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**RESPONSES TO TRADE OPENING:
EVIDENCE AND LESSONS FROM ASIA**

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Abstract

In various Asian countries, international trade has raised productivity, lowered markups through import competition (while increasing them through cheaper inputs that can be imported), raised wages, expanded employment, and, above all, reduced poverty. This is in sharp contrast to the impact of trade in some of the Latin American countries, which suggests exercising caution in extrapolating results to Asian countries that have not yet been studied. There are also a few adverse consequences of trade that have already been found for Asia. Apart from raising inequality, trade can increase informality, especially in the presence of labor-market rigidities. Additionally, there are the adverse effects stemming from trade adjustment as a result of worker mobility costs. In this context, this study discusses various policies that researchers have recommended.

JEL Classification: F10, F13

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1. INTRODUCTION

Over the last three decades, several developing countries have liberalized their trade regimes. This may have happened either due partially to conditionalities imposed by international organizations like the International Monetary Fund in response to emergency requests for loans (e.g., India) or due to a country's accession to the WTO (e.g., Indonesia). In many cases, the reforms may have stemmed from a country's own disappointment with its growth performance during its import substitution phase. While movement towards free trade is expected to expand the size of the overall pie, such changes always produce both losers and winners. In fact, it is this creation of winners and losers, along with "individual-specific uncertainty" (Fernandez and Rodrik 1991) about who benefits and who loses from reforms, that has led to the delays in trade reforms, appropriately called "status quo bias."

Guided by theoretical work, a large number of empirical papers focus on identifying the losing and winning sections of society from these reforms and even quantifying the impact of these reforms on the various economic classes, such as the poor relative to the rich and unskilled relative to skilled workers. While there certainly will be winners and losers, who exactly they will be also matters. If the rich benefit and the poor lose, then, despite economic growth, there will be a new situation with higher poverty and inequality. This does not necessarily mean that countries should not open up to trade. It only means that they will have to have social protection schemes in place at the time of trade reforms. Of course, if the incomes of the poor grow along with the overall economic growth brought about by trade opening, then trade reforms will be highly desirable. Even in these situations, social protection and redistributive policies might be necessary to maximize the progress in poverty reduction and minimize any possible increase in inequality.

As will be apparent from the evidence reviewed in this paper, researchers associate trade liberalization with poverty reduction in Asia. This has probably happened through economic growth. At the same time, they also sometimes and in some countries see a rise in inequality. In the case of the People's Republic of China (PRC), there has been a very rapid rise in income inequality but at the same time a particularly impressive reduction in poverty. On the one hand, there is, of course, no question about the desirability of poverty reduction. The desirability of lower inequality, on the other hand, can sometimes be questionable under certain conditions. For instance, some degree of inequality is optimal to preserve incentives in any economy. However, beyond a point, inequality could lead to social, political, and economic instability that could hurt a country's growth performance. It could also lead to inequality in educational attainment. Especially in the presence of credit market imperfections, inequality reduces a country's aggregate human capital and handicaps local businesses in their expansion (or even in their entry decisions), thereby adversely affecting growth.

In this paper, I first examine the evidence on the impact of trade opening on productivity, since productivity levels normally determine incomes. A rise in productivity, holding other things equal, improves workers' wages and lifts them out of poverty. In addition, it is always necessary to determine the distribution of any increase in per capita income. The first distribution of importance is that between producers and consumers. While every individual in society is both a producer and a consumer, owners of firms or capitalists actually receive the producer surplus. Thus, looking at the impact of trade on producer and consumer surplus indicates something about the distribution of welfare changes. A reduction in price–cost markups indicates a shift of the surplus from firm owners to consumers, most of whom are ordinary citizens, whose

primary income source is their raw labor power. Therefore, I also study the impact of trade reforms on markups.

As mentioned above, for ordinary citizens, the main source of income is their labor. It is therefore necessary to know whether trade provides a higher or lower reward for their labor and whether it provides greater and better opportunities to use their labor for their livelihoods. Therefore, I next review the evidence on the impact of trade reforms on wages, employment, and unemployment. Productivity and markups are just inputs into these outcomes that matter directly to citizens.

However, it is important to consider not only how many people have jobs but also the quality of their jobs. In developing countries, a large number of people work in the informal sector or informally for formal firms. These workers do not have job security, health insurance, a pension plan, and so on. In addition, they receive a wage that is a fraction of the formal worker wage. Therefore, it is important to investigate how trade affects informal employment as a proportion of the overall employment and whether there are any complementary domestic policies and institutions that affect this relationship. Investigating these relationships will allow me to make recommendations on domestic policies, for instance labor market policies.

In addition, it is necessary to examine the immediate impact on workers of trade reforms or shocks. While workers might move to a better steady state due to trade liberalization, they may need to incur mobility costs to move to the new steady state. As a result of incurring trade adjustment costs, workers might be hurt in transition, and they may lose a significant part of the gross welfare gains as a result. I discuss policies aimed at reducing labor mobility costs and minimizing the pain from trade adjustment.

I continue by directly examining the evidence on the impact of trade reforms on poverty, as well as the channels through which this impact takes place. In this regard, I consider rural and urban poverty separately. I also investigate the impact on the people just below the poverty line relative to those far below it. The impact of trade on poverty is important, especially when evaluating social welfare using a Rawlsian welfare function, which measures how well a society is performing by how well the least well off are performing.

The next item that this paper reviews is the impact of trade liberalization on inequality in its various forms. While there are summary measures of inequality, such as the Gini coefficient, every such measure has its weaknesses and no measure is able to capture all aspects of inequality. Therefore, starting with overall inequality, I move to more specific forms of inequality, such as the inequality among workers, which I capture through the ratio of the wages of the skilled to those of the unskilled, often using the ratio of wages of nonproduction workers to those of production workers as a proxy. I also study the inter-industry wage differentials and the way in which trade reforms affect them. It is important to analyze this heterogeneity, because different industries receive different amounts of tariff cuts. For example, in most countries, the tariff cuts were deepest in labor-intensive industries, simply because they were the most protected initially.

Another way in which trade affects the distribution of the overall pie is through its impact on the bargaining power of workers relative to their employers. In addition, as mentioned above, trade affects the monopoly power of firms, which I measure using the price–marginal cost markups. Apart from affecting the way in which consumers and producers share the surplus, this impact affects the wedge between the value of the marginal product of labor and the wage that labor receives. As a result, this may affect labor's share in the sales or output (and, at the macro level, the national income). It is also important to analyze the impact of trade on these labor shares (along with the

bargaining power of workers), since, during the last two to three decades, these shares have been falling all over the world, along with countries opening their trade regimes, in the presence of skill-biased technical change. It is important to investigate which of the two (trade or technological change) is the culprit here.

I find that, for Asian countries, trade has been able on the whole to stimulate productivity and, to a certain extent, discipline firms to reduce their markups (if I focus on the impact of reductions in output tariff cuts). As a result, wages have risen on average. In addition, large reductions in poverty have occurred. However, inequality has increased, for which part of the blame falls on trade. Thus, there is a need for redistributive policies and social protection policies, especially in the form of public works programs.

2. TRADE REFORMS, PRODUCTIVITY, AND MARKUPS

The standard gains from trade are those that countries obtain through specialization and exchange. Moving away from free trade to a state of protection leads to production as well as consumption distortion costs. Under protection, for an import-competing good, consumers pay and domestic producers receive a higher price than that under free trade. This distorts both the consumption and the production of the good, with too little of the former and too much of the latter. It is possible to demonstrate these standard costs of protectionism or the standard gains from trade under the very basic conditions of perfect competition. Once countries move to less competitive market structures, allowing firms to have some degree of monopoly power, trade results in another gain. Trade destroys the monopoly power of domestic firms along with the deadweight losses that accompany it. Domestic firms, while still not facing any competition from other domestic firms, now face competition from foreign firms within the same industry. Domestic consumers are no longer at the mercy of domestic firms, and, as a result, firms cannot charge unusually high markups over their costs. In other words, trade has a way of disciplining domestic firms, the extent of which it is possible to estimate by examining the impact of trade on price–marginal cost markups.

In addition to a decline in markups, which benefits consumers for given production costs, import competition can also have an impact on these costs themselves through the induced changes in technology and efficiency. Procompetitive effects of trade lead to an increase in the incentives for import-competing firms to invest in R&D and function more efficiently. The way in which these effects work is that reductions in the production costs of domestic firms relative to those of foreign firms now lead to a gain in the market share of the former at the expense of the latter. This opportunity to grab market share from a foreign competitor or the danger of losing some market share to it due to lagging productivity leads to this procompetitive increase in the incentive for firms to invest in productivity increases. There is also a market size effect in the opposite direction, arising from the fact that the benefits of any reduction in the production costs of a domestic import-competing firm now applies to a smaller domestic market (for any domestic firm) under freer trade, thereby reducing the returns to cost reduction. In addition, the trade and endogenous growth literature highlights several other channels through which trade can affect productivity growth. These effects often move in opposing directions. For example, depending on whether skilled labor becomes more or less expensive through trade due to Stolper–Samuelson-type effects, R&D output may increase or decrease. Trade will also reduce the duplication of research efforts as well as leading to greater knowledge flows, resulting in higher productivity. Grossman and Helpman (1991) describe and rigorously model a number

of other channels. Due to these numerous mutually opposing effects, how trade affects productivity and productivity growth becomes an empirical question.

While all the theory on markups points in only one direction, namely that trade reforms, in the form of reductions in import protection for the output of an industry (leading to greater import competition), should unambiguously lower price–cost markups, the various theoretical models on the impact of trade reforms on productivity together predict little. However, it is important to study both empirically for a few reasons. While price depends on cost and markup, cost depends on productivity. In other words, consumer and overall welfare ultimately depends on productivity and markup, and it is thus important to study them, especially to gain some idea of the sizes of the actual changes. Furthermore, inputs may become cheaper due to trade liberalization, and that might have an opposite impact on markups.

In many studies, in the process of estimating productivity and trade's impact on it, researchers end up measuring markups and trade's impact on them. It is important to note that, while the latter is often a by-product of the former, markup estimations are sometimes necessary to achieve accurate estimates of productivity and changes in productivity.

Pioneered by Nobel laureate Robert Solow, the oldest approach to measuring total factor productivity growth was called growth accounting. The approach assumed perfect competition and constant returns to scale, with the implication that the share of a factor in the total output equals the elasticity of the output with respect to the factor. This is another way of saying that the reward to the factor equals the value of its marginal product. However, the elasticity of output with respect to this factor, measured as its share in output, would be underestimated in the presence of imperfect competition and increasing returns to scale. This would overestimate the unexplained growth in output or what researchers call total factor productivity (TFP) growth. Robert Hall's (1988) path-breaking work in macroeconomics incorporated imperfect competition and markups as well as non-constant returns into the analysis of TFP growth. In international trade, Harrison (1994) was the first to incorporate these two features into TFP growth estimation using firm-level data from Cote d'Ivoire. The same regression estimates both markups and productivity growth as well as changes in them in response to trade liberalization. Krishna and Mitra's (1998) paper was the first to estimate these parameters using the same methodology (though slightly modified to incorporate changes in returns to scale) for an Asian country.

2.1 Trade Reforms, Productivity, and Markups: Empirics

I start with the case of India. The oldest study on the impact of trade reforms on markups and productivity in India is the one by Krishna and Mitra (1998). They use firm-level data for a few industries in the period 1986–93 on output, capital, labor raw materials, energy use, and input shares in output (using the data on input expenditures) to produce estimates of both markups and productivity along with changes in them between the pre- and post-reform periods. The idea is that, if they regress the growth rate of output on a weighted sum of the growth rates in the various inputs (the weights being the shares of the various inputs in the value of the output), the coefficient of this variable is the price-to-marginal cost markup and the intercept term is the estimated TFP growth. Additionally, using an interaction dummy variable and the dummy variable itself (where the dummy variable takes the value one for the post-reform years and zero otherwise), we can estimate the change in the markup and productivity growth.

Such a study is meaningful only if the trade reform is not endogenous to changes in the relevant economic variables. The Indian trade reforms initiated in 1991 provide such an opportunity, since the reforms, as Krishna and Mitra argue, were unexpected in that the Indian government approached the IMF to rescue it from a bad macroeconomic situation. The IMF loans came with the strict conditionality of economic reforms, which included trade liberalization as an important component. There were other reasons as well to believe that the reforms were exogenous.

For three out of the four industries studied, namely non-electrical machinery, electronics, and transport equipment, Krishna and Mitra find statistically significant reductions in markups. In the pre-reform phase, the markups are in the range of 1–2, and they all fall below 1 after the reforms. This is consistent with the idea that a firm might lose money while adapting to a new and changing environment. In another industry, namely electrical machinery, the markup is below 1 initially, and no statistically significant change in the markup is observable.

Moving to productivity growth, in 3 out of 4 industries, namely electrical machinery, non-electrical machinery, and electronics, the point estimates of productivity growth increases are positive, ranging between 3 and 6 percentage points, but these estimates are not as precise as the markups and markup changes. In the case of transport equipment, there is a decline in productivity growth, but the estimate is highly insignificant statistically.

One important point to note is that this method involves choosing inputs and output simultaneously, as a result of which both output and inputs are correlated with technology shocks. Consequently, the right-hand side input variables are correlated with the error term. Researchers argue that this will lead to biased estimates of productivity growth and markups. Krishna and Mitra assert that the estimates of the change in markup and change in productivity growth will be biased only if the above-mentioned correlation changes after the reform. They do not expect this reform to have a systematic impact on this correlation. Krishna and Mitra support their arguments with Monte Carlo simulations.

Since Krishna and Mitra's study, the methodologies for markup and productivity estimation have improved, and they address the above concerns directly. The recent studies on productivity and markup are separate. Topalova and Khandelwal (2011) use the Levinsohn–Petrin approach to address the simultaneity problem that I described above (as well as the measurement error problem). The approach recognizes that the choice of materials responds to technology shocks and changes in the capital stock. Under such conditions, inverting this function of technology shocks and capital stock obtains the technology shocks as a function of material inputs and capital. Further assuming a Markov process for technology, the authors are able to control for simultaneity problems. The authors also have a longer sample period for their firm-level analysis, spanning a 15-year period, 1987–2001. Additionally, they investigate the impact of both tariffs on final goods as well as inputs.

Topalova and Khandelwal find a procompetitive impact of output tariffs in that lower tariffs lead to higher productivity.[1] However, they conclude that the positive impact of an equal input tariff reduction is much greater in size. A 10% reduction in the output tariff increases productivity by 0.3%, while a 10% reduction in the input tariff leads to a 4.8% productivity increase. Between 1989 and 1996, the output and input tariff declines led to about 1.7% and 10.6% increases in productivity, respectively. The authors view

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[1] Note that the new literature, unlike the old literature (Krishna and Mitra 1998; Harrison 1994), focuses on productivity levels rather than productivity growth rates.

this result as indicative of a much stronger impact of trade liberalization through the greater availability of a broader range of inputs of higher quality as well as "exposure to new technologies" rather than through greater competition from final products coming from abroad. Goldberg, Khandelwal, Pavcnik, and Topalova (2010) confirm this channel, finding that trade liberalization led to a 21% decline in the prices of intermediate inputs and an 8% increase in the variety of intermediate inputs.

De Loecker, Goldberg, Khandelwal, and Pavcnik (2016) rigorously study the impact of trade liberalization on the markups of Indian firms. Using an improved version of the Levinsohn–Petrin approach to deal with the fact that physical quantities of output and inputs are rarely observable (leading to biases in production function estimation), the authors arrive at estimates of the elasticities of output with respect to the various inputs. Under constant returns to scale, the price–marginal cost markup equals the elasticity of output with respect to an input divided by the input's share in the sales of output. They calculate these markups and investigate their relationship to trade liberalization for the period 1989–97. Reductions in input tariffs increase markups. Average costs are lowered through reductions in input tariffs but partly offset by the fact that only some of these benefits are passed on to consumers as a result of an increase in markups. A 10 percentage point reduction in input tariffs can lead to an 8% increase in markups. A 10 percentage point reduction in output tariffs has a procompetitive effect of reducing markups by 1.2%–1.5%. While output tariffs declined on average by 62 percentage points during the 1989–96 period, input tariffs declined by 24 percentage points. The net impact was an increase in markups during this period of about 13 percent. Given that costs declined by 31% due to lower input prices as well as a greater variety of inputs (consistent with Goldberg et al. 2010 as well as Topalova and Khandelwal 2011), this meant that there was an average decline in prices (relative to the overall 2-digit sectoral price level) of about 18%. The authors also find that the procompetitive effect of output tariff reduction was concentrated in the initially high-markup firms. While a 10-percentage point reduction in output tariffs led to a 4.4% reduction in markups in firms that were among the top 10% of the initial distribution of markups, the remaining firms, on average, experienced a 1.3% markup reduction.

Nataraj (2011) also examines formal- and informal-sector firms in India separately for the period 1989–2001 and finds that, while mainly output tariff reductions affect informal-firm productivity, input tariff reductions affect only formal-sector firm productivity. A 10 percentage point reduction in the output tariff increases formal-firm productivity by up to 0.76% but increases informal-firm productivity by 4.8%. A 10 percentage point reduction in the input tariff increases formal-firm productivity by 4.6%, with no statistically significant effect on informal-firm productivity. This makes intuitive sense, since informal-sector firms rarely buy imported inputs but might feel the competition from imported final products.

Amiti and Konings (2007) study the impact of the 1990s trade reforms on firm-level productivity in Indonesia. Indonesia's trade reforms are linked to its WTO accession in 1995, and the sample period for this study is 1991–2001. This is, in fact, the first study to investigate the impact of input and output tariffs simultaneously on firm productivity, which it calculates using the Olley–Pakes approach to correct for both simultaneity in input and output choice and sample selection bias. While a 1%–6% increase in productivity is attributable to a 10 percentage point reduction in the output tariff, they find that firms that import inputs can experience up to a 13% increase in productivity from a 10 percentage point input tariff reduction. They also find that the Asian Financial Crisis somewhat muted the latter effect from 1997 onwards. This is understandable, since domestic currency devaluations would have led to an increase in the domestic price of inputs. The authors also find the beneficial effects of output tariff reforms to be

concentrated in the more competitive industries (as compared with the high-markup ones), while the positive effects of input tariffs on productivity do not vary by the degree of within-industry competition. The results here qualitatively survive correction for endogeneity of trade reforms through an instrumental variable approach in which the initial (1991) tariffs instrument the change in tariffs.

Brandt, Van Biesenbroeck, Wang, and Zhang (2017) study the impact of trade liberalization on firm-level markups and total factor productivity in the PRC around the time of its WTO accession. As in the case of India, input tariff reductions increase markups, implying an incomplete pass-through of input cost reductions to consumers. On the other hand, output tariff reductions reduce the markups only of the relatively large firms, mainly incumbents, and have no impact on the markups of other firms, especially new entrants. On average, a 10 percentage point reduction in the output tariff leads to up to a 1% markup reduction, while a 10 percentage point reduction in the input tariff leads to a 7% markup increase. [2] The authors argue that the endogeneity of the trade liberalization is not a major concern by showing that neither past industry productivity nor past productivity change determine tariff reductions. The procompetitive effects in this study and in that of De Loecker et al. are not comparable, since the latter observe firm-level prices to which they can apply their estimated markups to compute firm-level marginal costs, which, in turn, they can control for in their estimation of the procompetitive effects of output tariff reductions. To the extent that there are procompetitive effects on productivity and costs that are incompletely passed on to consumers, this study of the PRC will underestimate the output tariff effects on markups. The procompetitive effect of a 10 percentage point decline in the output tariff is a 1.7% increase in total factor productivity, while, for the same percentage decline in the input tariff, the total factor productivity gain is 16%–18%. While the bulk of the gain in industry-level productivity comes from increases in within-firm productivity, some of the gains arise through the entry of new productive firms that are flexible enough to incorporate newer, more efficient technology. The exit of relatively low-productivity firms is another channel but is not as strong. The authors also find that the industries that experience deeper input tariff cuts are those that experience a relatively smaller reallocation of output from less to more productive firms.

Yu (2015) also considers the impact of trade liberalization of firm-level TFP in the PRC for the period 2000–06. While he also finds a positive impact of both input and output tariff reduction on TFP, in contrast to other studies, he identifies a much bigger impact of output tariff reductions than input tariff reductions. With a 10 percentage point output tariff reduction, TFP increases by 9%. A 10-percentage point input tariff reduction increases TFP by only 5%. Many reasons could explain the difference in results. The sample period is slightly different (in Brandt et al. it is 1998–2007), but the tariff measures are also firm-specific in Yu's study, with firm-specific weights based on the multiple product lines that each firm sells in the case of output tariffs and firm-level imports of various imported inputs in the case of input tariffs. Another result that Yu obtains is that the impact of these tariff reductions on TFP decreases with an increase in the share of processing imports in total imports. This is not surprising, since these processing imports do not lead to greater import competition nor were they ever subject to tariffs during the authors' sample period.

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[2] Fan, Gao, Li, and Luong (2017) obtain qualitatively similar results on markups. They run regressions separately for firms engaged in processing trade and other firms. As they expect from the theory, these effects empirically do not appear for the former but are apparent in the latter type of firms.

Bas and Causa (2013) examine the impact of input tariff reductions, among many policy changes, on the labor productivity of Chinese firms. In this study, they take the productivity heterogeneity among firms quite seriously. Using a sample of Chinese firms for the period 2001–08, they find that input tariff reductions increase labor productivity and that the effect is stronger for firms at the domestic technological frontier than for other firms. Firms that are on or close to the frontier experience a 0.74% increase in productivity from a 1 percentage point reduction in the input tariff. Firms of which the productivity is half of the domestic technological frontier will experience roughly a 0.5% rise in productivity from the same 1 point reduction in the input tariff. The procompetitive impact of output tariff reductions seems to be stronger for firms that are relatively distant from the technological frontier.

There is also an industry-level study by Kim (2000) for the Republic of Korea for the period 1966–88. He finds that a 10 percentage point reduction in the quota–coverage ratio leads to an increase in TFP growth of about 0.26 percentage points and a reduction in the markup of 1.33 percentage points. A 10 percentage point reduction in the nominal rate of protection, on the other hand, leads to an increase in the TFP growth rate of only 0.12 percentage points and a reduction in the markup of 0.4 percentage points. Trade liberalization, primarily quota coverage reduction from 10% to 30%, during the entire sample period raises the annual TFP growth rate permanently by over 2 percentage points.[3]

Thus, we see that trade reforms generally lead to productivity increases and that the reduction in input tariffs has a much bigger productivity-enhancing impact than an output tariff reduction. Pavcnik (2002) for Chile and Fernandes (2007) for Colombia also find a positive impact of trade liberalization on productivity, but, for countries outside Asia, no studies decompose the impacts of output and input tariffs. As regards productivity growth, Harrison (1994) finds support for an increase in firm-level productivity growth as a result of trade reforms in Cote D'Ivoire. At the same time, she concludes that tariff cuts lead to a reduction in markups. Levinsohn (1993) shows a reduction in markups as a result of trade liberalization for Turkey. Overall, through these channels, trade should increase the average income and at the same time improve the distribution of real incomes.

It is important to note that empirical studies on the impact of trade on productivity and/or markups only exist for a handful of Asian countries, namely the PRC, India, Indonesia, the Republic of Korea, and Turkey. However, the fact that the results are no different for all the other non-Asian countries should offer a certain degree of confidence that these relationships may be generalizable to other Asian countries.

The next logical point to study is the impact of trade on the two most fundamental labor market outcomes, namely wages and employment, since both these outcomes depend on productivity and markups, as explained below.

3. TRADE, WAGES, AND EMPLOYMENT

Trade benefits the abundant factor and hurts the scarce factor. Given that most of the Asian economies are abundant in labor, in particular low-skilled labor, I expect trade to increase wages, in particular low-skilled wages, in these countries. However, this result (the Stolper–Samuelson theorem) is based on the assumption that factors move freely between sectors, one of the key assumptions of the Heckscher–Ohlin model. This assumption is unlikely to be valid in developing Asia, especially in the short to medium

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[3] The nominal rate of protection actually rose from 36% to 39%.

run, thereby reducing the relevance of the Heckscher–Ohlin model to this region. Even with low levels of education, workers need to have sector- or even firm-specific skills, and those take time to acquire. Workers acquire some skills on the job. As a result, workers who become displaced, through import competition, cannot easily find new jobs in the expanding sectors. Those who remain employed in the shrinking sectors may experience wage reductions. Furthermore, if the Stolper–Samuelson effect holds, even weakly, the wage increase can result in many firms reducing their employment in response.

However, the procompetitive productivity effect, for which evidence exists, can result in an increase in firm-level and industry-level employment and wages. In addition, the destruction of monopoly power, brought about by import competition, shrinks the wedge between the price and the marginal cost and thus between the value of the marginal product and the wage, thereby possibly leading to an increase in the wage. However, if there is rent sharing, the decline in the rents can lower the wages that employees receive and/or the employment itself. In addition, the incentive to remain unionized decreases. With de-unionization, workers' bargaining power lessens, representing another channel through which wages can shrink. In addition, in a monopoly situation, the seller produces too little and as a result the employment is low. Trade, by reducing the monopoly power of domestic firms, might be able to increase employment through this channel.

3.1 Trade, Wages, and Employment: Empirical Evidence from Asia

Amiti and Davis (2012) investigate how the average wage of a firm changes with trade liberalization. They examine the differential effects of output and input tariff cuts on firms that are purely domestic (do not export or import) and those that export and/or import. The theoretical model that guides their estimation is one of fair wages in which workers receive a fraction of the profits. In other words, more profitable firms pay higher wages. As a result, greater openness in trade leads to exporting firms earning higher profits and, therefore, paying higher wages, while those selling only in the domestic market but facing import competition suffer from profit reductions and pay lower wages. Additionally, firms that use imported inputs become more profitable and pay higher wages, with the effect being smaller and statistically not significant for non-importing firms. A 10 percentage point output tariff cut leads to a 2.4% reduction in the wage paid by a non-exporting firm but a 2.4% increase in the wage paid by an exporting firm. A 10 percentage point input tariff reduction results in a 2.3% wage increase in firms that do not import their inputs, while it leads to a 7.5% wage increase in firms that import at least some of their inputs. The reason for firms that do not import any of their inputs possibly ending up paying higher wages due to input tariff cuts might be the competition from other firms in the labor market or a procompetitive effect on upstream industries.

Here again, the results are robust to controlling for endogeneity using an instrumental variable approach, which runs the regression in long differences (five-year differences) and instruments the long-differenced output tariffs using the industry's initial share of production workers in total employment and its interaction with an initial export status indicator and a non-tariff barrier dummy (and a few other variables). For the first-differenced input tariff variable, the instrument is the initial input tariff interacted with the initial import status.

Dutt (2003), using industry-level data for India, also finds that real wages rise after liberalization. He further discovers that real wages are positively related to import penetration. While trade protection has no significant effect on the wage level, he finds that wage growth is negatively related to protection: wage growth is higher for relatively less protected industries and during years with lower tariffs.

Relatively little research focuses on the impact of trade on employment at the micro level. Kambhampati, Krishna, and Mitra (1997) find that, controlling for wages and markups, after trade liberalization, the firm-level labor demand increased in India by 4%–9%, depending on the industry. Not controlling for wages and markups produces a statistically insignificant impact of trade reforms on firm-level employment, due to the mutually opposing channels that I described above.

Dutt (2003) finds results for employment and employment growth that are similar to his results for wage and wage growth with respect to import penetration and protection.

In a study on the Republic of Korea, Mitra and Shin (2012) find that a 10 percentage point reduction in industry-level tariff reduces labor demand at the firm level in the Republic of Korea by about 0.6% and that a 10 percentage point increase in the ratio of exports to output increases this labor demand by 0.7%.

Hasan, Mitra, Ranjan, and Ahsan (2012) investigate the impact of trade liberalization on industry-level as well as state-level unemployment rates in India. A 10 percentage point decrease in the state-level employment-weighted average tariff rate leads to a 7.5% decline in the state-level unemployment rate. In addition, a 10 percentage point reduction in a 2-digit industry-level tariff leads to a 0.08 percentage point reduction in the probability of being unemployed within an industry. An increase in the value of the marginal product of labor brought about by trade liberalization seems to drive all the above results.

For all the Asian countries studied so far, it seems that trade does not reduce firm wages or employment. In most cases, trade reforms have led to an increase in wages and employment. In the case of India, it is also apparent that tariff cuts lead to reductions in unemployment rates. Empirical work investigating the impact of trade reforms on wages and employment in non-Asian countries, on the other hand, does not provide such a positive view. For example, Ravenga (1997) finds that, in addition to the reduction in the demand for output of domestic import-competing firms in Mexico, trade reforms led to a destruction of monopoly rents, which firms shared with workers, in turn becoming another wage- and employment-reducing effect. Ravenga finds the overall impact of trade reforms on firm-level wages and employment in import-competing firms to be negative. She is able to break down the overall negative effect into the channel through the destruction of quasi-rents and the remaining ones. Currie and Harrison (1997) find no statistically significant effect of trade reforms on firm-level employment in Morocco. They conclude that, while there are positive effects through markup reductions and productivity increases, there is a negative effect through a switch in demand towards imported substitutes for domestic products.

Clearly, based on my earlier theoretical discussion, there are many channels that flow in different directions. For all the Asian countries, for which rigorous research investigates the wage and employment effects of trade reforms, researchers do not find any adverse impact. For non-Asian countries, however, some adverse effects are apparent, which prompt caution about generalizing the positive effects to the remaining Asian countries. As a result, the use of redistribution and adjustment policies becomes quite important. To add to this, the evidence within Asia that exists on trade adjustment and the impact of trade on informality, which I will discuss next, strengthens the case

for such policies. As I will argue, such policies can also create and maintain support for globalization.

4. TRADE AND INFORMALITY

Having a job is important for an individual's well-being. However, conditional on having a job, the quality of that job also matters. What determines the quality of a job? One obvious determinant is the wage, but there are other important determinants as well. These include job security, whether the job has a pension plan, whether it provides health insurance, what its working conditions are, and so on.

Some, albeit not all, labor regulations aim to provide some of the elements of job quality. Firms in the formal sector have to follow their country's labor laws and other regulations, such as those related to corporate taxes. However, adherence to these regulations results in additional costs for these firms. Consequently, firms in developing countries often want to remain small and in the informal sector. In addition, firms in the formal sector employ casual or informal short-term workers to gain the flexibility to hire and fire them, which is not possible in the case of permanent workers. Casual or short-term jobs, including those in informal-sector enterprises, lack adequate job security and social insurance. Thus, the fraction of employment that is informal is an important inverse indicator of job quality.

What are the trade-offs here for firms? Remaining small (and in the informal sector) prevents firms from exploiting economies of scale and from using modern technology, which is usually cost-effective only when the scale of production is sufficiently large. In addition, temporary workers have very little incentive to learn on the job and be efficient, since a large proportion of the human capital that they acquire through on-the-job training and experience is firm-specific and will not be of much use elsewhere. However, a contraction in demand makes an industry less profitable, and, therefore, it is less cost-effective for any firm in that industry to hire more costly (but more productive) regular (permanent) workers, while an expansion in demand produces the opposite result.

As mentioned earlier, Nataraj (2011), in her study of India's formal and informal manufacturing enterprises, found that a given output tariff reduction increases informal-firm productivity proportionally much more than formal-firm productivity, while the comparison is reversed in the case of an input tariff reduction. This finding is important, as one expects it to result in the expansion of informal relative to formal employment due to the former but a reduction due to the latter. Thus, one expects informality to respond to trade liberalization.

Mitra and Ural (2008), in their study of the Indian manufacturing sector, find that industry productivity, output, value added, and employment increase with tariff reductions, with the impact being relatively greater in states where labor regulations generate relatively flexible labor markets. However, Sundaram, Ahsan, and Mitra (2013) discover the opposite effect of trade openness on informal-sector firms with five or fewer workers. These firms experience a greater increase in output, value added, and employment due to tariff reductions in the relatively rigid labor regulation states compared with others. These results indicate that trade liberalization might reduce informality (the share of employment or output in the informal sector) in states with relatively flexible labor regulations and increase it in other states. This might be driven by the need for formal-sector firms, due to restrictive labor regulations, to outsource some of their work to informal-sector firms.

The results for India are quite consistent with those that Goldberg and Pavcnik (2003) find in their study of how the informal sector in Brazil and Colombia responded to trade liberalization in the 1980s and 1990s. While, in the case of Brazil, Goldberg and Pavcnik do not find any evidence of a relationship between informality and trade liberalization, for Colombia they find evidence of an increase in informality as a result of trade liberalization for only the earlier part of their sample period. This relationship disappears after the implementation of the labor regulation reforms that made the Colombian labor market more flexible, which is the latter part of their sample period.

In another paper, Ahsan and Mitra (2017) find that informality in India was rising in low-productivity sectors relative to high-productivity sectors, which were also the sectors that were expanding in relative output and employment. However, this differential trend disappears with trade liberalization, possibly due to the need for greater flexibility in input choice, which the employment of casual workers can provide, as explained above.

McCaig and Pavcnik (2018) study the impact of Vietnamese exports on informality. They find that, as US tariffs on exports from Viet Nam to the US fell from 23.4% to 2.4% through the US–Viet Nam Bilateral Trade Agreement (BTA), these exports expanded from $1.1 billion in 2001 to $5 billion in 2004 and individuals moved from employment in small, informal enterprises to employment in large, formal firms. Over the first two years after the start of the BTA, the proportion of informal workers in the manufacturing sector decreased from 66% to 60%. The authors also find that industries with bigger US tariff cuts experience larger reductions in informality. This movement contributes to aggregate productivity growth of about 1.5%–2.8% annually and economic development.

While it is difficult to find any study that examines the impact of trade on informality in the PRC, there is a study by Liang, Appleton, and Song (2016) that shows that the proportion of casual employment in urban areas of the PRC increased from 24% in 2007 to 42% in 2013. The authors put much of the blame for this on the 2008 New Labor Contract Law, which requires all employers to write up contracts for each of their employees and to provide social insurance for workers who have contracts longer than two years. However, the implementation and compliance are far from perfect, and formal firms often hire short-term workers without contracts despite the law that prohibits such hiring. In other words, the study shows that a more stringent labor law has resulted in greater evasion and non-compliance with the law, so making the law more stringent has been totally counterproductive. However, this study does not discuss identification issues. As a result, researchers cannot rule out one of the causes of the increase in employment informality being the opening of the Chinese economy.

I next look at a cross-economy study by Fiess and Fugazza (2012), whose panel dataset includes, among others, a number of Asian economies, such as the PRC; India; Indonesia; Japan; Bangladesh; Pakistan; Sri Lanka; Nepal; Malaysia; Hong Kong, China; Singapore; and the Philippines. While they find that output informality rises with trade openness, employment informality falls. This is possible if there is a large increase in the relative labor productivity of the informal sector. However, employment informality falling with trade openness is good news from the point of view of job quality. I also believe that it is necessary to separate developed and developing economies or allow an interaction of trade openness or restriction with economy per capita income, as the relationship between trade and informality for developed and developing economies can be quite different. In addition, the interaction of the trade variable with the nature of labor regulations or the flexibility of labor markets will provide valuable insights.

Thus, it seems fairly clear that, in the presence of labor regulations that produce rigid labor markets, import competition increases informality. However, export expansion seems to reduce informality. Labor reforms can contain, or even reverse, the informality-increasing effects of trade liberalization. The fact that researchers find the complementarity between trade and labor-market flexibility to hold for all the Latin American countries studied with respect to these issues makes it also plausible for the Asian countries not studied so far.

5. LABOR MOBILITY, TRADE SHOCKS, AND ADJUSTMENT COSTS

I next consider the adjustment costs incurred by workers moving from one sector to another in response to trade shocks. Artuc, Lederman, and Porto (2015) carry out path-breaking work on this issue. In their first step, the authors estimate the average labor mobility costs stemming from labor market frictions using industry-level data (within the manufacturing sector) on employment and wages. They perform this exercise for several countries (31 developing countries and 25 developed countries), using a dynamic model of sectoral employment choices. The labor mobility cost or the cost of moving incurred by a worker in moving to another sector from his/her current sector of employment turns out to be a few multiples of the annual average wage. It is 3.88 times the average wage in South Asia, 3.95 times in Central Asia, and 3.46 times in East Asia and the Pacific. Regarding individual countries, it is 2.71 for the PRC, 2.87 for India, 3.34 for Iran, 3.46 for Indonesia, 3.77 for the Republic of Korea, 4 for Lithuania, 4.47 for Azerbaijan, and 4.89 for Bangladesh. For most developed countries, the numbers are much lower, for example 1.43 for Finland, 1.7 for Germany, 1.82 for the Netherlands, 2.21 for the US, and so on. The authors also examine the correlations between mobility costs in the various countries and country-specific characteristics. Richer countries have lower mobility costs. The mobility costs are also higher in countries with a larger proportion of their labor force in "vulnerable employment" or low-quality jobs, a higher number of procedures to enforce a contract, and a higher number of days required to export.

Based on these mobility costs, the second stage involves the estimation of the welfare effects on workers in the food and beverage sector, following a 30% decline in the price of food and beverages due to a trade shock. A 9.55% potential welfare increase is reduced to an 8.53% actual welfare increase due to the presence of mobility costs in India. For the PRC, these numbers are 8.25% and 7.05%, respectively. The difference between the potential and the actual is higher in Indonesia, with those numbers being 11.28% and 9.02%, respectively. Clearly, the difference is increasing in the mobility costs estimated. If I consider countries with even higher mobility costs, the difference is much bigger between potential and actual welfare gains, for which the numbers are 12.87% and 8.16% for Bangladesh and 10.38% and 5.23% for the Philippines. Evidently, mobility costs wipe out a sizeable proportion of the welfare gains from trade.

While the initial impact of a food and beverage price decline due to a trade shock is a decline in real wages in the food and beverage sector, after some time, the real wage starts to rise and reaches a higher steady state within a few years. The higher the labor mobility cost in a country, the longer it takes to converge to the new steady state. While countries with a low mobility cost, like the PRC, will reach 95% of the new steady-state real wage in about 3 years, it could take 10–11 years in Bangladesh or the Philippines.

Matusz (2003) also provides a calibration of a dynamic multisectoral search model of unemployment. He uses the data from the National Sample Survey Organization in India to calculate the duration of unemployment as 4.4 months and the rate of job separation from a firm as 2% per year. He uses these to calibrate his model and finds that the adjustment costs can be up to 60% of the gross benefits from trade liberalization. This is considerably higher than the figures in the previous study, but, in general, the broader point is that mobility or adjustment costs can account for a significant proportion of aggregate welfare changes. After a trade shock, according to the results of Matusz's exercise, it takes the economy over 10 years to reach the new steady state.

The above results are consistent with the cross-country results of Dutt, Mitra, and Ranjan (2009), who study the impact of trade policy on unemployment. The dataset includes a handful of Asian countries in addition to countries from other parts of the world. The authors find a very interesting response of unemployment to trade liberalization. Initially, there is a rise in unemployment in the year of liberalization. However, over a longer period of time, there is a reduction in unemployment relative to the initial level. Trade liberalization leads to immediate dislocations of workers, resulting in a short-term spike in unemployment rates of about 0.6% on average. Over a longer time horizon of 2–3 years, employment recovers and the rise in unemployment reverses, leading to a 2.5% decline in the unemployment rate in the long run. The results are similar at the industry level for India in Hasan, Mitra, Ranjan, and Ahsan's (2012) study.

Thus, informality and labor adjustment costs are real problems in developing Asia. Furthermore, trade reforms can magnify these problems. Therefore, next I discuss policy options to address these problems.

6. POLICIES TO TACKLE TRADE-INDUCED ADJUSTMENT AND INFORMALITY

I have shown that trade adjustment costs, as a result of worker mobility costs, can destroy a significant part of the welfare gains from trade. In addition, these costs can lead to an initial decline in real wages in the sector that is hit with a negative trade shock, followed by a rise to the higher, new steady state. The transition to this new steady state can be slow, the speed being inversely related to the magnitude of labor mobility costs. Hollweg, Lederman, Rojas, and Bulmer (2014) provide several policy options to tackle the problems associated with adjustment costs. These policies aim to reduce the mobility costs that workers incur, such as subsidizing destination-specific relocation costs, training programs to provide skills specific to destination sectors, unemployment benefits or insurance, job search assistance, subsidized employment through public works programs, announcing trade reforms in advance, or gradual trade liberalization that would allow for advance planning, skill acquisition, searches, and so on. They warn about the dangers of more stringent employment protection laws through more restrictions on the firing of workers, as such policies would slow down the job creation in expanding sectors and the transition to the new, better steady state.

Mitra and Ranjan (2011) discuss social protection policies for workers exposed to external or globalization shocks. They also note the benefits of expanding unemployment benefits and insurance to facilitate job searches to enable efficient matching of workers and jobs but with strict monitoring to ensure that such searches are truly taking place. Like Hollweg et al. (2014), they do not recommend excessive use of employment protection policies in the form of firing restrictions, which often end

up being hiring restrictions. The reason for this is that employers are reluctant to hire workers when they know they cannot fire them in the event of a negative shock or in the case of incompetence. Mitra and Ranjan advocate East Asia-style public works programs that serve the twin purpose of providing interim employment for people who have lost their jobs in sectors exposed to adverse external shocks and improving the public infrastructure that is badly needed in many developing countries. They also argue that these various forms of unemployment support will build and sustain support for greater openness of the economy.

As regards informality, there is strong evidence that trade liberalization will increase it in the presence of restrictive labor regulations. This is quite clear from Goldberg and Pavcnik's empirical work on Latin America as well as my own work on India with coauthors. In addition, the PRC has experienced an increase in informality due to the recent introduction of more rigid labor regulations in the presence of substantial openness. Therefore, reforms of labor regulations are probably the solution.

7. TRADE, POVERTY, AND INEQUALITY

Trade can affect poverty and inequality through many channels. According to Bhagwati (2004), trade raises growth, which, in turn, reduces poverty. Researchers often consider trade to be "an engine of growth," especially in the light of the experiences of several Asian countries, including the PRC and India, which have liberalized their trade regimes during the last few decades. The theoretical literature on trade and growth, however, provides several different channels heading in opposite directions, as the section on trade and productivity explained. However, David Ricardo's work from a couple of centuries ago clearly shows that there are "gains from trade" when trade is driven by comparative advantage. For policy purposes, this means that international trade is likely to lead to an increase in real per capita income. In other words, trade expands the size of the pie. This rise in real per capita income is economic growth.

Not only economists but also world leaders have been aware for many decades that growth is a necessary condition for poverty reduction. Especially in the 1950s and 1960s, when many developing countries had abysmally low per capita incomes, it was clear, as a matter of simple arithmetic, that redistribution would not lead to poverty reduction. For example, perfect equality with a very low per capita income can put everyone below the poverty line.

While there is empirical evidence, after controlling for reverse causation through an instrumental variable approach, that trade increases per capita income (Frankel and Romer 1999; Irwin and Tervio 2002), there is also evidence that the poor usually share a country's growth. In fact, the growth in incomes of the poor is no less than the rate of growth of per capita income (Dollar and Kraay 2002). Additionally, there are redistributive effects of trade in that trade redistributes in favor of the abundant factor and away from the scarce factor. In poor countries, the abundant factor is unskilled labor and those below the poverty line are all unskilled workers. Thus, trade, by increasing the incomes of the poor, is expected to raise the poor above the poverty line.

However, the above logic depends very much on intersectoral factor mobility. In the absence of such mobility, workers in declining sectors are trapped there losing incomes and/or jobs. Trade also makes capital goods cheaper, while these capital goods are often complementary to skilled labor and not unskilled labor, thereby raising wage inequality and poverty under certain conditions (Davis and Mishra 2007). Furthermore, for firms to export successfully, they need to be able to offer goods of higher quality

than under autarky. However, higher-quality goods are more intensive in skilled labor; thus, trade can increase the demand for skilled labor and reduce the demand for unskilled labor, thereby raising poverty and inequality. In other words, in such scenarios, simple Heckscher–Ohlin predictions will not hold.

I next look empirically at the impact of trade on poverty and inequality.

7.1 Trade, Poverty, and Inequality: India–PRC Comparisons

I start here by discussing some basic evidence that I present in Mitra (2016), in which I discuss the experiences of two large Asian countries, namely the PRC and India. India's trade-to-GDP ratio increased from roughly 13% in 1988 to 48% in 2010, while its average tariff rate fell from 80% to 10% during the same period. The $1.25-a-day poverty rate decreased during the period from 53% to 32%. The most rapid decline in poverty, from 41.6% to 32.7%, occurred during the period 2005–10, when growth was also the most rapid, in the range of 8%–10%, except for 2008. Based on a cross-country regression, Mitra (2016) finds that the increase in trade as a fraction of the GDP accounts for a fourth of the reduction in poverty in India. The income inequality in India during this period was fairly stable. The Gini coefficient increased only a little from about 32 to 34, the entire blame for this (or even more!) falling on trade liberalization, based on Mitra's (2016) cross-country regression analysis.[4] The ratio of the incomes of the top 10% to the bottom 10% rose by only slightly above 10% from 6.9 to 7.7.

In the PRC, the trade-to-GDP ratio rose from 17% in 1984 to 70% in 2005 but then fell to 62% in 2008 and 49% in 2009 due to the Great Recession. The PRC's average tariff decreased from 32% to 4% during the period 1984–2010. The PRC's $1.25-a-day poverty rate fell from 69% to 12% during this period. Based on my cross-country regression, I find in Mitra (2016) that the increase in trade as a fraction of the GDP accounts for a seventh of the reduction in poverty in the PRC. The residual is possibly attributable to growth that other factors drive, such as infrastructure and skill development, as well policies to promote labor market flexibility. However, this topic requires rigorous investigation. In addition, the PRC's Gini coefficient increased from 28 to 42 during the period 1984–2009, a fifth of which is due to trade liberalization, based on Mitra's (2016) cross-country regression analysis. The ratio of the incomes of the top 10% to the bottom 10% rose from 6 to 18 during the same period.

It is clear from the above comparison that the PRC, where inequality increased much more, actually performed much better in poverty reduction than India. While both India and the PRC have grown quite rapidly during the last couple of decades, the PRC's growth performance has been significantly better than India's and has remained steady at that rate for a longer period of time. This relatively rapid growth has led to a faster reduction in poverty. It is quite possible that the PRC was spending more of its tax revenues on infrastructure, while India was using them mainly for redistributive purposes and public works programs that were not so productive. Thus, inequality was unable to rise substantially in India, but its poor performance with regard to infrastructure probably hurt its growth performance as well as its progress in poverty reduction.

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[4] While the actual increase in inequality, according to the Gini coefficient, was 2 points, the increase predicted by trade liberalization (the tariff reduction that actually took place) was 3.5 points.

7.2 Trade and Poverty: Astructural, Reduced-Form Intra-country Studies from Asia

I next look at some intra-country studies on trade, poverty, and inequality. I start with studies based on a direct, astructural, reduced-form approach. Topalova (2007) examines a panel of districts in India by creating measures of rural, urban, and overall poverty rates (the proportion of people below the poverty line) and a measure of district-level protection, which is a weighted average of industry-level tariff rates, the weights being the initial share of the labor force in individual districts (also calculated at the rural, urban, and overall levels). Topalova finds that districts in which rural workers were more exposed to a rise in import competition (in the form of a greater reduction in the weighted average tariff) experienced a relatively slower reduction in rural poverty. Compared with a district that did not experience any change in tariff, a district that experienced the mean level of tariff reduction witnessed a 2 percentage point rise in poverty. In the case of urban poverty, Topalova does not find a statistically significant relationship with district-level protection, but the coefficient sign is the same as in the case of rural poverty. In fact, she describes one of her findings as trade liberalization leading to a "significant setback" in rural poverty reduction (equaling about 15% of the poverty reduction that took place in India in the 1990s).

Hasan, Mitra, and Ural (2007), later updated by Cain, Hasan, and Mitra (2012), perform a cross-state panel analysis for India (as opposed to Topalova's cross-district analysis). Apart from considering states, they examine National Sample Survey Organization (NSSO) regions (the number of NSSO regions being roughly three times the number of states). Their main finding is that states where workers were more exposed to foreign competition, through a greater employment concentration in industries that were more open to trade, had lower rural, urban, and overall poverty rates. States with greater trade liberalization (a greater reduction in employment-weighted tariffs) also experienced greater poverty reduction. These effects were more pronounced in states with labor laws that allowed more flexible labor markets, greater road density, and greater financial development. The authors find that the trade liberalization during the period 1987–2004 led to a 38% reduction in poverty. A 1 percentage point greater reduction in the employment-weighted average tariff led to a 0.57% additional reduction in the poverty rate.

There could be a number of reasons for the differences in results between Topalova and Hasan and Mitra and their coauthors. Firstly, results can differ because compositional changes can drive poverty reduction (relatively poor districts within a state shrinking and rich districts expanding). This is a plausible story, since researchers find that, while labor is quite immobile between states, there is no such evidence for the lack of mobility of workers between districts within a state. There are other differences, such as differences in the treatment of nontradable sectors in the calculation of the weighted protection, the non-inclusion of the 1993 NSSO round in Topalova's study, and the greater variety of protection measures used in the Cain–Hasan–Mitra–Ural studies.

Another study, by Mukim and Panagariya (2012), shows that, contrary to the previous claims, socially backward classes have also experienced declines in poverty rates during the period since the trade reforms, with some evidence existing that trade reforms led to a decline in their poverty.

Kis-Katos and Sparrow (2015) conduct a similar analysis of the impact of the Indonesian trade reforms on poverty for 259 Indonesian districts in the period 1993–2002. One difference between the above studies on India and this one on Indonesia is that these authors examine both the employment-weighted output and the input tariffs, with the unit of observation being a district every three years from 1993 to 2002. The measures that the authors use are the poverty rate, the poverty gap, and the squared poverty gap. Kis-Katos and Sparrow find that poverty (as defined through any of the three measures) declines with a reduction in the input tariffs but that output tariff reductions increase poverty. A 1 standard deviation (or 2 percentage point) larger reduction in the employment-weighted input tariff leads to a reduction in the poverty rate that is half a standard deviation (6.7 percentage point) greater. Running these regressions for separate education levels (no education, primary education, junior secondary education, and senior secondary education), the two extreme education levels seem to drive the results. Furthermore, the impact of input tariff reductions seems to work through an increase in the share of working adults in the population, and there is some evidence of this happening through an increase in the wage rate, possibly due to an increase in firm productivity, as Amiti and Konings (2007) show for the Indonesian case. In the case of wage increases, the channel is more pronounced for medium-skill workers, while the worker participation channel works mainly for low-skill workers.

McCaig (2011) studies the impact of tariff reduction in the US as part of the bilateral trade agreement between the US and Viet Nam on the poverty rates in Vietnamese provinces. He constructs a Vietnamese province-specific US import tariff using employment levels in various industries within a province as weights. McCaig finds that there is negligible inter-province migration, making this analysis meaningful. A 1 standard deviation reduction in the weighted-average US tariff that a province faces leads to a 33%–40% reduction in poverty within 2 years.

Thus, there seems to be considerable evidence that unilateral trade reforms have reduced poverty at the state level in India (though the district-level evidence available so far is different). In the case of Viet Nam, state-level poverty declined as a result of the US's reciprocal tariff cuts. In addition, input tariff reductions have led to poverty reductions in Indonesian provinces, while output tariff reductions have led to slight increases in the incidence of poverty. Research finds that trade liberalization had a poverty-reducing effect in Poland through greater wage increases in labor-intensive industries that also experienced deeper tariff cuts (Goh and Javorcik 2007). Furthermore, in the 1990s, Mexican provinces that were more open to FDI and imported and exported more relative to the value of their output experienced greater poverty reduction relative to the more closed provinces based on these measures (Hanson 2007). Goldberg and Pavcnik (2007b), on the other hand, find that urban poverty is unrelated to tariffs in the Colombian case but negatively related to the volume of competing imports.

Overall, as long as the right kinds of complementary domestic policies and institutions are in place, trade liberalization has a favorable impact on poverty reduction in Asia, and this also applies to many other parts of the world.

Next, I discuss studies that are more model driven.

7.3 Trade and Welfare: Empirical General Equilibrium Studies from Asian Countries

I now move on to studies that use the approach called empirical general equilibrium analysis, which Porto (2006) pioneers. These studies focus on the changes in the cost of consumption as measured using the compensating variation of the various price changes, both in tradable and in nontradable industries, as a consequence of trade liberalization (mainly tariff changes) as well as changes in wages resulting from tariff declines. In the formula for compensating variation, price changes interact with budget shares, which researchers can allow to vary across income classes. Ural Marchand (2012), in an empirical general equilibrium study for India, allows wage responses to vary by skill level and age. For that purpose, she creates a quasi-panel based on skill level, age, and industry over time, since the available data are repeated cross sections and not a true panel. She also assumes no interindustry labor mobility, so wages for different skills and ages in an industry respond only to changes in that industry's price. Unlike Porto, she assumes no impact of tariff changes on nontradable prices. However, like most of this literature, Ural Marchand also ignores land and capital income. The benefit of this analysis is that it is possible to compute the welfare changes at each point in the income distribution. The price transmission of tariffs in this analysis can differ between rural and urban areas as well as the remoteness of the location from the nearest port. Overall, Ural Marchand finds a pro-poor effect of trade reforms in India in that the poor benefited proportionally more than others. Her analysis shows that households at all levels of per capita expenditure benefited from the reforms. Both the consumption and the wage effects separately benefit the poor, especially those significantly below the poverty line relative to those just below it. The benefits are greater for households in urban areas than for those in rural areas and for those in relatively less remote areas due to muted transmission of the price effects of tariffs. Over the entire 1988–2000 period studied, the overall estimated welfare gain was 27% for those at the lowest per capita expenditure levels in rural areas, while it was 13% at the highest levels in rural India. For urban areas, these numbers are 40% and 18%, respectively.

Han, Liu, Ural Marchand, and Zhang (2016) evaluate the pass-through of tariff reductions into price reductions and through that the impact on urban poverty in the PRC. Having calculated the pass-through into tradable prices (allowing for this pass-through to change with the share of the private sector in the city's economy) and the general equilibrium impact of tradeable price changes on nontradable prices, it is possible to calculate the percentage welfare change (through a change in the cost of consumption) for each urban household in the PRC using a compensating variation formula. While the overall percentage increase in welfare is about 7%, poor households experience about a 14% increase in welfare. The percentage gain in welfare keeps decreasing with the overall household expenditure. This is not surprising, since tradables, such as food, clothing, household appliances, and so on, form a bigger share of the household budget in the case of relatively poorer households. Richer households buy relatively more expensive nontradables, such as high-quality education, health care, housing, entertainment, and so on. Both the tariff pass-through and the welfare gain from a given tariff reduction increase with the share of the private sector in the economy.

Seshan (2014) performs a similar empirical general-equilibrium analysis for Viet Nam for the period 1993–98. The author modifies the approach to incorporate household production in agriculture, in which consumption and supply decisions (including input use decisions) are not separable. This is an important feature of Vietnamese

agriculture. Given that relaxing export restrictions on agricultural products, along with reducing import restrictions on goods such as chemicals and fertilizers, was an important part of the overall trade reforms in Viet Nam, making this change to the model was essential. Seshan finds both overall poverty and inequality reduction arising from trade liberalization. While rural poverty fell by 9 percentage points, urban poverty rose slightly. Besides, Seshan finds that trade liberalization was responsible for a third of the decline in overall poverty and half of the decline in rural poverty during this period.

Thus, based on the empirical general-equilibrium welfare studies, we find that, while the welfare impact of trade reforms in Asia has been positive, it is special in that it has been pro-poor. In fact, Porto (2006) also finds such an impact of Mercosur on Argentina. While Mercosur is a customs union that people expect to lead to both trade creation and diversion, the focus of Porto's study is only trade creation. In that respect, it is not especially different from the studies on Asia. However, certain assumptions of his model differ slightly, especially compared with the Indian study, in that he allows for some intersectoral labor mobility as well as the possibility of tariff cuts to affect nontradable prices. In addition, unlike Ural Marchand, he does not allow the price transmission of tariff cuts to vary by distance from the nearest port or by rural and urban areas or the wage responses to vary by age, skill level, and so on. Furthermore, unlike Seshan, he does not allow for household production in agriculture, in which consumption and production decisions occur jointly.

7.4 Trade and Inequality: Empirical Evidence from Asia

7.4.1 Overall Income Inequality

While the above studies focus mainly on wage inequality, the question as to whether trade affects overall income inequality is also important. In Mitra (2016), I show, using cross-country regressions for 46 countries over the period 1981–2013, that a 10 percentage point tariff reduction raises inequality, as measured by the Gini coefficient (on a 0–100 scale), by half a point. Based on these regressions, all of the blame (and more!) for the slight increase in inequality in India can be placed on trade reforms, while, for the PRC, trade liberalization is responsible for a fifth of the inequality increase. A country-by-country examination of what happened to inequality following trade reforms, however, does not produce any clear patterns (Goldberg and Pavcnik 2007a).

Krishna and Sethupathy (2012) construct the Theil index of inequality for the various states and for rural and urban areas for all the years of the "thick" NSSO rounds in India in the period 1988–2005. The advantage of this index is that it is additively separable into "within-group" and "between-group" inequality (within and between states and within and between rural and urban areas). The authors find that the inequality, 70% of which is within-group, immediately after the reforms first decreased during the period 1988–94, then it increased during the period 1994–2000 and decreased thereafter. These results are robust to the use of other measures of inequality. In addition, protection does not seem to be significantly related to inequality.

7.4.2 Wage Inequality

Kumar and Mishra (2008) focus on the impact of trade liberalization on the industry wage premium and overall wage inequality in India for the period 1983–2000. They estimate the value of the three-digit industry fixed effects in Mincerian wage regressions run year by year with individual-level household survey data from the

National Sample Survey Organization (NSSO) for each NSSO survey round on individual age, employment, and educational and other demographic characteristics. The study controls for state and occupational indicators. The final wage premia take the form of percentage deviations from the average industry for each year. Pooling all these wage premia for the various industries over all the years to create a panel, the authors regress the industry wage premium on the nominal rate of protection, the non-tariff barrier coverage ratio, and the import penetration ratio. The two preferred specifications are the ones in levels with year and industry fixed effects and those in first differences with year effects. A 1 percentage point reduction in the industry's import tariff leads to a 0.17% increase in the industry wage premium, which the authors explain using the available evidence on the procompetitive effects of tariff reductions on productivity. To the extent that industries with a larger share of unskilled workers in total employment experienced a greater tariff reduction, the wage inequality must have decreased. The authors confirm this by running the above regression separately for skilled and unskilled workers. The results in Kumar and Mishra's paper are qualitatively robust to controlling for endogeneity through the use of instrumental variables, namely 1980 Nominal Rates of Protection interacted with foreign exchange reserves as well as the initial share of unskilled workers in employment interacted with foreign exchange reserves. The results are also robust to controlling for gross fixed capital formation.

Amiti and Cameron (2012) study the impact of trade liberalization in Indonesia on wage inequality (measured by the ratio of the wage rate of non-production to that of production labor) at the firm level for the period 1991–2000. Using 5-digit output tariff rates and the shares of various inputs at the firm level as weights to arrive at input tariffs, the authors find that a 10 percentage point input tariff reduction lowers wage inequality by 2.6% on average for all firms but by 4.5 for importing firms. For firms with imports as a share of the value of all inputs that are in the top 10%, this effect is 8.5%. This shows that, while imported inputs might be, on average, substitutes for skilled workers, they are probably complements for unskilled workers. The regression of firm-level skill intensity (the ratio of nonproduction to production labor) on the interaction of importing status and input tariff confirms this, showing that importing firms reduce their skill intensity with input tariff liberalization. Output tariffs seem to have no impact on wage inequality.

Chen, Yu, and Yu (2013) investigate the impact of input tariff cuts on wage inequality between skilled and unskilled workers within Chinese firms. The authors argue that skilled workers share the profits of the firm primarily so that they are incentivized to perform well rather than due to the presence of firm–worker bargaining. Since input tariff reductions increase profits, skilled workers' wages rise relative to those of unskilled workers, whose wages firms determine in a perfectly competitive labor market. The authors find evidence that input trade liberalization, in the presence of profit sharing between skilled workers and firms, leads to an increase in skilled–unskilled wage inequality. Running equations in first differences, they instrument the first-differenced tariff with the lagged tariff. Interestingly, their result is completely the opposite of Amiti and Cameron's (2012) finding for Indonesia. The coefficient is smaller when the sample includes processing firms, demonstrating that this channel is not valid for processing firms.

While there is evidence that trade liberalization reduced wage inequality in India and Indonesia, the impact was the reverse in the PRC. The results from Latin America are similar to those from the PRC. Feenstra and Hanson (1996, 1997) find that wage inequality rose in response to trade reforms during the period 1975–88 in Mexico, primarily from input tariff cuts that resulted in relatively skill-intensive activities in processing these inputs moving to Mexico from the US (where these activities were the

least skill intensive in the US but still more skill intensive than the existing production activities that Mexican workers were already undertaking). Attanasio, Goldberg, and Pavcnik (2004) find that trade liberalization increases wage inequality in Colombia. However, Pavcnik et al. (2004) do not find any impact of tariff cuts on wage inequality in Brazil. The difference between these results is attributable to differences in labor market flexibility as well as informal-to-formal sector labor mobility between Colombia and Brazil. Overall, for Asia as well as the rest of the world, researchers find mixed results regarding this question. Helpman et al.'s (2017) and Krishna, Poole, and Senses's (2014) more recent work shows that wage inequality can have a non-monotonic or increasing relationship with respect to trade openness. Openness in trade leads to higher returns to exporting firms from investment in screening to find the best workers. This screening process leads to the recognition of worker characteristics that are usually unobservable (especially to the econometrician). The match quality also improves in exporting firms with greater openness. As a result, exporting firms are able to pay higher wages. As trade costs fall, initially only a few firms export, but with further reductions in trade costs, more and more firms export. This can contribute to a non-monotonic response of wage inequality to greater trade openness. In fact, it is possible in this case, as Helpman et al. (2017) show, for inequality to increase first and then start to decrease. They show the latter part in their model but not in the data, as trade costs have not yet fallen to that level in Brazil.

I next move on to the labor shares, which researchers view as being negatively correlated with income inequality.

7.4.3 Labor Shares

Recently, there has been an interest in the factor shares or the so-called functional distribution of income. While the share of labor had remained constant for many decades all over the world, the last two to three decades have witnessed a decline in this share in many parts of the world, especially developing countries (International Labour Organization (ILO) 2011). At the same time, globalization, especially trade reforms, have taken place at a rapid pace all over the world. Thus, there is a tendency to blame the declining labor share on trade. The issue of declining labor shares needs further investigation for a few reasons. Firstly, the rich derive their income mainly from capital and land, the distribution of which is highly unequal throughout the world. Secondly, the poor derive their incomes mainly from their raw labor, and labor incomes are relatively more equally distributed. Thirdly, the overall inequality and the share of labor are strongly negatively correlated (Atkinson 2009). Finally, while globalization has taken place at a rapid pace, skill-biased technological change has occurred equally rapidly. Therefore, the exact cause of the declining labor share and whether globalization has speeded up this decline or whether the decline would have been even greater in the absence of globalization are unknown.

For India, Ahsan and Mitra (2014) use firm-level data to investigate the impact of tariff cuts on the share of the wage bill in firm sales. This study indicates something quite nuanced. For relatively small firms (those that lie in the bottom third of the distribution), which also turn out to be relatively labor intensive, based on the within-firm variation, controlling for macro effects, the authors find that tariff reductions increase labor shares, while for large firms (in the top third of the distribution), which are relatively less labor intensive, labor shares decrease with tariff reductions. While the elasticity of the labor share with respect to the industry-level tariff is -0.5 in the former set of firms, it is 0.8 for the latter. The study also finds that there is a decline in the bargaining power of workers in the sharing of profits across the board (as Rodrik (1997) argues and predicts), arising from these tariff cuts, but there is an offsetting force coming from the

destruction of the monopoly power of domestic firms, which shrinks the wedge between the value of the marginal product and the wage. The second force is the dominant one in the case of small firms.

Mitra and Shin (2014) find qualitatively similar but quantitatively slightly different results for the Republic of Korea using firm-level survey data both for the labor share and for the bargaining power of workers. Kamal, Lovely, and Mitra (2014), on the other hand, find that, in the case of Chinese firms in the period 1998–2007, tariff cuts lead to increases in firm-level labor shares across the board. This effect is stronger for coastal firms than for interior firms and varies by ownership type, namely domestic private, foreign, and state owned. Both input and output tariff cuts seem to have qualitatively similar effects. The effective rates of protection have qualitatively similar effects on the share of wages in the firm value added.

Regarding the case of India, while a reduction in the bargaining power of workers (through either direct competition from imported inputs or through indirect competition from goods produced by foreign inputs and labor) is an important force arising from trade liberalization, it is also possible that the decline in rents leads to declining unionization. This can happen due to the reduced incentives to meet the costs of forming new unions and maintaining old ones. Using household survey data for the period 1993–2004 from India, from which the authors create measures of union presence (the proportion of workers in an industry in unionized activities) and union membership (the proportion of workers in an industry who are union members) in various industries by state, Ahsan, Ghosh, and Mitra (2017) find evidence that, in net importer industries, a 10 percentage point reduction in the import tariff led to a 0.8 percentage point reduction in the proportion of workers working in unionized activities as well as in the proportion of workers who are union members. This investigation also finds evidence from firm-level data that industry quasi-rents per plant declined with tariff cuts (where quasi-rents are total sales minus material and fuel costs minus the wage bill evaluated at the prevailing non-union wage in the household survey data).

7.4.4 Trade and Labor-Demand Elasticities

Rodrik (1997) argues that trade liberalization makes the labor demand more elastic. Through trade liberalization, cheaper and a greater variety of imported substitutes for domestically produced goods are available. This makes the demand for domestically produced goods more elastic. The demand for labor, being derived from the demand for goods and services, also becomes more elastic. In addition, imported inputs can directly substitute domestic labor.

The study of the impact of trade on labor demand elasticities is important for a few reasons. An increase in the magnitude of labor demand elasticity results in lower bargaining power for workers relative to employers, greater volatility in employment and wages for the given volatility in productivity, and a greater negative impact of rises in input and fuel costs on workers.

Hasan, Mitra, and Ramaswamy (2007) show that, with tariff cuts, the absolute value of the elasticity of labor demand at the industry level in Indian manufacturing rose from 0.076 to 0.186 in states with labor regulations that ensure a relatively rigid labor market, while in the other states it increased from 0.206 to 0.316. These calculations are based on a change in the average manufacturing tariff from 150% in 1988 to 40% in 1997. In contrast, Slaughter (2001) finds no systematic impact of trade liberalization on labor demand elasticities for the US, while this impact is statistically insignificant for Turkey (Krishna, Mitra, and Chinoy 2001).

For the Republic of Korea, Mitra and Shin (2012) find weak evidence of trade liberalization increasing labor demand elasticities. However, there is some evidence that Korean exports have increased their firm-level labor demand elasticities. A 10-percentage point increase in the share of exports in firm-level output leads to an increase in absolute labor demand elasticity of up to 0.04.

8. DISCUSSION AND CONCLUDING REMARKS

As is apparent from the above discussion, trade has been beneficial to Asian countries through a number of channels and in many different respects, namely through higher productivity, lower markups through import competition, higher wages, higher employment, lower unemployment, and, above all, lower poverty rates.[5] This is in sharp contrast to the impact of trade in some of the Latin American countries, which might suggest that the beneficial impacts might not be generalizable to Asian countries that so far remain unstudied. There are, however, a few adverse consequences of trade even in the Asian countries that are studied rigorously, and public policy needs to address these. Firstly, trade can increase informality, especially in the presence of labor market rigidities. Secondly, there is an adverse effect stemming from trade adjustment as a result of worker mobility costs. Then there is rising income inequality. However, it is quite possible that the diversion of government funds from social expenditures to infrastructure building during this period of globalization is the reason for some countries not being able to contain the rise in inequality. However, at the same time, this could be the reason for rapid growth and, in turn, through its "pull-up" effect (Bhagwati 2004), the reduction in poverty.

My review of the evidence also shows that, in some respects, globalization has put pressure on workers. For example, their bargaining power relative to their employers has decreased, most likely due to the greater options available to employers in terms of obtaining inputs from abroad or even the wider variety of imported final goods and services available to consumers, thereby making the services of domestic workers more replaceable. This reflects in the rise of labor demand elasticities in the two Asian countries for which evidence is available, namely India and the Republic of Korea, and in some other countries outside of Asia. As explained earlier, this, apart from reducing the bargaining power of labor, makes workers' incomes more volatile and their jobs more uncertain. In addition, workers have to bear a higher burden of rises in input and fuel costs.

Bhagwati (2004) argues that "appropriate policies" are necessary to reap and harness the gains from trade. For example, he reasons that countries can specialize away from goods for which the world prices are falling steeply but still specialize according to their comparative advantage. He is also in favor of other complementary "appropriate policies," especially with respect to agriculture, financial development, property rights, infrastructure building, and so on. Cain, Hasan, and Mitra find that Indian states that were financially more developed had higher road density, were closer to ports, and had labor regulations that enabled more flexible labor markets were able to achieve a greater reduction in urban poverty as a result of trade reforms. The work of Krishna, Mitra, and Sundaram (2010) also supports this result, finding that "lagging" regions or states (those that are distant from their respective nearest ports) within South Asia have been relatively less successful in reducing poverty through trade reforms.

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[5] For a summary of the research discussed here, please see the literature table at the end of this paper.

Thus, the above evidence stresses the need for better infrastructure, especially a denser and better network of roads and greater investment in the building of new ports, and at the same time a larger number of bank branches and labor regulations that can provide workers with the right kind of protection without sacrificing flexibility for employers to respond nimbly to the demand and supply shocks that they face in a more globalized environment. In addition, social protection and "appropriate" redistributive policies are necessary to make sure that the losers from globalization are appropriately compensated to minimize the chances of a reversal of reforms (which policy makers should not underestimate). Countries should use public works programs, which provide the unemployed and underemployed with productive job opportunities, as much as possible as a means of social protection and, at the same time, infrastructure building, which is essential for maximizing the gains from trade in its many forms. Public works programs can be especially important in Asian developing countries, where the informal sector accounts for a substantial share of employment.

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APPENDIX

Responses to Trade Opening: Summary of Evidence from Asia

Topic	Authors	Economies Covered	Main Finding
Trade reforms, productivity growth and markups at the firm level	Krishna and Mitra (1998)	India	Statistically significant reductions in markups and increases in productivity growth in firms in majority of industries studied.
Trade and productivity	Topalova and Khandelwal (2011)	India	Procompetitive impact of output tariff reduction: lower tariffs lead to higher productivity. Much greater increase in productivity from an equal input tariff reduction.
Trade, intermediate goods prices and variety	Goldberg, Khandelwal, Pavcnik and Topalova (2010)	India	Trade liberalization led to a considerable decline in the prices of intermediate inputs and an increase in their variety.
Trade liberalization and firm-level markups	De Loecker, Goldberg, Khandelwal and Pavcnik (2016).	India	Output tariff reductions led to a reduction in firm-level price-marginal cost markups, while input tariff reductions led to an increase in these markups.
Trade liberalization and formal and informal firm productivity	Nataraj (2011)	India	Output tariff reductions increased informal firm productivity proportionally much more than formal firm productivity. The reverse was the case with input tariff reductions.
Trade liberalization and productivity	Amiti and Konings (2007)	Indonesia	While a 1%–6% increase in productivity can be attributed to a 10 percentage point reduction in output tariff, firms importing inputs experience up to a 13% increase in productivity from a 10 percentage point input tariff reduction.
Trade liberalization, markups and productivity	Brandt, Biesenbrock, Wang and Zhang (2017)	People's Republic of China (PRC)	A 10 percentage point reduction in output tariff leads to 1 percent markup reduction, while a 10 percentage point reduction in the input tariff leads to a 7 percent markup increase. The procompetitive effect of a 10 percentage point decline in output tariff is 1.7% increase in total factor productivity, while for a 10 percentage point decline in input tariff the TFP gain is 16%–18%.
Trade liberalization and markups	Fan, Gao, Li and Luong (2017)	PRC	Looking separately at firms engaged in processing trade and other firms, effects in Brandt et al empirically do not show up for the former but are seen in the latter.
Trade liberalization and firm productivity	Yu (2013)	PRC	With a 10 percentage point output tariff reduction, firm TFP increases by 9%. A 10 percentage point input tariff reduction increases firm TFP by only 5%. These impacts go down with an increase in the share of processing imports in total imports.
Trade liberalization, firm productivity and technological frontier	Bas and Causa (2013)	PRC	Firms, on or close to the frontier, experience a 0.74% increase in productivity from a percentage point reduction in input tariffs. Firms whose productivity is half of the domestic technological frontier will see roughly a 0.5% rise in productivity from the same tariff reduction. The procompetitive impact of output tariff reductions is stronger for firms relatively distant from the technological frontier.
Trade liberalization, industry productivity and markups	Kim (2000)	Republic of Korea	A 10 percentage point reduction in the quota-coverage ratio led to a TFP growth increase of 0.26 percentage points and a markup reduction of 1.33 percentage points. A 10 percentage point reduction in the nominal rate of protection led to a TFP growth rate increase of only 0.12 percentage points and a markup reduction of 0.4 percentage points. Trade liberalization overall during the entire sample period raised annual TFP growth rate permanently by over 2 percentage points.

Appendix *table continued*

Topic	Authors	Economies Covered	Main Finding
Trade Liberalization and firm-level wages	Amiti and Davis (2012)	Indonesia	A 10 percentage point output tariff cut leads to a 2.4 percent reduction in the average non-exporting firm wage but a 2.4 percent increase in the average export firm wage. A 10 percentage point input tariff reduction results in a 2.3 percent wage increase in non-importing firms, but a 7.5 percent wage increase in firms that import at least some of their inputs.
Trade liberalization, firm-level wages and markups	Kambhampati, Krishna and Mitra (1997)	India	Controlling for wages and markups, after trade liberalization firm-level labor demand increased in India by 4%-9%, depending on the industry.
Trade and industry-level employment and wages	Dutt (2003)	India	Industry-level employment goes up after liberalization and is positively related to import penetration. But there is no significant effect of trade protection on the employment level. However, employment growth is negatively related to protection.
Trade and firm-level employment	Mitra and Shin (2012)	Republic of Korea	A 10 percentage point reduction in industry-level tariff reduces firm-level labor demand by 0.6 percent. A 10 percentage point increase in the ratio of exports to output increases firm-level labor demand by 0.7 percent.
Trade liberalization and unemployment	Hasan, Mitra, Ranjan and Ahsan (2012)	India	A 10 percentage point decrease in the state-level employment-weighted average tariff rate leads to a 7.5 percent decline in the state-level unemployment rate. Also, a 10 percentage point reduction in a 2-digit industry-level tariff leads to a 0.08 percentage point reduction in the probability of being unemployed within an industry.
Trade liberalization, labor-market flexibility and informality	Sundaram, Ahsan and Mitra (2013)	India	Informal sector firms with five or fewer workers experience a greater increase in output, value added, and employment due to tariff reductions in the relatively rigid labor regulation states as compared to others. Trade liberalization might be reducing informality (the share of employment or output in the informal sector) in states with relatively flexible labor regulations and increasing it in other states.
Informality, structural change and trade liberalization	Ahsan and Mitra (2017)	India	Informality was rising in low-productivity sectors relative to high-productivity sectors, which were also the sectors which were expanding in relative output and employment. This differential trend goes away with trade liberalization
Exports and informality	McCaig and Pavcnik (2018)	Viet Nam	As US tariffs on exports by Viet Nam to the US were lowered from 23.4% to 2.4% through the US-Viet Nam BTA, individuals moved from employment in small, informal enterprises to large, formal firms. Within the first two years, the proportion of informal workers in the manufacturing sector went down from 66% to 60%. Industries with bigger US tariff cuts also experienced larger reductions in informality. This contributed to aggregate productivity growth of about 1.5%-2.8% annually.
Labor regulations and informality in an open economy	Liang, Appleton and Song (2016)	PRC	The proportion of casual employment in urban PRC increased from 24% in 2007 to 42% in 2013, probably due to the 2008 New Labor Contract Law (in an open economy).

Appendix *table continued*

Topic	Authors	Economies Covered	Main Finding
Trade openness and informality	Fiess and Fugazza (2012)	PRC; India; Indonesia; Japan; Bangladesh; Pakistan; Sri Lanka; Nepal; Malaysia; Hong Kong, China; Singapore; the Philippines; and many non-Asian countries	While output informality rises with trade openness, employment informality falls.
The adjustment costs of trade and worker mobility costs	Artuc, Lederman and Porto (2015)	PRC, India, Iran, Indonesia, Republic of Korea, Lithuania, Azerbaijan, Bangladesh, the Philippines and many non-Asian developed and developing countries	The labor mobility cost is 3.88 times the average wage in South Asia, 3.95 in Central Asia and 3.46 in East Asia and the Pacific. A sizeable proportion of the welfare gains from trade are being wiped out by adjustment costs.
Policies to minimize trade adjustment costs	Hollweg, Lederman, Rojas and Bulmer (2014)	Cross country study, includes above countries	Policies aimed at reducing labor mobility costs include subsidizing destination-specific relocation costs, training programs to provide skills specific to destination sectors, unemployment benefits or insurance, job search assistance, subsidized employment through public works programs, announcing trade reforms in advance or gradual trade liberalization etc.
Social protection policies for workers exposed to external	Mitra and Ranjan (2011)	No specific country	The study notes the benefits of expanding unemployment benefits and insurance but with strict monitoring. The study recommends against excessive use of employment protection policies and advocates for East Asia style public works programs. The authors also argue that various forms of unemployment support will build and sustain support for greater openness of economy.
Trade and per-capita incomes	Frankel and Romer (1999)	Cross-country study	Trade increases per-capita income.
Trade and per-capita incomes	Irwin and Tervio (2002)	Cross-country study	Trade increases per-capita income.
Growth in incomes of the poor	Dollar and Kraay (2002)	Cross-country study	The growth in incomes of the poor is no less than the rate of growth of per capita income.
Trade, growth, poverty and inequality	Mitra (2016) (first relevant part)	India and the PRC	The PRC, where inequality went up much more, actually did much better at poverty reduction than India. While both India and the PRC have grown quite rapidly during the last couple of decades, the PRC's growth performance has been quite a bit better and that has led to a faster reduction in poverty.
Trade and poverty reduction	Topalova (2007)	India	Districts, whose rural workers were more exposed to an import competition rise, saw a relatively slower reduction in rural poverty. Compared to a district that did not experience any change in this exposure, a district experiencing the mean change in it saw a 2 percentage point poverty rise. Urban poverty saw no statistically significant relationship but had the same coefficient sign as rural poverty. Trade liberalization led to a "significant setback" in rural poverty reduction.

Appendix *table continued*

Topic	Authors	Economies Covered	Main Finding
Trade and poverty reduction	Hasan, Mitra and Ural (2007), later updated by Cain, Hasan and Mitra (2012)	India	States with workers more exposed to foreign competition had lower rural, urban and overall poverty rates. States with greater reduction in employment weighted-tariffs also experienced greater poverty reduction. These effects were more pronounced in states with labor laws making for more flexible labor markets, greater road density and greater financial development.
Trade and poverty reduction of social backward classes	Mukim and Panagariya (2012)	India	Socially backward classes also experienced declines in poverty rates during the period since trade reforms, with some evidence that trade reforms led to a decline in their poverty.
Trade and poverty reduction	Kis-Katos and Sparrow (2015)	Indonesia	Poverty declined with a reduction in the input tariffs but increased with output tariff reductions. A one standard deviation larger reduction in the employment-weighted input tariff leads to half a standard deviation greater reduction in the district-level poverty rate. The results seem to be driven by people at the extremes in education levels.
Trade and poverty reduction	McCaig (2011)	Viet Nam	A one standard deviation reduction in the employment-weighted average US tariff faced by a province leads to 33%-40% reduction in poverty within two years.
Trade and poverty	Ural-Marchand (2012)	India	There was a pro-poor effect of trade reforms in that the poor benefited proportionally more than others. The benefits were greater for households in urban areas than those in rural areas and for those in relatively less remote areas.
Trade and poverty	Han, Liu, Ural Marchand and Zhang (2016)	PRC	The poor saw a great percentage increase in their real incomes as compared to the rich due to trade liberalization
Trade, poverty and inequality	Seshan (2014)	Viet Nam	Overall poverty as well as inequality fell due to trade liberalization. While rural poverty fell drastically, urban poverty went up slightly. Trade liberalization has been responsible for a third of the decline in overall poverty and half of the decline in rural poverty during the post-reform period.
Trade and inequality	Mitra (2016) (second relevant part)	India and the PRC (cross-country regressions using data from 42 countries were run)	All of the slight increase in inequality in India over the last couple of decades can be attributed to trade reforms, while in the PRC trade liberalization is responsible for a fifth of the inequality increase.
Trade and inequality	Krishna and Sethupathy (2012)	India	Inequality, right after the reforms, first went down during 1988-94, then went up during 1994-2000 and went down thereafter. Protection does not seem to be significantly related to inequality.
Trade and wage inequality	Kumar and Mishra (2008)	India	A percentage point reduction in the industry's import tariff leads to a 0.17 percent increase in the industry wage premium. Bigger tariff reductions and, therefore, bigger wage premia increases in unskilled labor intensive industries resulted in a reduction in wage inequality.
Trade and wage inequality	Amiti and Cameron (2012)	Indonesia	A 10 percentage point input tariff reduction lowers wage inequality by 2.6 percent on average for all firms but by 4.5 for importing firms. For firms whose imports as a share of the value of all input are in the top 10 percent, this effect is 8.5 percent.
Trade and wage inequality	Chen, Yu and Yu (2013)	PRC	Input trade liberalization, in the presence of profit sharing between skilled workers and firms, leads to an increase in skilled-unskilled wage inequality. This effect is not valid for processing firms.

Appendix *table continued*

Topic	Authors	Economies Covered	Main Finding
Trade and labor shares	Ahsan and Mitra (2014)	India	For the relatively small and labor-intensive firms, tariff reductions raised labor shares, while for the large and relative low labor intensity firms, labor shares fell with tariff reductions. While the elasticity of the labor share with respect to the industry-level tariff is -0.5 in the former set of firms, it is 0.8 for the latter.
Trade and labor shares	Kamal, Lovely and Mitra (2015)	PRC	Tariff cuts lead to increases in firm-level labor shares across the board. This effect is stronger for coastal firms than for the interior firms and vary by ownership type: domestic private, foreign and state owned. Both input and output tariff cuts have qualitatively similar effects.
Trade and labor shares	Mitra and Shin (2014)	Republic of Korea	Results are qualitatively similar but quantitatively different from Ahsan and Mitra (2014)
Trade and unionization	Ahsan, Ghosh and Mitra (2017)	India	In net-importer industries, a 10 percentage point reduction in the import tariff led to a 0.8 percentage point reduction in the proportion of workers working in unionized activities as well as in the proportion of workers that are union members. Industry quasi rents per plant were declining with tariff cuts.
Trade and labor-demand elasticities	Krishna, Mitra and Chinoy (2001)	Turkey	The impact of trade liberalization on firm-level labor demand elasticities was statistically insignificant.
Trade and labor-demand elasticities	Hasan, Mitra and Ramaswamy (2007)	India	The absolute elasticity of labor demand at the industry level in Indian manufacturing went up, due to trade liberalization, from 0.076 to 0.186 in states with rigid labor regulation states from 0.206 to 0.316 in the flexible labor regulation states.
Trade and labor-demand elasticities	Mitra and Shin (2014)	Republic of Korea	There was weak evidence of trade liberalization increasing labor demand elasticities. However, Korean exports have increased their firm-level labor-demand elasticities. A 10 percentage point increase in the share of exports in firm-level output led to an increase in absolute labor-demand elasticity by up to 0.04.