

**ADJUSTMENT TO TRADE POLICY
IN DEVELOPING COUNTRIES**

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1 INTRODUCTION

How do developing countries adjust to changes in trade policy? Until the last decade, most trade economists would probably have used the Heckscher-Ohlin (HO) model, or some variant of it, to answer the question.¹ The thinking was that trade by developing countries was largely based on their comparative advantage in industries that were intensive in the use unskilled labor, agricultural land, or supplies of natural resources. Models of intraindustry trade were viewed as best suited for analyzing trade among developed countries. Developments in both empirical and theoretical research suggest that factor proportions alone are insufficient to understand how a developing economy will respond to trade liberalization at home or abroad.

On the empirical side, the Stolper-Samuelson Theorem, which uses HO logic to predict how changes in goods prices will affect factor prices, has not found much empirical support (Goldberg and Pavcnik, 2007). Applying a simple HO model implies that trade liberalization will tend to reduce income inequality in developing countries, as factors move into labor intensive industries, causing the relative demand for and income of capital or skilled labor to decline. In fact, trade liberalization is often accompanied by an *increase* in the relative demand for skill and a *rise* in wage inequality (Feenstra and Hanson, 2003). Another important development in the literature is recognition of significant differences between exporting and non-exporting firms, as well as between multinational and domestic enterprises. Relative to firms that sell solely on the domestic market, exporters tend to be larger, more skill intensive, more capital intensive, and more productive, and to pay higher wages (Bernard, Redding and Schott, 2007), a finding that

¹ See, for instance, Hanson's (2004) discussion of literature on the analysis of trade reform in Mexico.

holds in both developed and developing economies (Tybout, 2003). Multinational firms are larger and more productive, still. When trade barriers fall, exporters expand at the expense of smaller, less skill and capital intensive domestic establishments. The HO model is silent about why firms differ, ascribing them little role in adjustment.

On the theory side, perhaps the most influential development in trade during the last two decades has been the framework put forth by Melitz (2003), which explicitly allows for firms to be heterogeneous in terms of their productivity and makes fixed costs of exporting central to international commerce. The Melitz model accounts for why exporters are better than non-exporters along most performance dimensions and explains why average industry productivity rises as trade barriers fall. Building on the earlier empirical literature which documented the effects of trade liberalization on industrial productivity, the Melitz model has helped place firms at the center of analysis of how an economy adjusts to changes in trade barriers.

Trade economists now appreciate that the world is more complicated – and more interesting – than the textbook HO model would imply. As a result, the task of empirically identifying the mechanisms through which trade affects wages, employment and industry structure is commensurately more challenging.

In this paper, I review recent empirical research on trade policy in developing economies. Along the way, I also address relevant theoretical research, which provides context for findings that are hard to reconcile with classical trade theory. I organize the discussion around three topics: how trade affects firms and industries, how trade affects wages and employment, and how trade affects incomes and poverty. I will address mainly trade reform in manufacturing, which has been the focus of the literature.

2 TRADE AND FIRMS

In the Melitz model, a reduction in tariffs or other variable trade costs changes the composition of firms within an industry. Given fixed costs to exporting, only more productive firms find it profitable to export. Less productive firms sell exclusively on the domestic market (or not at all). If barriers to selling goods abroad fall – due, say, to bilateral or multilateral trade liberalization – more productive firms expand their production, as firms that were already exporting increase their sales abroad and new firms, which were not quite productive enough to break into foreign markets before, begin to export. The expansion of more productive firms comes at the expense of less productive establishments, some of which are forced to exit production. These changes in the composition of firms cause average industry productivity to rise.

There is substantial empirical literature that documents a correlation between industry productivity and trade barriers, in a manner consistent with Melitz (with much of this work *preceding* Melitz's theoretical analysis). Harrison's (1994) and Levinsohn's (1993) classic studies of Cote d'Ivoire and Turkey, respectively, were the first to find such a relationship. In more recent work, Pavcnik (2002) found that during Chile's trade liberalization in the 1970s and 1980s aggregate productivity rose in manufacturing, due in part to the reallocation of resources from less productive to more productive plants. Muendler (2008) found similar evidence for Brazil, where falling trade barriers raised the probability of exit for less productive firms and led to higher plant and industry level efficiency. These studies are emblematic of a larger literature on episodes of trade reform in developing countries, which tend to find a negative correlation between trade barriers and productivity for both plants and industries. Tybout (2002) contains a

detailed review of this work, concluding that there is a robust positive correlation between industry productivity and trade reform. The mechanisms underlying the correlation include resource reallocation from less to more productive plants (consistent with Melitz) and productivity improvements within plants (whose source is not well understood). There is also evidence that a reduction of trade barriers is followed by a fall in markups charged by firms and lower dispersion in productivity across firms.

What is notable about the mechanisms described in the literature is that they involve a reallocation of resources *within* industries, a finding documented using plant level data for several countries in Latin America by Haltiwanger, Kugler, Kugler, Micco and Pages (2004). Absent are the between industry employment shifts induced by trade, which are important for the Stolper-Samuelson Theorem. In Mexico, for instance, Revenga (1997) found little evidence of between sector employment shifts in manufacturing, following the country's 1980s trade reform. Pavcnik and Goldberg's (2007) survey of how developing countries respond to globalization cited few studies that emphasize the movement of resources from import-competing industries to export-oriented industries. A simple explanation is that specialization occurs not across industries but within industries. Schott (2004) found that even within very narrow product categories (10 digit Harmonized System level) the US imports goods from both high wage and low wage countries. Within individual categories, unit values for goods from high wage countries are substantially higher than unit values for goods from low wage countries, suggesting that products are differentiated by quality and that countries specialize within product categories according to quality.

While some of the factors released by less productive firms are absorbed by more

productive firms in the same industry, other factors may leave manufacturing altogether. A common perception in the popular press is that trade reform is associated with growth in the size of the informal sector. However, empirical evidence on the relationship between trade and informality is mixed. For Brazil and Colombia, Goldberg and Pavcnik (2003) found no evidence of a long run expansion in the informal sector after a fall in trade barriers. In more recent work on Brazil, Menezes-Filho and Muendler (2008) found that workers leaving formal manufacturing sectors in response to reduced trade barriers often moved to the informal sector. Whether these workers tend to take up jobs in informal manufacturing shops or informal service establishments is unknown.

For firms, trade does more than change the opportunity to sell abroad and the intensity of import competition from foreign rivals; it also improves access to imported inputs, thereby enhancing efficiency. Greater product variety can be an important source of welfare gains. For consumers, Broda and Weinstein (2006) have documented that the United States enjoys substantial welfare gains from the increase in imported product varieties and an associated reduction in effective consumer prices. For firms, a related set of gains appear to exist. In India, Goldberg, Khandelwal, Pavcnik, and Topalova (2008), found that lower tariffs in imported inputs led to an increase in the variety of inputs available on the Indian market, which in turn lowered effective input prices for firms. Here again, the evidence on the effects of trade is mixed. Using data for Brazil, Muendler (2008) takes a different approach, examining whether plant productivity is associated with access to foreign inputs. He found that the effect, while present, accounts for only a small part of the post trade reform growth in Brazilian productivity.

Increased trade in intermediate inputs has other important affects on industrial

structure. Input trade arises in part because of global production networks, in which multinational firms divide the manufacturing process into stages and locate each stage in the country where it can be performed at least cost (Feenstra and Hanson, 2003). The expansion of US owned *maquiladoras* (export assembly plants) in Mexico (Feenstra and Hanson, 1997), Hong Kong export processing establishments in China (Hsieh and Woo, 2005), Japanese assembly plants in Southeast Asia (Head and Ries, 2002), and European subcontractors in Eastern Europe (Marin, 2008) are all examples of the global fragmentation of manufacturing. Skill and capital intensive stages of production remain in high wage countries, while labor intensive stages move to low wage countries. Global production networks appear to be based on comparative advantage, but in an environment of extreme specialization. In the HO model, extreme specialization arises only with the absence of factor price equalization. While the lack of FPE may seem a natural assumption to make for the analysis of trade between developed and developing economies, it is only recently that trade economists have begun to apply empirically extensions of the HO model that allow for unequal factor prices.

Feenstra and Hanson (1997) provide a model of the globalization of production in which firms in a skill-abundant North use firms in a nonskill-abundant South to produce intermediate inputs. Assuming wages differ between nations, the North specializes in high-skill tasks and the South specializes in low-skill tasks. While a reduction in trade barriers has effects qualitatively similar to the Stolper-Samuelson theorem, the movement of capital or the transfer of technology from North to South has effects that are quite different. If Northern firms use foreign direct investment to move production to the South, they will logically choose to move the least skill-intensive activities that they

perform. By moving these activities to the South, the average skill intensity of production *rises* in the North. The same also happens in the South, since the South initially specializes in the least skilled tasks. When the North “offshores” production to the South, it turns out that the relative demand for high-skilled workers rises in *both* countries. Naturally, trade costs determine the magnitude of offshoring from North to South. For data on US multinational firms, Hanson, Mataloni and Slaughter (2005) found that exports of intermediate inputs to their foreign affiliates for further processing is strongly negatively correlated with tariffs and shipping costs.

In the next section, I discuss the implications of offshoring for wages. In the remainder of this section, I focus on what offshoring means for how Northern and Southern firms adjust to changes in macroeconomic conditions. If we assume that the skill intensive tasks performed in the North include fixed cost activities, such as management, research and development, and marketing, while the tasks performed in the South involve only variable cost production activities, offshoring will alter the relative volatility of output in the two countries. Bergin, Feenstra, and Hanson (2009a) showed theoretically that a shock to, say, demand in the North will lead to greater changes in employment in the South, meaning that offshoring is associated with the South having higher volatility. Suppose the North has a positive demand shock, which causes local production and wages to expand. With higher wages in the North, Northern firms that previously did not offshore any production to the South now find it profitable to do so. Adjustment in the extensive margin of offshoring transmits the shock to the South in a powerful manner, such that employment volatility is higher in the South than in the North. Bergin, Feenstra, and Hanson (2009b) documented that employment volatility for

maquiladoras in Mexico is greater than for the corresponding manufacturing industries in the US, even after controlling for overall differences in the volatility of industrial production between the two countries. Through offshoring, shocks to US manufacturing have a disproportionately large effect on Mexico.

3 TRADE AND WAGES

In developing countries, falling trade barriers are associated with the exit of less productive firms, rising average industry productivity, greater fragmentation of production, greater volatility of employment, and possibly more informality. What do these changes mean for wages of developing country workers? One downside of the failure of the simple HO model is that few alternative models give much in the way of general results about how trade shocks affect wages. Theoretically, a wide range of outcomes are possible; empirically, a wide range of outcomes have been observed. Rather than attempting to catalogue all of these outcomes, I focus on those that are most relevant to our discussion.

It is perhaps useful to begin with what we *don't* know. One may expect that changes in the composition of firms due to trade liberalization would affect the level and structure of wages. However, there has been little connection between the theoretical literature on firm heterogeneity and the empirical literature on trade and wages. What might we expect to happen? As less productive and skill intensive firms exit production and more productive and skill intensive firms expand, workers who lose their jobs may see a drop in their earning power associated with the destruction of firm specific human capital. In data for Mexico in the 1980s, Revenga (1997) found that wages for

manufacturing workers are positively correlated with industry tariffs. As industry tariffs fall, industry wage premia do, as well. Attanasio, Goldberg, and Pavcnik. (2004a) found similar evidence for Colombia; however, in a separate paper on Brazil (Attanasio, Goldberg, and Pavcnik, 2004b) they found no evidence of changes in industry wage premia after trade reform. In the instances where it does occur, declining industry average wages could reflect dislocation effects by workers in the industry or the loss of rents, both of which could result from a decline in trade protection.

The expansion of more efficient, skill intensive plants may increase the relative demand for skilled labor. Theoretical research has only recently begun to address the issue. Helpman, Itskhoki, and Redding (2008) developed a model in which trade can lead to higher wage inequality and greater unemployment in *all* economies (when moving from autarky to free trade). Their framework depends on firms being imperfectly informed about worker ability and there being costly matching of workers to firms, which together generate *residual* wage inequality that increases as more productive firms increase their market share following trade reform. In Indonesia, Amiti and Davis (2008) found that after trade reform average wages fell in import competing industries and rose in exporting industries, which they suggest is consistent with firm heterogeneity. Their results, however, depend on firms setting wages according to a “fairness” principle, which is untested. The bottom line is that we have strong reason to expect that firm heterogeneity will mediate the impact of trade shocks on wages but we do not yet know which mechanisms for transmission of the shocks are most relevant empirically.

There has been considerably more research on how the global fragmentation of production affects the wage structure (see the survey in Feenstra and Hanson, 2003).

Mexico's 1980s trade reform also liberalized foreign investment, which was followed by an increase in the relative wage of skilled labor (Hanson and Harrison, 1999). FDI in Mexican manufacturing was concentrated in maquiladoras, many of which were created by US firms moving unskilled-labor intensive production activities to Mexico. Feenstra and Hanson (1997) found that the shift in Mexican manufacturing toward export assembly plants can account for nearly half of the observed increase in the country's demand for skilled labor (nonproduction workers). Hsieh and Woo (2005) documented a similar phenomenon in Hong Kong and China. As Hong Kong moved labor-intensive production activities to China in the 1980s and 1990s, the country saw an increase in the relative demand for skill. Across Hong Kong manufacturing industries, Hsieh and Woo (2005) found a positive correlation between the nonproduction wage share and imports from China, which accounted for over half of the increase in the relative demand for skilled workers that occurred in Hong Kong over the period.

In Mexico, the effects of FDI on the wage structure appear to differ from those of tariff changes. Chiquiar (2008) found that during the 1990s, when the North American Free Trade Agreement was implemented, regions of Mexico closer to the United States enjoyed higher wage growth and a decline in the return to schooling, meaning wage inequality fell within these regions. In theory, as shown by Feenstra and Hanson (1997), it is possible for FDI and tariff reductions to affect wage inequality in an opposing manner. In related work, Hanson (2007) found that regions of Mexico with more initial FDI, more initial trade with the US, and greater emigration opportunities to the US enjoyed higher wage growth during the 1990s.

In the developing countries examined by Goldberg and Pavcnik (2007) –

Argentina, Brazil, Chile, Colombia, Hong Kong, India, and Mexico – all experienced an increase in wage inequality during the 1980s and 1990s. Which of these experiences can be explained by trade? While offshoring appears important in Hong Kong and Mexico, it has little relevance for labor market outcomes in the other countries, owing to the fact that they do not participate very extensively in global production networks. It appears that for these countries Stolper Samuelson effects are not present (given wage inequality rises following trade reform). Work by Pavcnik (2003) and Muendler (2008) suggests that imported intermediate inputs and skill biased technical change are also unimportant. The literature has done an admirable job of ruling out explanations for how trade affects wages, but, beyond the countries engaged in global production networks, has not provided strong evidence of a link between wage inequality and trade.

Verhoogen (2008) suggests one alternative mechanism linking trade and wages is that greater openness leads firms to improve the quality of goods they produce, which in turns requires them to upgrade the skill level of their workforce, leading to an increase in the demand for skill and greater wage inequality. He found evidence consistent with this story in Mexico during adjustment to the 1994-95 devaluation of the peso. Kugler and Verhoogen (2009) presented similar evidence for Colombia. Related to the logic of Helpman, Itskhoki, and Redding (2008) (whose work emphasizes sorting of workers by ability rather than quality differences across firms) it is changes inside firms and industries induced by trade reform that lead to wages in the wage structure. This line of work, while intriguing, is still limited to a handful of countries.

In many developing countries, wage inequality rose following periods of trade liberalization (and other economic reforms). While there is evidence in support of

particular hypotheses (offshoring, quality upgrading) in particular countries (Colombia, Mexico, Hong Kong), in most developing economies there is no clear empirical relationship between greater economic openness and the structure of wages.

4 TRADE, INCOME AND POVERTY

Beyond concerns about whether trade increases the dispersion of wages, how does it affect income levels? Trade changes household well being through its impact on wages and goods prices. Identifying the impact of trade on household income thus requires estimating its effects on these price outcomes. Even if trade increases wage inequality, it could still lead to an increase in average incomes and even in incomes of the poor. Is there evidence that trade raises living standards in developing countries?

In one of the few studies to take a general equilibrium approach to trade and living standards, Porto (2006) examined the effect of Argentina's trade reform on household welfare. Trade barriers affect households through their effect on the relative prices of goods, which in turn affect labor income and consumption. Households differ in terms of their consumption patterns and level of educational attainment, meaning that price changes will have differential impacts across families. Porto's approach involves estimating the impact of trade policy changes on goods prices, estimating how changes in goods prices affect wages, and then simulating changes in household welfare, given data on the tariff reductions associated with Argentina's entry into Mercosur and household budget shares and factor supplies. Compared to rich households, poor households spend a higher share of their budget on food and other basic items and have low schooling. Porto found that tariff cuts related to Mercosur led to an increase in the prices of goods

intensive in low skill labor, such as food and beverages, to which poor households allocated more of their spending. He also found that the relative price fell for non-traded goods, such as health, education, and leisure goods, to which rich households allocate more of their spending. Together, these results imply Mercosur's tariff cuts were associated with a rise in the inequality of household welfare in Argentina.

In related work, Nicita (2004) extended Porto's framework to Mexico. He found that during the 1990's, tariff changes in Mexico led to an increase in real disposable income for all households, with richer households seeing a 6% increase and poorer households seeing a 2% increase. As a consequence of these income gains, there was a 3% reduction in the number of households in poverty. While Mexico's tariff cuts appeared to lower poverty, it also appeared to increase inequality in income.

Taking a reduced form approach, Topalova (2004) examined the differential exposure of Indian districts to trade liberalization to identify the effects of trade on poverty. Over the period she studied, poverty rates were falling sharply throughout India (the reasons for which her approach cannot address). She found that districts more exposed to trade reform had smaller decreases in poverty; her results on inequality not precisely estimated. We again see examples of trade having different effects in different countries. In one country trade appears to reduce poverty (Mexico), while in another it appears to slow its decrease (India). Porto's (2006), Nicita's (2004), and Topalova's (2004) is notable for using consumption based measures of well being to examine the effects of trade reform, rather than much of the rest of the literature, which focuses on wages, whose relation to welfare is less clear cut.

5 DISCUSSION

During the last decade and a half, there has been an explosion in research on how changes in trade policy affect developing countries. While there are a number of robust findings in the literature, the mechanisms behind many of the outcomes are not well understood. Following the liberalization of trade, less productive firms become more likely to exit production, average industry productivity rises, and firms increase the fragmentation of production across borders. The literature is just beginning to assess how the impact of trade on firm and industry productivity translates into changes in wage and employment outcomes in an economy. Recent evidence suggests that the fragmentation of production is associated with greater employment volatility. Interestingly, changes in industry productivity are largely associated with the reallocation of resources among firms within a sector. Between sector employment shifts do not appear to be a general outcome of trade reform, though in some instances post trade reform churning in the distribution of firms has been associated with greater informality.

In Latin America and some parts of Asia, greater economic openness has come with increases in the dispersion of wages and income. While the coincidence of these outcomes is well established, identifying the channels through which trade affects wages has proven to be more difficult. In some instances, greater wage inequality appears to be a result of developed country firms outsourcing production to developing country establishments or developing country firms upgrading the quality of output they produce. However, the empirical relevance of these mechanisms is much stronger in some countries (Colombia, Mexico, Hong Kong) than in others (Argentina, Brazil, Chile, India). There are not general empirical results on how trade affects the structure of wages

in developing countries, which may be due to the wide variation across countries in industry structures, resource supplies, and reform episodes. Because trade does not have a uniform affect on wages, it does not have a uniform affect on household incomes and poverty, either. The impact of trade on poverty depends on how falling trade barriers affect the relative prices of goods consumed by the poor and the demand for factors controlled by poor households. In some countries, trade reform appears to have triggered price changes that help poor households, which in others it has not. While one may want the literature to offer more conclusive results, the data seem unwilling to cooperate.

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