-a-vis the sL sector and may be seen to improve the overall distribution. On the other hand, since all available evidence points to a rapid rise in wages of skilled workers in the sL-intensive sectors, the wage dispersion between the two sectors may, nevertheless, increase despite the rise in average wage in the uL sector. It is also possible that rising productivity in the uL sector may not lead to rising wages due to comparatively lower union density and weaker bargaining mechanisms.

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12 These developments are extensively reported in trade magazines and other specialized sources. In all 31 studies included in Hufbauer, Berliner and Elliott (1986) protection and subsidies were accompanied by productivity-enhancing technological changes in labor-intensive sectors.

13 However, see Sachs and Shatz (1994) for some limited evidence.

14 When a typical chief executive officer of a large U.S. firm earns 190 times as much as a typical worker did it is clear that productivity differentials alone are a poor guide to explain distribution of income.
Furthermore, the distinction between the short and the long runs may bedevil the analysis. While the promotion of skill-intensive segments in import-competing industries may have led to greater income inequality, this also leads the transition toward a general improvement in productivity and a rise in living standards across all sectors. It is not clear whether the cause of income equality would have been better served by perpetuation of low-wage employment. The maintenance of low-paying employment may have an initial equalizing effect on income distribution, but the second round effect may well be negative from the standpoint of increasing productivity and living standards. In today’s world it is difficult to conceive of viable economic growth and a continuing rise in living standards without an active role for technological changes that may in the short run increase earnings disparity. Trade plays a comparably benign role. What the international experience suggests is that the growth of trade, despite problems of short-run adjustment, may well by compatible with a more equitable distribution of income.

**Concluding Comments**

This paper has attempted a reexamination of the link between trade liberalization with low-wage countries and growing wage inequality in industrial countries. Our analysis suggests that this link is, at best, tenuous since none of the papers is able to demonstrate convincingly that domestic prices of goods that directly compete with low-wage imports have fallen. In fact, the evidence for the opposite tendency, i.e., of rising prices, is generally stronger. This is very simply due to the fact that imports from low-wage countries have been subject to high and prolonged trade barriers.

In any event, trade with low-wage countries and rising wage inequality is consistent with a number of different hypotheses. We may mention two here. First, the wage disparities that researchers have discovered are equally likely the result of policies that have frozen resources in the least promising industries that do not draw on the comparative strength of labor force in industrial countries. Second, an equally plausible hypothesis is that growing trade with low-wage countries may well have contributed to wage dispersion since industrial country exports to these countries are skill-intensive and those industries pay higher wages.

It was shown in this paper that the influence of technological changes induced by subsidies on factor prices and wages appears to be much more critical. The sole purpose of investment subsidies was to raise productivity of labor in an attempt to compete with low-wage imports. The resulting changes in factor proportions appear to be the cause both of unemployment of the unskilled and of a widening wage distribution. Trade with low-wage countries has undoubtedly caused dislocations in goods and factor markets in certain import-competing industries but technology alone is the decisive factor in wage inequality.
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