

Trade and labour market outcomes:

A summary of the main theories and evidence at the firm and worker levels

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► Introduction

The literature addressing the impact of trade on labour markets has evolved significantly over the last four decades. Beginning with country-level frameworks founded on oversimplified assumptions, it has proceeded to develop models accounting for the heterogeneity that exists among firms and workers and better explaining actual patterns of trade and the implications for the labour market. Concurrently, a combination of more and better longitudinal and cross-sectional databases, enhanced computational capabilities and improved quantitative tools has resulted in a surge of empirical studies. Their findings have provided valuable insights into the effects of trade on a number of labour market indicators, many of which are important when evaluating trade policies in relation to decent work.

The aim of this chapter is to give a short summary of the extensive literature on the impact of international trade on enterprises and workers.¹ On the theoretical side, the chapter briefly reviews the evolution of trade theory, from the neoclassical concept of comparative advantage to the so-called “new-new trade theory” and its account of heterogeneous firms and workers, in order to better understand the intra-industry and intra-firm consequences of trade. On the empirical side, it reviews recent literature on trade and labour market outcomes with respect to both the structural and quasi-experimental approaches. In so doing, this chapter acknowledges the progress to date in assessing the impact of trade on the labour market, but highlights the challenges and limitations still to be overcome. Prominent among these are the collection of more targeted data – for example, linked employer–employee datasets (LEEDs) – and the need for new statistical indicators that better capture all the dimensions of decent work.

The chapter is structured as follows: section 3.1 reviews the theoretical frameworks supporting the primary theories of trade and discusses the implications for the labour market; section 3.2 presents the main empirical approaches to the study of the effect trade has on the labour market; section 3.3 briefly considers the theoretical and methodological advances made in this field, along with what needs to be considered in future studies; and section 3.4 ends the chapter with some concluding remarks.

1 For a more detailed and extensive survey of the literature, see Aleman-Castilla (2020). See also Hernandez (2020) and Hernandez in this volume on macro and meso approaches and their use.

► 3.1 Theories of trade and labour market outcomes

Up until the 1980s, conventional explanations of international trade relied on the Heckscher–Ohlin (H–O) framework (Ohlin 1933), emphasizing the *comparative advantage theory* first put forward by Ricardo (1817) and Torrens (1815).² The original version of the H–O model supposes a world comprising two countries, two commodities and two homogeneous factors of production, for example, labour and capital or skilled and unskilled labour. Each country has the same production technology with constant returns to scale and perfect competition in every market. There is mobility for the factors of production within, but not between, countries. It is also assumed that goods vary in terms of the mix of factors required in their production, and that different countries have different factor endowments.

The H–O model's simple specification yields four fundamental results: (i) a country exports those goods whose production makes the most use of its abundant factors, and imports those goods whose production requires those factors it has the least of; (ii) trade tends to equalize the real prices of factors of production between countries, thereby acting as a substitute for international migration; (iii) a rise in the relative price of a good increases the return to the factor used most intensively in its production, and conversely reduces the return to the scarcely used factor; and (iv) an increase in the endowment of a factor of production will increase the production of the good that uses that factor intensively and reduce the production of the one that does not. The implication of the H–O model for the labour market is that trade can be expected to increase the demand for labour in countries where labour is abundant, and that real wages should tend to equalize between trading partners.

The specific-factors model is a variant of the comparative advantage model first discussed by Jacob Viner (1892–1970) and later developed by Samuelson (1971) and Jones (1971). Known as the Ricardo–Viner (R–V) model, it departs from the comparative advantage theory by recognizing, first, that factors of production cannot move immediately and freely between industries and, second, that industries differ in terms of the factors of production they require, so that a shift in the mix of goods a country produces has a long-run

² According to comparative advantage theory, international trade and its benefits are a consequence of the differences between countries with regards to the opportunity costs of producing the same goods. Countries would necessarily have different relative opportunity costs if their factor endowments or technologies differ.

effect on the relative demand for certain factors of production. This implies that, even though international trade may be generally of benefit at the national level, it could nonetheless have a negative effect on certain areas or population groups.

Krugman, Obstfeld and Melitz (2014) note that, according to the R-V model, trade will damage the factors of production in the import-competing industries that are most immobile. This applies not only to capital and land, but also to those members of the labour force unable to relocate easily to other sectors, who experience prolonged periods of unemployment as a consequence.

By the mid-1970s, comparative advantage theory was no longer applicable to patterns of trade, which were by then characterized by (a) a high degree of exchange between economies possessing similar factor endowments; (b) production concentrated in large domestic markets; and (c) the export of goods with high transport costs. Incorporating assumptions more nearly reflecting trade as it actually was – namely, economies of scale, product differentiation and imperfect competition – Krugman (1979, 1980) developed a *new trade theory* to explain differences in technology and factor endowments in order to account for international specialization and trade.

Krugman's most complete model supposes a world comprising two countries, each with two industries.³ These two countries may differ in size, trade with each other and face positive "iceberg" transport costs.⁴ There are many goods in demand from similar consumers that can potentially be produced. Labour is the sole factor of production, and homogenous firms seek to maximize profits in a monopolistically competitive environment with free entry and exit.⁵ Under these assumptions, there are welfare gains to be had from trade, because the world produces and consumes a greater diversity of goods as a result; wages are higher in the larger country; and each country specializes in the industry with the largest home market, thereby realizing economies of scale and minimizing transport costs.

The availability of more frequent, extensive and detailed data provided empiricists with comprehensive evidence of productivity differences

3 The model propounded in Krugman (1979) is extended gradually. Krugman based his first model on a single-industry economy with no transport costs. He then introduced transport costs of the "iceberg" type, before finally considering a two-industry economy with "iceberg" transport costs (the version referred to here).

4 According to the "iceberg" transport cost model, only a fraction of an exported good reaches its destination, the rest having "melted away" in transit.

5 There are many producers offering differentiated goods that are not perfect substitutes; each firm takes as given the prices asked by other firms and ignores any possible influence its own pricing decisions may have on those of its competitors.

between firms in the same industry. From this it became clear that the more productive firms were the ones most likely to engage in trade and benefit from within-industry resource reallocations. Given that this could not be explained by the theories then current, all of which assumed firm *homogeneity*, Melitz (2003) developed instead a novel dynamic industry framework allowing for firm *heterogeneity* in order to study the possible *intra*-industry consequences of trade.

In this groundbreaking model, trade is seen to induce the most productive firms to export, while others continue to serve the domestic market only, and the least productive are forced to exit the industry altogether. As an industry's exposure to trade increases, resources are reallocated towards the more productive firms, which in turn augments productivity and contributes to welfare gains. New opportunities to profit from foreign markets are also created, thereby encouraging new firms to enter the industry. Together, these two effects increase labour demand and boost real wages.

Melitz went on to stress the importance of firm heterogeneity in determining the economic impact of globalization within an industry in any particular country. His model sparked a whole new trade theory, as subsequent studies expanded on its applications by incorporating additional features that included worker heterogeneity, labour market frictions and the international fragmentation of production.

3.1.1 Worker and wage heterogeneity

Yeaple (2005) constructed a GE framework incorporating both technological variety and heterogeneous workers to explain why firms producing similar products can vary considerably in terms of size, productivity, wages paid and engagement in export-related activities. In this model, firms that are identical at the outset are free to produce goods using different technologies and differently skilled workers in a competitive labour market – precisely the conditions, coupled with different trade costs, that give rise to firm heterogeneity.

The model supposes there are two countries and that each consumes and produces (a) homogeneous, non-traded services in a competitive sector and (b) differentiated manufactured goods in a monopolistically competitive sector. Both sectors use only the labour provided by a continuum of workers with differing skills. Firms can freely enter either sector, but in order to produce a variety of manufactured goods they must first pay a fixed cost according to the technology employed.

Trade is also costly, attracting both fixed and variable “iceberg” transport costs. There is a single technology with which to produce the homogeneous, non-traded services, whereas two alternative technologies exist with which to produce the manufactured goods. Workers are paid a technology-specific efficiency wage, and firms minimize costs subject to their technology and the wage distribution. The effect of trade on the four key decisions that firms have to make is analysed within this framework: namely, (i) whether to enter a particular industry; (ii) the choice of technology to use; (iii) whether to engage in export activities; and (iv) the selection of workers.

A combination of trade costs, the characteristics of alternative technologies and the availability of skilled workers goes towards explaining why exporting firms are larger, adopt more advanced technology, pay better wages and are more productive than non-exporting firms. More specifically, lower transport costs increase the size of the labour force working with the advanced technology, as well as the wages earned by the most highly skilled workers, but negatively affect the wages of the less skilled.

Ben Yahmed (2012) proposed a framework utilizing statistical discrimination (Lazear and Rosen 1990), technological variety, heterogeneous workers and monopolistic competition between heterogeneous firms to explain why trade affects the gender wage gap differently according to skill level. In this model, the skills and job commitment of men and women are different (i.e. the availability and willingness to maintain a long and continuous working life).

Unlike skills distribution, which is common and perfectly apparent, job commitment cannot be observed by an employer. This leads to statistical discrimination against women due to a perceived weaker attachment to the labour market. Employers pay worker-specific wages, allowing them to hire women at lower wages to compensate for lower commitment. Firms decide on technology investment and hiring at the same time, calculating the expected productivity of workers according to their skills and expected commitment. Workers that are highly skilled and committed are more productive, particularly in high-technology firms.

This model therefore predicts that skilled workers will be employed in high-technology firms, where the rewards for skills and expected commitment are higher, and that in order to compensate for a perceived lower level of job commitment, women employed in these firms need to have a higher skill level than men. The consequence of this is a widening of the gender wage gap at the upper end of the skill and wage distributions. In this model, international trade takes place between two countries producing

different varieties of a differentiated good. Lower trade costs induce firms to adopt high technology and export, thereby increasing the demand for skilled and committed workers, so further extending the gender gap at the top end of the wage distribution.

3.1.2 Labour market frictions

Felbermayr, Prat and Schmerer (2011) integrated the Melitz (2003) framework discussed above with the Pissarides (2000) model of equilibrium unemployment to account for workers who lose their jobs having to go through a period of active searching in order to find new employment opportunities due to trade liberalization. The framework they constructed supposes a world comprising symmetrical countries that interact in product markets. There is a single final good, manufactured under perfect competition from domestically produced or imported intermediate inputs that are supplied by monopolistically competitive firms.

Labour is the sole factor of production, inelastically supplied by households. Market access costs for input producers wishing to enter any of the symmetric export markets are fixed, and international trade exhibits variable “iceberg” trade costs. Lastly, the labour market is imperfectly competitive due to search-and-matching frictions, which lead to intra-firm bargaining. The Felbermayr, Prat and Schmerer model predicts that a reduction in variable trade costs or an increase in the number of trading partners will have a positive effect on both wages and employment; that is, unemployment decreases with trade liberalization while wages increase whenever aggregate productivity net of transport costs grows.

Davidson, Matusz and Shevchenko (2008) offer an alternative model that includes search-and-matching frictions and heterogeneity among firms as well as workers in order to explain: (a) why exporting firms are larger and pay better wages (Bernard and Jensen 1999); (b) why a firm’s decision on whether to export is not strictly persistent over time (Roberts and Tybout 1997); and (c) how trade liberalization serves to widen the skill wage gap (Hanson and Harrison 1999).

Here the product market is perfectly competitive, but the “labor market is characterized by frictions in that it takes time for unemployed managers and firms with vacancies to find each other”, where manager is interpreted as “all workers that cannot be found without search” (p. 297). Low- and highly skilled workers search for a job, while firms decide whether to enter the industry and choose between adopting a basic or an advanced technology (Albrecht and Vroman 2002).

Both capital and labour go into the production of a homogeneous good, and each firm requires a single manager to coordinate production. Under these conditions, some firms choose a basic technology, hire unskilled workers and pay low wages; others opt for advanced technology and hire highly skilled workers at high wages. Underemployment comes about when highly skilled workers are matched with low-tech firms. Larger and more productive firms pay better wages and engage in the export trade, but the decision to export is imperfectly persistent, in that firms will only continue to do so for as long as they are matched with highly skilled workers.

3.1.3 Informality

Another aspect of the labour market receiving greater attention is the informal economy.⁶ Aleman-Castilla (2006) is perhaps the first attempt to use a dynamic industry model with firm heterogeneity to describe the ways in which trade liberalization affects informality. Following Roberts (1989), in this framework, the informal sector is defined as a set of economic activities carried out either by small firms or the self-employed that do not abide by legislative requirements such as registration, the payment of taxes and social security provision.

It adds to the Melitz (2003) model the decision made by firms as to whether to be formal or informal. Although formality implies higher labour costs, it is also an opportunity to achieve greater productivity and gain access to foreign markets. Informality, on the other hand, exposes firms to the risk of being apprehended by the government and having to pay part of their profit as a fine. Within this context, reductions to import and export tariffs force the least productive informal firms to exit the industry and increase market share and profits for those formal firms that already export, thereby contributing to an increase in aggregate productivity.

Greater exposure to trade affords new profit opportunities, prompting the entry of new firms and increasing labour demand and real wages. This in turn raises the costs of formality, which pushes firms at the margin into informality. Reductions to import and export tariffs thus have an ambiguous effect on the informality rate, squeezing out the least productive informal

6 The ILO defines the “informal economy” as encompassing all economic activities performed by workers and economic units that are not covered, or only insufficiently covered, either in law or in practice, by formal arrangements. Jobs are considered to be informal if the employment relationship is subject to neither national labour legislation, income taxation, social protection nor entitlement to employment benefits. Informality does not cover illicit activities, and is to be found across all economic sectors. It is estimated that, globally, more than 60 per cent of workers are in informal employment (ILO 2018).

firms, while at the same time increasing informality within the formal economy.

Paz (2014) has also examined the impact of trade liberalization on informality, focusing in this case on a small open economy in which changes to trade policy affect a firm's decision whether to offer either formal or informal jobs (the latter defined as when an employer does not comply with payroll tax regulations).

Similarly, the formality decision is embedded in the Davis and Harrigan (2011) model of trade, together with firm heterogeneity and efficiency wages (Shapiro and Stiglitz 1984), allowing for worker heterogeneity through different levels of effort, so that among firms with the same level of employment, some choose to hire formal and others informal workers. This model predicts that, whereas a reduction in domestic import tariffs will *decrease* the average formal wage and have an ambiguous effect on the share of informal workers, a reduction in export tariffs (i.e. trading partner import tariffs) will *increase* the average formal wage and reduce the share of informal employment in the economy.

A recent contribution by Dix-Carneiro et al. (2021) develops a model of trade in a small open economy with search-and-matching frictions and collective bargaining, in which heterogeneous firms decide whether to operate formally or informally. Formal firms comply with minimum-wage regulations, pay dismissal costs and taxes, but imperfect enforcement by the government gives rise to informality.

The presence of labour market frictions and hiring costs implies that there is unemployment in equilibrium. In the product market, there is a tradable and a non-tradable sector, each producing differentiated goods in a monopolistically competitive environment where there are formal and informal firms. In each period, incumbent firms establish a new productivity level and decide whether to exit the industry, or adjust their labour force and become formal.

Hiring costs are greater for larger firms, while dismissal costs are only paid by formal firms. Potential entrants observe a productivity signal based on forecasts and decide whether to enter and, if so, whether as a formal or an informal firm. If they do decide to enter, they then monitor actual productivity. Lastly, firms in the tradable sector can export, but face fixed costs, tariffs levied on imports and "iceberg" trade costs. The Dix-Carneiro et al. model predicts that trade will result in workers being reallocated towards larger and more productive firms, thereby reducing informality in the tradable sector, but with an ambiguous effect on aggregate informality.

3.1.4 Global value chains: International outsourcing and offshoring

Lastly, we come to GVCs. According to Inomata (2017), classical trade theory has undergone three waves of reconstruction. The first was new trade theory, which brought into question the premises of perfect competition and constant returns to scale. The second was new-new trade theory, which reconsidered the assumption that producers are homogeneous. The literature on GVCs represents a third wave, one that challenges the neoclassical premise that countries trade only final products, and that each product is made using domestic factors of production. Thanks to remarkable advances in transport and in information and communication technology (ICT), production can now be broken down into several sequential tasks, each of which can be reallocated geographically so as to maximize efficiency.

Among the theoretical frameworks on GVCs and their labour market implications that first appeared in the 1990s, the one contributed by Antràs and Helpman (2004) is perhaps key, as it integrates increasing returns to scale and firm heterogeneity into a North–South model based on contract theory in order to study the choices between (a) outsourcing versus vertical integration and (b) domestic versus foreign production. In this model, labour is the sole factor of production, and wages are higher in the North than the South.

The production of differentiated final goods requires northern headquarter services and southern manufactured intermediates. Final-good producers supply the former, and operators of manufacturing plants the latter. International fragmentation of production is allowed, so that a final-good producer may choose between having a northern or a southern manufacturing partner. Coordination with a foreign manufacturer is more costly, and relationship-specific investments are governed by imperfect contracts.

When in equilibrium, highly productive firms acquire southern inputs, while low-productivity firms acquire northern ones. Among firms that choose not to outsource abroad, the more productive tend to vertically integrate. Additionally, in sectors with little need for headquarter services there is no vertical integration; instead, less productive firms outsource domestically, while the more productive outsource abroad. Finally, either widening the North–South wage divide or reducing the trading costs of intermediate inputs serves to increase the proportion of firms importing intermediate inputs and outsourcing.

In summary, the several theories reviewed in this section make a number of predictions about the likely effects of trade on labour market outcomes. First, exporting firms are likely to be larger, technologically superior, more productive and to pay better wages. Second, the reduction of tariffs on final products will (a) reduce wages in firms either oriented towards the domestic market or that do not import inputs and (b) raise wages in those firms that export and those that import inputs. Third, trade increases wage inequality, as well as unemployment and labour turnover, thereby having an ambiguous impact on workers' welfare.

Fourth, the demand for skilled and committed workers is likely to grow with trade openness, as is the wage gap between skilled and unskilled workers. Fifth, while the demand for women workers increases with trade openness, its effect on the gender wage gap is ambiguous. Sixth, trade liberalization is likely to reduce informality in tradable sectors, but to have an ambiguous effect on informality overall. Seventh, trade liberalization and the widening of the wage gap between developed and developing countries will lead to greater outsourcing. Eighth, and finally, reducing offshore production costs for basic activities is likely to boost productivity and benefit the most skilled workers.

► 3.2 Evidence on trade and its implications for the labour market

There is a variety of complementary empirical methods available to researchers to use when studying the impacts of trade on labour markets (Goldberg and Pavcnik 2016); choosing between them depends on the specific research question that wants answering and the characteristics of the data at hand. This section reviews a sample of studies that have adopted either (a) a structural or (b) a quasi-experimental approach when analysing the effects trade has on labour market outcomes.⁷

The structural approach evaluates the effects of policies through the estimation of key parameters or reduced-form equations derived from

7 The assorted empirical strategies can be grouped into three broad categories: (i) the structural approach, (ii) the quasi-experimental approach and (iii) randomized controlled trials. Carrying out randomized controlled trials for trade policies at a national level is almost impossible, which is why there is no empirical research on trade that has used this approach.

an underlying theoretical framework.⁸ This approach is also useful for identifying the mechanisms underlying observed economic behaviour and policy counterfactuals (Blundell 2017). Its efficacy is nonetheless subject to the consistency of estimators, as well as to the assumptions and constraints adopted in the underlying theory. Structural methods of estimation have been used to evaluate the effects of trade on labour market outcomes, including on employment, wages and informality.

The quasi-experimental approach, like the structural approach, uses economic theory to guide empirical work, but seeks to differentiate causal effects from specific events or situations (Angrist and Krueger 1999). Quasi-experimental studies provide evidence about causal effects by controlling for observable differences between groups, comparing the same units of observation at different points in time in order to reduce biases, or using instrumental variables as a source of external variation (Angrist and Pischke 2010). In the case of changes to trade policy, because the identification of the causal effects depends less on specific functional-form assumptions, quasi-experimental studies are unsuitable for evaluating welfare or general effects (Goldberg and Pavcnik 2016). Nonetheless, the quasi-experimental approach has provided a large amount of evidence on the ways in which trade affects a range of labour market outcomes.⁹

3.2.1 Employment and wages

There has been a considerable number of studies undertaken on the impact of trade on employment and wages. Among recent studies, Coşar, Guner and Tybout (2016) explored what would be the combined effects on firm dynamics, job turnover and wages in Colombia of reductions in (a) trade frictions, (b) tariffs and (c) dismissal costs. To do this, they developed a GE model linking globalization and labour regulations to wages, job flows and unemployment.

The model was set up so as to extend previous models of dynamic matching (Bertola and Caballero 1994; Bertola and Garibaldi 2001) and search frictions in the context of heterogeneous multiple-worker firms, “to include fully articulated product markets, international trade, serially correlated productivity shocks, intermediate inputs and endogenous firm entry and exit” (Koeniger and Prat 2007, 627). Their model is fitted using the method of

8 A reduced-form equation is the expression obtained from solving the equilibrium or first-order conditions in a model for all its endogenous variables, where these are expressed as functions of the existing exogenous variables.

9 See Sekerler Richiardi, Ghani and Pham in this volume for an example of a quasi-experimental approach applied to SMEs in Viet Nam.

simulated moments (Gouriéroux and Monfort 1996) based on establishment-level data from 1981 to 1990.

Results indicate that reductions in import tariffs and labour market reforms were jointly responsible for a significant part of the increase in inequality experienced over the course of the decade, but that they are unlikely to have been the reason for the increase in job turnover and unemployment observed. Reductions in trade frictions intensified the outcomes of the labour reforms and partially explain the rise in unemployment. The authors concluded that labour reforms ameliorated the possible negative effects of trade reforms.

Helpman et al. (2017) developed a heterogeneous-firm model with search-and-matching frictions in order to study the effects of trade on wage inequality in Brazil. In this model, firms do not observe workers' abilities, but they can invest in the screening of workers and are heterogeneous as regards export market entry costs and screening efficiency.

The framework features (a) what is termed a "selection effect", whereby highly productive firms hire more workers, are more likely to export and pay better wages; and (b) what is termed a "market access" effect, whereby serving foreign markets requires production on a larger scale, which is complementary to greater selectivity in the labour market. The result is that exporters have more skilled workers and pay better wages.

The econometric model is then estimated using maximum likelihood, the generalized method of moments, and a semi-parametric selection model (Powell 1994) on data from a 1986–98 LEED for the manufacturing sector extracted from Brazil's Annual Social Information Report (RAIS) and trade transactions data from the Secretariat of Foreign Trade of the Ministry of the Economy (SECEX/ME). The authors found that trade had a significant impact on wage inequality, with the opening up of "trade raising the standard deviation of log worker wages by around 10%" (Helpman et al. 2017, 393).

Amiti and Davis (2012) have likewise studied the relationship between wages and trade, analysing how reducing tariffs on final products and also on inputs affects a firm's involvement in trade. Using a GE model that incorporates firm heterogeneity, trade in inputs and final products, plus firm-specific wages, they predict that a reduction in output tariffs is likely to lower the wages paid by import-competing firms but raise them at exporting firms, and that a reduction in input tariffs will increase wages at importing firms.

To test this, the authors estimated a firm-level equation of average wages on industry-level output tariffs, firm-level weighted average input tariffs, exporter/importer indicators, firm fixed effects, location-year effects and other firm characteristics. The authors used 1991–2000 firm-level data

from an annual survey of large and medium-sized manufacturing firms in Indonesia.

To determine a firm's market orientation, the authors referred to firm-level information derived from a census of importers and exporters on the value of exports, imported inputs and domestically purchased inputs for each plant. To differentiate the effects on wages from input as opposed to output tariffs, they referred to a list specifying the amount spent on intermediate inputs by each firm that was included in a 1998 manufacturing survey provided by Statistics Indonesia. The results supported the predictions made by the theoretical model.

Finally, three papers by Krishna, Poole and Senses (2011, 2012, 2014) used linked employer–employee data from Brazil to examine the impact of trade reforms during the 1990s on the wages earned by workers employed at heterogeneous firms, allowing for the non-random assignment of workers to firms.¹⁰ The authors found that trade liberalization had a differential and positive effect on wages paid by exporting firms.

However, after controlling for worker and firm characteristics, and using firm–worker match-specific effects to account for the endogenous mobility of workers, they went on to find that this effect was not a significant one, but that workforce composition improved in exporting firms in terms of skills and the quality of matches. The authors also found that the effects of trade reforms on wage inequality differed between groups of workers. Wage dispersion was greatest among more educated workers, with university-educated workers employed by exporting firms paid better than their counterparts at non-exporting firms.

3.2.2 Gender wage gap

International trade can also impact the gender wage gap. Ben Yahmed (2017) recently investigated this using a model economy characterized by an international Cournot oligopoly where two countries produce and trade a homogeneous good. Employers are assumed to care about the gender composition of the workforce and pay men a wage premium. This prejudice against women in terms of wages generates firm heterogeneity with regards to labour costs.

International trade has a pro-competitive effect on gender wage that means discriminatory firms fare less well, because they are less productive due

¹⁰ To allow for the fact that a worker's assignment to a firm may not be independent of time-invariant, match-specific productivity, worker–firm match effects (or job-spell effects) are included in the fitted wage equations.

to discrimination being more costly. Import penetration forces down the demand for costlier male labour among discriminatory firms, thus reducing the gender wage gap. Moreover, a market-sized effect arises due to new opportunities to export abroad being only open to the most competitive firms, and this narrows the gender wage gap as a consequence.

The validity of these predictions was tested against the results of the economic liberalization of Uruguay in 1991, using data from a 1983–2003 longitudinal household survey, the 1988–96 Annual Survey of Industry, the 1997 Economic Census, the 1998–2003 Survey of Economic Activity, and trade data from the CEPII TradeProd database (Mayer, Paillacar and Zignago 2008). Analysis found that foreign competition does indeed reduce the gender wage gap, but that opportunities to profit from exporting widen the gap when production concentration is high (i.e. domestic competition within a sector is low).

The number of studies on this topic has grown significantly in recent years.¹¹ Juhn, Ujhelyi and Villegas-Sanchez (2013), for instance, used firm-level data from the 1992–2001 Mexican National Survey of Employment, Wages, Technology and Training to look at how NAFTA has affected gender inequality within industries and firms in Mexico. They found that, although a reduction in tariffs raised women's share of wages in blue-collar jobs, there was little evidence of it doing the same for white-collar occupations.

A study by Hakobyan and McLaren (2017) explored instead the impact NAFTA has had in the United States, using an empirical approach based on local labour markets and data from censuses conducted in 1990 and 2000. The authors found a negative effect on wage growth specific to blue-collar married women.

Lastly, Bøler, Javorcik and Ulltveit-Moe (2015) investigated the difference in the gender wage gap between exporting and non-exporting manufacturing firms in Norway, using linked employer–employee data from various sources collected by Statistics Norway between 1996 and 2010. By controlling for unobservable heterogeneity, the authors found that the gender wage gap was greater for exporting compared with non-exporting firms.

3.2.3 Informality

One of the earliest studies to examine the effect of trade liberalization on informality is that by Goldberg and Pavcnik (2003), which defined the informal sector as one that fails to comply with labour market legislation and does not

¹¹ Aguayo-Tellez (2012) and Papyrakis, Covarrubias and Verschoor (2012) provide comprehensive literature reviews.

provide workers with benefits. Using 1980s and 1990s data from Brazil and Colombia, the authors looked at whether increased foreign competition due to trade reforms forced formalized firms to reduce labour costs by either cutting employee benefits, hiring temporary workers or subcontracting work to informal firms.

The study measured trade liberalization according to changes to import tariffs, which varied between sectors. This variation was used to identify the effects on informality by relating it to changes in the likely prevalence of informal employment in each sector through a two-step estimation approach. For Colombia, tariff data were sourced from the National Planning Department and labour force data were sourced from the National Household Survey conducted twice a year between 1986 and 1998. For Brazil, the source of trade data was Muendler (2004), with the labour force data sourced from the Monthly Employment Survey conducted between 1987 and 1998. The study found no evidence that trade reforms increased informality in either country. Similar methodological strategies have been used in other studies, with mixed results for different developing countries.

Aleman-Castilla (2006) looked at the impact of NAFTA on informality in Mexico and found reductions in Mexican import tariffs were associated with reductions in the incidence of informality in tradable industries, while reductions in the US tariffs on Mexican exports helped reduce informality in those industries that were relatively more export-oriented. Likewise, Paz (2014) assessed the effects of trade liberalization in Brazil during the 1989–2001 period, finding that a reduction in import tariffs slightly increased both informality and the average informal wage but reduced the average formal wage, whereas cutting foreign tariffs had the opposite effect.

On the structural approach side, Dix-Carneiro et al. (2021) estimated an equilibrium model with heterogeneous firms in order to study the relationship between trade and informality in a small open economy with labour market frictions and imperfectly enforced regulations. The study uses seven datasets with information on formal and informal firms and their workers.¹² The authors first fixed some of the parameters in the model by combining aggregate data, estimates from previous papers and the statutory value of institutional parameters (for example, taxes). The

12 These include RAIS; the Annual Surveys of Industry, Trade and Services, which collect detailed information on the inputs, outputs and revenues of firms; customs data from the Secretariat of Foreign Trade; the Urban Informal Economy Survey, which is a linked employer–employee survey conducted in 1997 and 2003; and the Monthly Employment Survey.

remaining parameters were then obtained using an indirect inference estimator with equilibrium constraints.¹³

The authors ran counterfactual experiments to assess the effects of trade shocks on an economy with a large informal sector. There were four main results. First, trade openness decreased informality in the tradable sector, but had ambiguous effects on informality overall. Second, trade openness resulted in large welfare gains due to increased productivity, even when informality was suppressed. Third, the inclusion of the informal sector in trade evaluations reversed predictions as to how trade was likely to impact inequality driven by firm heterogeneity, in the sense that trade liberalization now had the effect of reducing wage inequality. Fourth, and last, the informal sector worked as an “unemployment” – but not a “welfare” – buffer in the event of negative shocks.

3.2.4 Local labour market outcomes

Finally, there is the growing body of empirical literature documenting the ways in which trade policies affect local and regional labour markets differently, depending on the industry mix. A relevant study in this area is by Topalova (2010), measuring the impact of trade liberalization on poverty in India during the 1990s. The study adopted a difference-in-differences estimation strategy to examine (a) the variation in sectoral composition across districts and (b) the intensity of the liberalization across production sectors.

It found that in rural districts, where the production sectors most exposed to liberalization were concentrated, poverty declined more slowly and consumption did not grow as much. In addition, the negative impact of liberalization was felt most strongly by the least geographically mobile people at the bottom of the income distribution.

Two related studies are those by Kovak (2013), which investigated the effect on wages of trade liberalization in Brazil during the 1990s, and Autor, Dorn and Hanson (2013), which analysed what effect rising Chinese import competition during the 1997–2007 period had on local US labour markets. A consistent finding from this type of study is that the cost–benefit of

¹³ See, for example, Gouriéroux and Monfort (1996) and Smith (2008). Indirect inference is a simulation method for estimating the parameters of economic models when the likelihood function is analytically intractable.

international trade is unevenly distributed, not only geographically, but also across industries and skill groups.

In conclusion, the main findings of the empirical literature can be summarized as follows. First, trade has contributed to an increase in wage inequality in several countries. Second, trade liberalization affects regions, sectors and population groups in different ways, and the type of liberalizing reform (import-oriented, export-oriented, or both) is important. Third, trade leads to a gradual relocation of displaced workers and to lower wages in most of the affected sectors, but also to enhanced welfare due to more and better work alternatives becoming available in the labour market. Fourth, trade liberalization reduces informality in tradable sectors, but may increase it in non-tradable sectors. Fifth, and lastly, exporting firms employ more workers and pay better wages.

► **3.3 Trade and decent work: The road ahead**

The surge in new and extended theoretical frameworks seeking to explain the impacts of trade on labour markets has by no means receded. Recent studies have variously sought to construct frameworks that incorporate economies of scale, product varieties and monopolistic competition; reconcile firm heterogeneity and imperfect competition with the neoclassical theory of comparative advantage; or else highlight the importance of rigidities in local labour markets.

Moreover, the slow but persistent trend towards deglobalization since the Great Recession of 2008–09 needs to be acknowledged, as this has seen a decline or, at best, a stagnation in the export and import of goods and services as a share of global GDP. This trend – given added impetus by the recent trade war between China and the United States, and expected to intensify further due to the detrimental effect the COVID-19 crisis has had on GVCs – may yet induce a profound shift in the way international trade is modelled and studied.

Furthermore, a majority of the conceptual dimensions of decent work are still to be incorporated into a formal theoretical approach. The ILO has declared the promotion of “opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity” to be its primary goal, emphasizing that “decent work is the converging focus of all its four strategic objectives: the promotion of rights at work; employment; social protection; and social dialogue” (ILO 1999, 3). The ILO’s Decent Work Indicators (ILO 2013), particularly those relevant to trade policy analysis (ILO 2021), are a set of alternative labour market metrics that should be considered for use in future research.¹⁴

After convening an international Tripartite Meeting of Experts on the Measurement of Decent Work in September 2008, the ILO adopted the Framework on the Measurement of Decent Work. This covers ten substantive elements: (i) employment opportunities; (ii) adequate earnings and productive work; (iii) decent working time; (iv) combining work, family and personal life; (v) work that should be abolished; (vi) stability and security of work; (vii) equal opportunity and treatment in employment; (viii) a safe work environment; (ix) social security; and (x) social dialogue plus employers’ and workers’ representation. These elements constitute the structural dimensions of the decent work measurement framework under which both statistical and legal framework indicators are organized and classified.

To date, the theoretical frameworks modelling trade and labour market outcomes have focused primarily on the effects of trade on wages, employment, informality and gender discrimination. There is, however, clearly a need to develop new frameworks for measuring the impact of international trade and globalization on other substantive elements of decent and productive work.¹⁵

Furthermore, the COVID-19 pandemic has set new parameters in terms of labour and trade topics. It has revolutionized both the concept and the conditions of work to varying degrees, depending on the sector and the

14 The *Handbook on Measuring Quality of Employment: A Statistical Framework* (UNECE 2015), prepared by the Expert Group on Measuring Quality of Employment, also provides a coherent framework on this aspect.

15 Understanding the implications of trade for decent work becomes even more relevant in view of growing evidence as to the positive effect that better working conditions have on a firm’s performance. See, for example, Brown, Dehejia and Robertson (2018), who assess the impact of the Better Work programme (a joint programme between the ILO and the International Finance Corporation) on firms in Indonesia, Jordan and Viet Nam; or Robinson, Perryman and Hayday (2004), who argue that employees with a positive attitude towards the firm they work for – driven by an involvement in decision-making, career development opportunities and the attention paid to employee well-being – perform better.

profession. For example, the resultant widespread use of technological tools and the adoption of novel practices such as home-office or hybrid schemes have clearly shown geographical location to be less relevant than previously thought for certain types of workers. This has created a new reality that needs to be accounted for.

Along the same line of technology-driven change, the so-called Fourth Industrial Revolution represents a fundamental transformation in the way people work and trade, with large benefits as well as risks. Modern theory coupled with quantitative analysis leveraging high-frequency and detailed data should aim to incorporate these factors.

Similarly, the empirical literature is not exempt from the need to look beyond the traditional metrics of the world of work.¹⁶ In this respect, consider for example the concept of decent working time. The ILO's main statistical indicator for decent working time is *employment in excessive working time* (EEWT), defined as the percentage of the employed population who work more than 48 hours per week (ILO 2013).¹⁷ It is a measure of exposure to overwork; that is, of people working longer hours than the threshold beyond which negative effects become observable. Among other negative consequences, a high EEWT value upsets the work-life balance and increases the risk of injury at work. It may also indicate inequitable remuneration and can reduce productivity. As an indicator, it can be readily constructed from labour force surveys in countries that meet ILO standards.

Furthermore, EEWT is a relevant statistical indicator for evaluating decent work in the context of international trade, particularly in settings that involve multinational enterprises (Galhardi 2018). However, although several studies have assessed a change in working hours as a possible margin of adjustment to international trade (Feliciano 2001; Autor, Dorn and Hanson 2013; Kim and Vogel 2018), its impact in terms of excessive working time has been largely unexplored.

16 Anker et al. (2002) is one of the earliest papers to propose viable statistical indicators for measuring the dimensions of decent work. See also Burchell et al. (2014) for a review of the development of concepts relating to the quality of employment and the ILO's Decent Work Agenda.

17 The employed population comprises working-age persons who were either in paid employment or self-employed during the reference period.

► 3.4 Concluding remarks

The theoretical literature on trade has undergone a significant evolution over recent decades. It has moved away from the neoclassical model of comparative advantage and towards new-new trade theory and its near family of dynamic industry models incorporating heterogeneous firms and workers, labour market frictions, GVCs and other more realistic and modern features of the product and labour markets.

However, even though novel theoretical frameworks have been developed to assess the impact of trade on various labour market outcomes, most of the structural dimensions of decent work, such as work–life balance or decent working time, have not yet been considered. Moreover, new models will need to incorporate the two phenomena that have deeply impacted international trade and the labour markets: first, the COVID-19 pandemic, which has led to the widespread adoption of new technologies and practices that are changing the notion and importance of location with regards to work; and second, the new digital era, also known as the Fourth Industrial Revolution, which is changing the way people behave and make decisions, including within the domain of trade and labour, generating large benefits as well as risks in the process.

The growing availability of more and better data, plus improved computational and econometric tools, is creating a significant body of research on the effects of trade on labour markets that provides valuable feedback for the recursive improvement of the underlying theoretical frameworks. In this respect, LEEDs obtained from surveys and administrative data, as well as large, high-frequency and detailed datasets, have become particularly relevant. This is because they allow researchers to (a) distinguish between the effects of decisions taken at the firm level and those taken at the worker level; (b) conduct equilibrium analyses of labour market outcomes; and (c) investigate the combined effects of worker and firm heterogeneity.

There are nonetheless some important challenges facing researchers. First, allowance needs to be made for certain recurring methodological issues, including measurement errors, aggregation problems and the endogeneity of policy variables.

Second, despite progress, there is still room for improvement in the coverage and the quality of data. It would be very useful to have a greater number of LEEDs, particularly for developing countries; and what is more, datasets that contain more complete information on the nature and characteristics of firms so as to obtain a better understanding of the trade-related decisions

that are taken, for example, with regards to outsourcing and offshoring. Combining administrative records, such as those held by tax authorities, with data from social security institutions would constitute a very promising source of worker- and firm-level data in this respect, making it possible to study the impact of trade policies on labour market outcomes not adequately covered by traditional establishment or household surveys.

Third, and finally, it will be necessary to widen the scope of analyses on the effects of trade by using alternative statistical indicators like the ILO's EEWT metric, if research is to capture more fully all the dimensions of decent work.

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