Compelling empirical evidence regarding the ways in which trade affects income dis­tributions within a country has emerged in the past two decades.1 The scope of analysis has consequently widened to examine broader dimensions of worker exposure to trade shocks, which underscore the complexity of the links between trade, inequality, and poverty. Previous surveys of the literature suggest that this complexity occurs for at least three reasons.

**Defining and measuring trade and its impacts is complex.** Although the general idea of “trade” is straightforward, the variables used to measure trade are diverse. As such, it is perhaps not surprising that the empirical results in the literature often generate conflicting results. “Trade” includes trade policy changes, value chains, output prices, outsourcing, and exchange rates. Much but not all of the current literature focuses on import competition or falling tariffs, leaving other dimensions understud­ied (MIlanovic and Squire 2007; Rojas-Vallejos and Turnovsky 2017; Wood 1997).

Changes in trade may affect the economy either through prices (producer or con­sumer prices) or quantities (the volume of exports or imports). Although most approaches suggest that prices are the most relevant channels, many studies focus on quantities because they are usually easier to measure. Trade also affects consumer prices and not just wages. Most studies approximate the impact of trade on welfare by exam­ining how much wages can buy, using the changing price of a fixed basket of goods as a reference point. This fails to consider welfare gains from greater product variety and obscures complicated distributional issues like the fact that poor and rich individuals consume different baskets, bringing different levels of benefits from changes in relative prices. Studies measuring the distribution of welfare gains across all the main relevant welfare channels are only beginning to emerge.

**The range of labor market outcomes affected by trade shocks is broad.** Employment, earnings, income inequality, informality, and unemployment are all crit­ical dimensions that deserve attention. Earnings are most often studied, but other dimensions represent important aspects of worker welfare and opportunity. Informality, for example, plays a key role in developing country employment. When workers do not have income support such as unemployment insurance or government income assis­tance, working is necessary for survival. As a result, informal work is common and plays the role that unemployment insurance might play in developed countries.

**A greater appreciation of the differences between short-term adjustment and long-term effects.** Much of the current conventional wisdom about the unexpected rise in inequality resulting from trade shocks focuses on the short term, which is defined as the period in which workers and capital do not shift between industries. As labor and capital become more mobile, they incur very significant adjustment costs. New insights into the importance and role of these adjustment costs raise the possibil­ity that localized costs of international trade are much higher than previously believed, possibly helping to explain why support for protectionism and tariffs have been rising in some countries. In the long term, however, the benefits tend to emerge in terms of decreasing wage inequality2 (Beyer, Rojas, and Vergara 1999; Gonzaga, Filho, and Terra 2006; Robertson 2004).

There are a few existing frameworks in the literature that provide a good starting point for understanding the varied channels through which trade can affect house­hold welfare. Deaton (1989), for example, provides a simple framework that shows how household can be affected by price changes through both consumption and earnings after the removal of a rice export tax. Porto (2006) expands on Deaton’s framework by distinguishing between the direct and indirect impacts of such trade policy changes between tradable sectors such as agriculture, manufacturing, and mining, and nontradeable sectors such as infrastructure and retail. McCulloch, Winters, and Cirera (2001) provide a framework that traces the changes in border prices as a result of trade policy shocks to (a) retail prices faced by consumers; (b) impacts on profits, wages, and employment by firms; and (c) effects on govern­ment revenue and expenditures on behalf of the poor. Drawing upon these frame­works, this report presents a simple guidance framework to systematically think about distributional impacts of trade.

First, households can be seen as both producers and nonproducers that consume as well as participate in the labor market. An advantage of separating the components in the definition of household welfare into production and consumption allows us to study these independently in order to identify and quantify the different sources of welfare effects across households.

Second, there are two key sources through which trade can affect welfare: prices and quantities. Among these, the following channels exist.

1. *Prices*. One channel works via the impact on household expenditure. Changes in tariffs or other trade costs result in changes in border prices, wholesale prices, and eventually in retail prices, which alter the total cost of consumption for house­holds. The other channel works via the impact on earnings. Changes in wholesale and retail prices result in changes to endowment prices, which affect firms’ profits and thus lead to changes in investment and wage decisions. Wages obtained by households and profits earned by capital owners can improve or worsen as a result of trade policy shocks. Households could also see their income affected by the changing prices of items they produce.
2. *Quantities*. Given that neoclassical trade models assume full employment and no barriers to labor mobility, they do not predict large effects of trade policy on employment levels. As firms’ competitiveness changes because of shifts in the prices of input (imported and domestic) and output, both wage and employment decisions could be altered at the sector level. The ability of households to maintain or gain new employment might consequently be affected.

Third, there are differences in initial endowments or assets. The magnitude of the impact for different households depends on the markets and services they use, —for example how much they consume of each product and which industry employs house­hold members. This in turn is influenced by a household’s endowments: skill levels, the ability to learn new skills, location, the ability to move, and its position in the income distribution.

Fourth, trade policy changes alter government revenue. The direct effect of the reduction of tariffs (or other trade taxes) might lead to lower tariff revenue; however, if it stimulates more imports or increases economic activity and revenue from other taxes, the overall impact on government revenue could be positive. Changes in tax revenue could alter the value of government expenditures on behalf of the poor, including direct transfers to households.

Overall, trade policy shocks can have varied impacts on households with different income levels and other characteristics and can result in an overall pro-poor, pro-rich, or neutral effect. In the next section, we use this guidance framework to review the evidence documenting the impact of trade on household welfare with a focus on the labor market and consumption channels and across region and time. We concen­trate on the impacts on labor market and consumption outcomes because two-thirds to three-quarters of national income accrues to wage earners in developing countries, and labor continues to be the poor’s main asset. Also, a vast majority of households in low-income countries are self-employed and may not participate in the labor mar­ket (Goldberg and Pavnick 2007a). In addition, we discuss how impacts vary across different groups on the basis of the demographic characteristics of workers and the income distribution.

Over the past decade, a new wave of literature has surfaced that captures the impacts of trade at the local or subnational level and by region of residence of workers. It argues that the impacts of trade on local labor markets within the country may differ because of differences in their initial sectoral composition. Following the joining of the North American Free Trade Agreement (NAFTA), for example, workers in northern Mexico, which was more export-intensive, benefited more than workers living in regions far from the United States. This new wave of literature also builds on a vast evidence base describing trade impacts on labor markets within countries that has evolved over the past decades in terms of how it views workers, shifting from a focus on physical or human capital to industry affiliation, worker age, and the type of tasks being per­formed.4 As highlighted by Robertson (2018), the differential impacts across regions occur primarily for two reasons.

1. *Geographical concentration of production*. Production tends to be geographically concentrated or localized, and when this occurs lower-cost imports of a good will benefit consumers of that good nationwide. Areas with a high concentration of producers competing with these imports, by contrast, will experience a fall in employment. Similarly, areas with a high concentration of export-oriented pro­ducers will benefit.
2. *Sluggish mobility across regions*. Faced with high moving costs, workers avoid moving between regions, and, if relocation costs are significant, trade liberaliza­tion effects will be highly localized.

A good place to begin is with a review of this literature that examines the old ques­tion of the welfare impacts of trade through the new lens of regional variation within developed and developing countries. The seminal study is by Topalova (2010), who focused on the impact of India’s trade liberalization. Since then, the academic commu­nity has analyzed the impacts of trade on labor market outcomes at the subnational level in developed countries, specifically focusing on the period leading up to and following China’s accession to the World Trade Organization in 2001. This analysis includes China’s rapid subsequent expansion in exports of low-skill-intensive manu­factured goods to the United States and other industrial nations.

The most influential paper is by Autor, Dorn, and Hanson (2013, henceforth ADH), who analyzed the effect of rising Chinese import competition between 1990 and 2007 on US local labor markets, examining cross-market variations in import exposure stemming from initial differences in industry specialization and instru­menting for US imports. The authors find that China’s rise accounts for about 25 percent of the decline in US manufacturing employment, producing highly dif­ferentiated local impacts. As for wages, the authors find that there was surprisingly no statistically significant impact in manufacturing between US community zones, but there was a decline in wages outside of the manufacturing sector.

Turning from the local labor market as the unit of analysis to individual work­ers within the local labor markets, Autor et al. (2014) find a differential wage impact of the China shock across local labor markets: Chinese import competition depressed wages, but high-income workers were affected less adversely than low-income earners. This was in contrast to ADH, who find no effects on wages. Overall, the evidence to date on wage effects from the China shock does not appear strong.

Another important study comes to a similar conclusion. Pierce and Schott (2016), who focus on the same channel (direct competition from China), find that imports from China lowered US manufacturing jobs and total employment. Other reduced-form studies (following the same methodological framework as ADH) and other gen­eral-equilibrium spatial model–based studies put estimates of US jobs lost due to trade with China at nearly 1 million (Caliendo and Parro 2015). Ten years after the rise of Chinese import competition, though, the areas adversely affected by trade had very similar populations: workers, in other words, did not want to relocate even after nearly a decade of import competition, highlighting severe labor adjustment costs. Several other studies focusing on the experience of developed countries with greater import competition find similar negative impacts on employment (Acemoglu et al. 2016; Asquith et al. 2017; Bernard et al. 2020).

ADH’s contribution to the literature has been significant in terms of quantify­ing an inarguably exogenous shock—China’s growth—and has stimulated the pro­duction of an entire body of literature that assesses the impact of this shock on subnational labor market outcomes using reduced-form methodologies. Many of these papers have added more complexity to the ADH framework, which has deep­ened the understanding of the results of this seminal work (see box 2.1). Xu, Ma, and Feenstra (2019), for instance, find that the negative employment effect of the China shock is reduced by about 20–30 percent when controlling for local housing prices. Another paper by Feenstra, Ma, and Xu (2017) contends that just focusing on Chinese exports is insufficient, given that the negative employment effects of Chinese imports on aggregate employment were completely offset by the positive effects of US exports.

Since the ADH study, empirical evidence has expanded to include emerging economies, although most studies have focused solely on estimating the downsides of increased import competition or falling tariffs on the local labor markets (Dix-Carneiro and Kovak 2017; Kovak 2013). Some recent studies have quantified the gains in export-producing regions or industries, but only a handful have investigated the longer-term effects of exports on labor market outcomes (Artuç et al. 2019; McCaig and Pavcnik 2018).

Although the channels of impacts are country-specific, some key messages can be drawn from the new body of literature that captures the impacts of trade at the local and subnational levels and by region of residence of workers.

First, effects of trade on labor income and poverty are large, localized (geographically concentrated), and limited to certain sectors and occupations. These could be negative or positive, depending on the type of trade shock faced by a country. When workers live in areas characterized by an industry losing its previous protections from import competition they can experience significant welfare losses. Evidence from European countries and the United States support this finding. Global value chain participation through backward and forward linkages, though, seems to reduce poverty at the subnational level. In Mexico and Vietnam, the regions that saw more intensive global value chain participation also saw a greater reduction in poverty (World Bank 2020). Similarly, studies that look at the impact of greater export orientation and access to developed country markets find that in India wages are higher and labor shifts away from informal to formal jobs (Artuç et al. 2019), and in China and Vietnam poverty is lower and labor shifts out of agriculture (Erten and Leight 2019; McCaig and Pavnick 2018).

Second, subnational impacts differ in both the short run and the long run depending on the adjustment process. In some countries, local labor market adjustments to trade shocks can be remarkably slow, with outcomes like wages and employment remaining depressed for a long period of time in the areas subject to more import competition from China (Autor, Dorn, and Hanson 2016). In Brazil and South Africa, recent work also finds that a wage and employment decline in regions more exposed to import competition can be long lasting, but that, in Bangladesh, regional effects dissipate, and women’s wages rise in the long run relative to men’s earnings after a rise in exports (see chapter 3).

Third, the informal sector could constitute important margins of labor market adjustment to trade in developing economies. Moving into informal employment serves as a fallback for trade-displaced workers, preventing them from falling out of the labor force completely, especially in regions with more flexible labor regulations.

Fourth, differences in levels of participation with global value chains across coun­tries may also be partly responsible for differing effects of trade shocks (such as import

211704.indb 20 4/23/21 11:59 AM Lessons from the Literature on Distributional Impacts 21

tariff reductions) on labor income (employment and wages). In Brazil, Menezes-Filho and Muendler (2011) find that low tariffs on intermediate inputs were associated with a lower likelihood of unemployment and higher formal sector employment. By contrast, Dix-Carneiro and Kovak (2017) find that, lower tariffs had the opposite effect, result­ing in higher informality in Brazilian micro-regions that were more exposed to tariff reductions, even 20 years after the trade reform. Similarly, after examining annual vari­ations in tariffs between 1993 and 2001, Sarra and Bombarda (2018) find that regional exposure to Mexican tariff reductions boosted the probability of formal employment in tradable sectors, especially for men. This may have been driven by the fact that export-oriented sectors benefited from the fall in Mexican tariffs as intermediate inputs became cheaper.

Earlier evidence on the subnational effects of trade has focused on India, although there is no clear verdict on how much increased import competition affects regional labor markets. A study by Topalova (2007) finds a 2.0 percent increase in the poverty incidence and a 0.6 percent increase in poverty depth in an urban district. en tariffs were cut during the 1990s, India’s progress in poverty reduction was set back by approximately 15 percent.

By contrast, Hasan, Mitra, and Ural (2007) find that the tariff reforms were not associated with higher poverty overall. In fact, the study shows that lower tariffs during the 1990s were associated with a 15 percent decline in urban poverty in states with flexible labor market institutions relative to other states. There was additionally no effect on rural poverty. Given that the authors use an estimation technique similar to Topalova (2007), they argue that the difference in results could be explained by their inclusion of measures for nontrade barriers.

When Topalova (2010) takes nontrade barrier measures into account, though, the author still finds that poverty rose dramatically in both rural and urban India in the 1990s.

On the export side, however, the verdict is clear. Indeed, there is evidence that export growth has resulted a large and persistent beneficial impact on informality and wages. Hasan et al. (2012) find that trade protection is negatively correlated with state-level unemployment, a correlation that is especially strong for states with high employment in exporting industries. They also find that lower tariffs reduce

211704.indb 21 4/23/21 11:59 AM 22 The Distributional Impacts of Trade

unemployment rates by about 41 percent in states with flexible labor markets and large export shares.

Using a similar methodological framework as ADH, Artuç et al. (2019) find that, more recently, larger exports per worker have resulted in higher wages for those typi­cally working in the formal sector (especially high-skilled workers) and less infor­mality for many marginalized groups in India (1999–2011) and Sri Lanka (2002–13).

1. In districts in India that are more export-intensive, a US$100 export increase per worker resulted in an annual wage increase of Rs 572 per worker. Higher exports also drew workers from the informal sector into the formal sector, especially women and low-skilled workers.
2. For Sri Lanka, a US$100 increase in exports per worker resulted in an average wage increase of SL Rs 975 and an average income increase of SL Rs 206.

Besides Artuc et al. (2019) little is known about how trade barriers affect local labor markets in Sri Lanka. This report consequently tries to fill a gap by assessing the impact of Sri Lanka’s trade policy changes not only on household income (through wages and sector of employment) but also on consumption through sectoral price changes (see chapter 3). This is done with a computable general-equilibrium (CGE) model linked to a microsimulation in a top-down approach, which is expanded to cover sub­national regions. We also discuss economic implications of paratariff liberalization using both the CGE model and the Household Impacts of Tariffs database and simula­tions tool (see box 2.2 for more details).

Unlike with India, not many studies of Bangladesh have investigated how trade impacts local labor markets. Bangladesh has been successful in accelerating its export growth over the years by mostly concentrating on the ready-made garments sector. In turn, its exports are far less diversified than those of its neighbors and other com­parators. There is, though, a dearth of empirical evidence on how this sector-specific export growth has affected local economic outcomes in the country. A recent study finds that a greater export orientation triggers a short-term increase in both formal and informal employment, as well as a longer-run increase in self-employment (Goutam et al. 2017). Using a reduced form model such as ADH, Goutam et al. 2017 find that trade increases labor force participation and formal employment in Bangladesh. Moreover, there is an even larger impact on labor force participation if the indirect impacts of trade in the form of induced demand through supply chain linkages are included. In this report, we expand this evidence by evaluating the impacts of greater export orientation in local labor market outcomes in Bangladesh, particularly relative to wages and informality, for different demographic groups (see chapter 3). We also explore whether these trade shocks remain localized or if they spread throughout the economy.

211704.indb 22 4/23/21 11:59 AM Lessons from the Literature on Distributional Impacts 23

For Brazilian workers, empirical evidence shows that the dynamic process of adjust­ment to trade liberalization reforms has been painful, bringing bigger declines in wages and lower employment over time.

Between 1991 and 2002, Kovak (2013) finds that microregions in Brazil facing liberalization-induced price declines greater than 10 percent experience 4 percent more declines in wages. Building upon this work, Dix-Carneiro and Kovak (2017) show that microregions facing larger tariff cuts experience prolonged declines in for­mal sector employment and earnings relative to other microregions: the impact of tariff changes on regional earnings 20 years after liberalization is three times the effect after 10 years (figure 2.1). Workers initially working in tradable sectors are more likely to locally transition to nontradable sectors, but this response is not enough to offset the strong declines in formal employment in tradable sectors (figure 2.2). Workers in nontradable sectors in harder-hit areas are similarly affected, indicating large spillovers from tradable to nontradable sectors. Why does this occur? The authors suggest there is a mechanism involving imperfect interregional labor mobility and dynamics in labor demand, driven by slow capital adjustment and agglomeration economies. These unfavorable results are consistent with conclusions by Góes et al. (2019), who deviate from the reduced-form methodology employed by these earlier studies and instead use a general-equilibrium model that aggregates information on production, employment, wages, prices, imports, and exports in 57 economic sectors in Brazil.

Most of the adjustment in Brazil takes place through the informal sector, which acts as a buffer for trade-displaced workers. Dix-Carneiro and Kovak (2017) show that, after Brazil’s trade liberalization in the 1990s, microregions more exposed to foreign competition faced higher unemployment in the medium term relative to the national average. In the long run, however, foreign competition had no effect on unemployment, but there was a significant positive effect on informal employ­ment at the local level. This view of the informal sector serving as a buffer is cor­roborated by Ponczek and Ulyssea (2018), who show that the medium-term effect of liberalization-induced foreign competition on unemployment was larger in microregions where labor market regulations were more strictly enforced, making labor shifts harder. The role of the informal sector as an important margin of labor market adjustment to trade has gained prominence in the literature in last two decades (see box 2.3)

What about the effects of an import and export shock on migration across microre­gions and labor reallocation from the formal sector to nonemployment within these regions? Using an instrumental-variable approach, Brummund and Connolly (2019)

**BOX 2.3**

**Informal Labor Markets and Trade**

A large share of the workforce (usually 40 to 80 percent) in emerging economies remains in infor­mal labor arrangements (Arias et al. 2018); however, until recently, empirical and modeling work has neglected the study of informality.

There is now a greater appreciation that the informal sector could constitute important mar­gins of labor market adjustment to trade. One view argues that trade-related shocks may increase the size of the informal sector, whereas others suggest that the informal sector could serve as a buffer for trade-displaced workers in the medium term, preventing them from falling out of the labor force completely. This has led to a small but burgeoning literature examining the links between changes in trade and informal labor markets in the past two decades. Goldberg and Pavcnik (2007a) provide a review of earlier studies and find mixed impacts, depending on country and industry characteristics. Specifically, labor markets that are characterized by effective regula­tion tend to have more firms that favor informal employment (Artuç et al. 2019). But labor markets that are more flexible tend to have less informal employment after trade liberalization. This cor­responds with work by Bosch, Goni, and Maloney (2012), which shows that the rise in informality in Brazil from 1983–2002 was driven to a much greater degree by rising labor costs and reduced flexibility than trade liberalization.

More recent studies find similar patterns. McCaig and Pavnick (2018), for example, found that the rise in exports in Vietnam driven by the United States-Vietnam Bilateral Trade Agreement led to a reallocation of labor from informal to formal manufacturing in the sectors most affected. By contrast, Dix-Carneiro and Kovak (2019) and Ponczek and Ulyssea (2018) sug­gest that the informal sector may serve as a buffer to trade-displaced workers and that, in the absence of informality, the effects of foreign competition on unemployment might have been more severe.

Most recently, a study by Dix-Carneiro et al. (2021) that applies a general-equilibrium model of a small, open economy with labor market frictions and imperfectly enforced regulations to Brazilian data finds that the informal sector in Brazil remains important in the face of a trade shock. It further goes on to show that repressing informality in the model increases productivity but at the expense of employment and welfare in the face of a trade shock.

211704.indb 26 4/23/21 11:59 AM Lessons from the Literature on Distributional Impacts 27

examine Brazil’s unique trade relationship with China to analyze this question. They find that export exposure reduces the movement of workers from the traded sec­tor to nonemployment and increases the movement of workers from nonemployment to the nontraded sector. These movements are primarily driven by the manufacturing sector. This is in stark contrast to the negative impacts on microregions that are more exposed to imports, which show more reallocation from manufacturing to nonem­ployment, and less movement from the traded sector to the nontraded sector. It thus seems that Brazilian labor markets responded more dynamically to the China shock than they did to the 1990s trade reforms.

Unlike Brazil, Vietnam’s experience of reallocation after trade reforms has been starkly different. In a study analyzing the labor market impacts of Vietnam’s free trade agreement with the United States, McCaig and Pavcnik (2018) find a significant reallocation of labor from informal household businesses to employers in the formal enterprise sector. The reallocation was larger in industries and regions that experi­enced larger declines in US tariffs on Vietnamese exports and also among younger workers.

The study also suggests that expanded export opportunities increased employment among manufacturing firms by 15 percent. At the same time, the aggregate share of household businesses declined in Vietnam during the early 2000s. Within the context of trade theory, the results indicate that the removal of export market distortions, which harm the profitability of more productive firms, induces a movement of labor away from less productive employers in the small business sector toward the more productive formal enterprise sector. In turn, this leads to sizable gains in aggregate productivity.

As for Indonesia, which has one of the highest mobility costs among developing countries, Agustina (2018) finds negative impacts of increased import competition between 2007 and 2013 on manufacturing employment share, nonmanufacturing employment share, and wages. And Cali, Hidayat, and Hollweg (2019) suggest that workers in more remote regions (especially in eastern Indonesia) face particularly high

211704.indb 27 4/23/21 11:59 AM 28 The Distributional Impacts of Trade

mobility costs. Not surprisingly, then, workers were unable to adjust to these trade shocks and became unemployed, with the highest impact driven by imports of con­sumption goods.

By contrast, the work of Kis-Katos and Sparrow (2015) and Kis-Katos, Pieters, and Sparrow (2018) shows positive labor market consequences across Indonesia’s regions following the liberalization of trade in intermediate inputs. Specifically, the authors find that poverty decreased more in regions that were more strongly exposed to the liberalization of tariffs for intermediate inputs. Among the potential channels behind this were the formalization of the unskilled labor force and structural reallocation of labor. Job formation and increases in unskilled wages were related to lower import tariffs on intermediate goods and retaining import tariffs on final outputs at their cur­rent levels. This reiterates the point that it is vital to distinguish between the type of imports being affected by tariff reductions when analyzing the impacts of greater import competition on welfare.

Not much is known about the local labor market impacts of trade in sub-Saharan Africa, but a recent study shows that trade impacts operate through the employment channel rather than the income channel. Erten, Leight, and Tregenna (2019) provide strong causal evidence on the effects of a quasi-exogenous reduction in import tariffs on local economies in South Africa between 1994 and 2004, the period of rapid trade liberalization. The results suggest that workers employed in districts facing larger tariff reductions experienced a significant decline in employment driven primarily by a decline in manufacturing sector employment relative to workers in districts facing smaller tariff reductions.

These displaced workers were unable to reallocate into other sectors. Instead, they were more likely to become discouraged, unemployed workers or exit the labor force entirely. Unlike in other countries, they also were not absorbed by the informal econ­omy. When examining differences with respect to education and race, the observed employment effects were consistent for individuals at varying education levels, but among relatively less-educated workers, non-white workers faced a higher likelihood of employment loss. By contrast, there was no evidence of significant differences with respect to gender, age, or location.

This study shows a concentration of negative impacts of trade on employment in certain regions or local labor markets and groups (black and other nonwhite workers), despite the reintegration of homelands into South Africa after 1994. This report adds to this evidence base by further analyzing how persistent these impacts on local labor markets are in the medium to long term—given the sharp tariff reductions observed

211704.indb 28 4/23/21 11:59 AM Lessons from the Literature on Distributional Impacts 29

after the democratic elections—by drawing upon municipal-level data from South Africa for the period 1996–2011 (see chapter 3).

The ability of workers to relocate between economic activities is an important factor in determining their resilience to trade shocks. Traditionally, neoclassical and other trade models have assumed adjustment to be costless or costs to be very small. Neoclassical trade theory assumes perfect, costless mobility among factors of produc­tion in which trade-induced price changes are assumed to have only economywide (not sector- or region-specific) returns. Other studies have deviated from this trend, con­tending that the long-run free trade equilibrium could be affected negatively by the existence of these adjustment costs. Davidson and Matusz (2004) show that the pres­ence of inflexible labor can lead to multiple equilibria (“good” or “bad” steady states), given a trade policy change or shock. Banerjee and Newman (2004) develop a model in which the short-term costs of factor reallocation that follow trade liberalization fall disproportionately on the poor.

As for the limited number of empirical studies, they too conclude that adjustment costs are relatively small. Using the experience of developing and advanced countries during episodes of trade liberalization and structural adjustment, they categorically estimate that periods of unemployment would be quite short and adjustment costs very small compared to the benefits of trade liberalization (Matusz and Tarr 1999, 2000; Papageorgiou, Choski, and Michaely 1990). Parallel academic studies focusing on advanced countries find similar results, attributing large declines in manufacturing employment to technological innovation (Feenstra and Hanson 2001; Harrison, McLaren, and McMillan 2011). A feature of most of the earlier work on adjustment costs is the disproportionate focus on developed countries.

Over the past decade, there has been renewed inquiry into adjustment costs driven primarily by global economic changes (growth of China, other East Asian countries, and Eastern European countries) and expanding empirical evidence. Several studies document the adjustment costs borne by workers after trade reforms in many develop­ing countries (for Colombia: Attanasio, Goldberg, and Pavcnik 2004, Goldberg and Pavcnik 2007b; for India: Topalova 2007; for Mexico: Revenga 1997; for Morocco: Currie and Harrison 1997). Moreover, studies focusing on the reallocation of workers across sectors find significant effects for developed countries (Pierce and Schott 2016; Revenga 1992), although less so in developing countries (Dix-Carneiro 2014; Goldberg and Pavcnik 2007a).

Artuç, Chaudhuri, and McLaren (2010), were among the first to attempt to estimate adjustment costs. They assume that migration decisions are based on the earnings pos­sibility in a given destination (the option value). For the United States, they find very

211704.indb 29 4/23/21 11:59 AM 30 The Distributional Impacts of Trade

high average moving costs from one broadly aggregated sector of the economy to another estimated to be several times average annual wages. Specifically, worker level adjustment costs were estimated to be as much as eight times annual earnings. They also predict a somewhat sluggish reallocation of workers following a trade liberaliza­tion, with 95 percent of the reallocation completed in eight years after the elimination of a 30 percent tariff on manufacturing.

Similarly high adjustment costs are found for Turkey, where wages in the for­merly protected sector declined by as much as 20 percent (Artuç and McLaren 2010). These surprisingly high estimated costs are similar to findings by other authors using different techniques such as Kennan and Walker’s (2011) estimates of costs for moving between US regions and Artuç’s (2009) estimates of intersec­toral moving costs.

Over the past decade, labor market adjustment costs have become central in a new wave of trade models, and all these studies estimate very high adjustment costs (such as Adão 2016; Caliendo, Dvorkin, and Parro 2019; Dix-Carneiro 2014). Like Artuç, Chaudhuri, and McLaren (2010), Dix-Carneiro (2014) and Adão (2016) use a Roy model of the allocation of workers across sectors to offer a structural analysis of the distributional effects of trade shocks, but they focus on exogenous changes in the terms of trade in a small economy. Dix-Carneiro (2014) estimates a median cost of mobility that ranges from 1.4 to 2.7 times annual average wages in Brazil. Caliendo, Dvorkin, and Parro (2019) emphasize the dynamics of adjustment after an unexpected trade shock. These models show that adjustment costs critically affect economic well-being. In extreme cases, high adjustment costs may overwhelm the positive benefits of trade liberalization.

Early papers treated these adjustment costs merely as a black box (as described by McLaren 2017), but more recent papers have been able to identify key components by studying labor markets in transition after a large trade shock. These adjustment costs fall into three key areas.

**Geographical costs.** Geography impacts mobility costs, especially when industries are geographically concentrated. Some studies estimate that these moving costs are very high. One such study by Morten and Oliveira (2016) finds that the mean observed migration cost is between 0.8 and 1.2 times the mean wage, with 84.0 percent of the migration cost fixed; that 3.5 percent depends on the distance between locations and 9.6 percent depends on the travel time*.* They also estimate that this costly migration generates heterogeneity in regional responses to trade shocks and also changes the inci­dence of regional shocks: 37 percent of the total incidence of a shock falls on residents, compared to 1 percent in a model where migration is costless. They also find that a region 10 percent more connected will have a 5.6 percent higher population elasticity to wage shocks.

211704.indb 30 4/23/21 11:59 AM Lessons from the Literature on Distributional Impacts 31

**Domestic regulations and policies.** The speed of labor reallocation can be impacted by flexibility of labor markets: a flexible labor market will support the required reallocation of labor whereas a highly regulated labor market will slow it down. An important study in this regard is by Kambourov (2009), who examines how the inflexibility of labor market regulations can be a source of high adjust­ment costs. Using a dynamic general-equilibrium sectoral model of a small open economy with sector-specific human capital, firing costs, and tariffs, it finds that, if Chile had not liberalized its labor market at the outset of its trade reform, then the intersectoral reallocation of workers would have been 30 percent slower, and as much as 30 percent of the gains in real output and labor productivity in the years following the trade reform would have been lost. Similar results were found for Mexico.

Gains from trade may not always be fully realized across regions because of certain existing domestic policies that could lead to institutional friction. Analyzing how the household registration system (*hukou*) affects migration and the extent to which it affects both aggregate and distributional effects of trade, Zi (2018) finds that China’s *hukou* system, which prohibits migrant workers from accessing vari­ous social benefits in their actual cities of residence, leads to urban areas receiving smaller migration inflows following an increase in exports. The analysis shows that trade liberalization increases China’s welfare by 0.63 percent. It also finds that abol­ishing the *hukou* system increases gains from input tariff reductions by 2.0 percent, and alleviates negative distributional consequences. Fan (2019) also shows that ignoring domestic geographic frictions leads to significantly underestimating trade’s impact on overall inequality and overestimating its impact on the aggregate skill premium in China.

**Sector- and occupation-specific human capital costs.** Some studies focus on mobil­ity issues that can arise from sector-specific worker experience or the nonadaptive nature of human capital. In analyzing an intersectoral reallocation of labor in response to trade reforms in Brazil, for instance, Cosar (2013) develops a small two-sector open economy model of equilibrium search with overlapping generations and sector-specific human capital. Simulation results show that labor market adjustment in response to a realloca­tion shock can take a very long time because of a combination of labor market frictions and sector-specific human capital. The uniqueness of human capital at the sector level, though, poses a much bigger barrier to labor mobility than search frictions.

In contrast, using a dynamic equilibrium model with labor market frictions and occupation-specific human capital, Ritter (2012) finds that, in light of the surge in trade in goods and services observed between 1990 and 2010 in the United States, a flexible labor market plays a bigger role in the adjustment process than the specific human capital of workers in high-skill service occupations.

211704.indb 31 4/23/21 11:59 AM 32 The Distributional Impacts of Trade

The bottom line is that large labor adjustment costs may lead to large unrealized gains from trade, and these costs could be triggered by geographical barriers, sector- or occupation-specific human capital barriers, or policy distortions. The understanding of these costs remains indispensable to better informing our knowledge on subnational impacts of trade, as well as understanding the different kinds of costs that workers bear. This is because governments will need to choose among a wide range of policies to help workers cope with job loss (see chapter 4).

**Conclusion**

Overall, substantial methodological advances in the literature have strengthened our ability to understand the complex relationship between trade, labor income, and con­sumption at the subnational level within countries. Trade clearly has brought overall gains to households and is critical to the reduction of poverty, but labor market and consumption gains have been concentrated in some regions and groups.

In addition, the evidence base is limited to a few countries, and several knowledge gaps remain despite significant advances in the understanding of the ex post and ex ante impacts of trade shocks. The disproportionate emphasis on examining the dis­tributional impacts of trade on labor markets (wages and employment) is clearly evident, while impacts on consumer prices remain relatively less understood because

of data limitations. Key gaps remain in our understanding of how trade shocks affect consumption and local labor markets (especially in low-income countries) and of short-term and long-term transitional dynamics following a trade shock. Also understudied, despite the expanding evidence base in recent decades, is the local impact of higher exports as opposed to the impact of import competition and lower tariffs. Some other areas for which quantitative evidence needs to be expanded include (a) the role of informal employment as a key adjustment mechanism, (b) gendered labor market outcomes, and (c) distributional impacts propagated through global value chains.

World Bank teams have contributed to filling some of these gaps by pioneering backward- and forward-looking methodological approaches. These approaches are complementary and can be grouped into three broad categories: (a) backward-looking reduced-form analysis using country-specific datasets, (b) forward-looking partial-equilibrium analysis using the HIT database, and (c) forward-looking general-equilibrium analysis using the CGE-GIDD tool.

1. To start with, backward-looking analysis assesses the importance of various channels of trade change effects on employment, wages, informality across time, regions, and demographic characteristics such as age and skill level. More com­plex analysis can account for mobility costs and adjustment mechanisms, result­ing in a richer analysis in comparison to ex ante approaches.
2. The HIT approach captures the ex ante short-term impacts of tariff liberalization and allows for granularity of outcomes across households given changes in tariffs at the product level. It incorporates detailed consumption patterns at the household level and is best equipped to estimate short-term impacts on consumption.
3. The CGE-GIDD approach allows for the ex ante medium- and long-term assess­ment of the impacts of trade policy reforms, because the model includes input-output relationships across sectors, differences across countries in the sectoral compositions of their economies, and bilateral trade relationships. It also imposes economic consistency, because changes across all variables add up to the total productive capacity within the economy consistent with factors of produc­tion and sectoral productivity. The impacts on households and regions are gen­erated in microsimulations consistent with the aggregate shocks.

In the next chapter, we delve deeper into some of the empirical gaps identified in this chapter and then use the backward- and forward-looking approaches described in this chapter to analyze the within-country impacts of trade on labor income and con­sumption for five countries through the lens of specific policy questions, data avail­ability, and time frame. Through these case studies, we also build on the evidence by filling in knowledge gaps and testing some of our key findings in new country contexts.

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