International trade has been an important engine of output and productivity growth historically, helping to lift millions out of poverty in recent decades. But since the global financial crisis, world trade growth has slowed, with the slowdown reflecting cyclical and structural forces. The coronavirus disease 2019 (COVID-19) pandemic and the Russian Federation’s subsequent invasion of Ukraine have further disrupted global supply chains and the trade that accompanies them. A removal of impediments that raise trade costs could reinvigorate world trade. Trade costs, on average, roughly double the cost of internationally traded goods relative to that of domestically sold goods. Tariffs amount to only one-twentieth of average trade costs; the bulk of those costs are incurred in shipping and logistics and trade procedures and processes at and behind the border. Despite a decline since 1995, trade costs remain about one-half higher in emerging market and developing economies (EMDEs) than in advanced economies; about two-fifths of this gap appears to be due to higher shipping and logistics costs and a further two-fifths to trade policy. A comprehensive reform package to lower trade costs would include trade facilitation measures, deeper trade liberalization, efforts to streamline trade processes and clearance requirements, improvements in transport infrastructure, more competition in domestic logistics and in retail and wholesale trade, and less corruption. Some of these measures could yield large dividends: It is estimated that among the worst-performing EMDEs, a hypothetical reform package to improve logistics performance and maritime connectivity to the standards of the best-performing EMDEs would halve trade costs.

Introduction

Global trade, powered by trade liberalization and falling transport costs, has historically been an important engine of output and productivity growth. In recent decades, it has helped to lift about 1 billion people out of poverty and many developing countries to integrate themselves into the world economy. Empirical studies indicate that an increase in trade openness of 1 percentage point of gross domestic product (GDP) has lifted per capita income by 0.2 percent (World Bank 2020c). The expansion of global value chains can account for a large part of the gains from trade (World Bank 2020c). Participation in global value chains generates efficiency gains and supports the transfer of knowledge, capital, and other inputs across countries, thereby boosting productivity. Integration into global value chains has also been associated with reduced vulnerability of economic activity to domestic shocks, although it has come with increased sensitivity to external shocks (Constantinescu, Mattoo, and Ruta 2020; Espitia et al. 2021).

Note: This chapter was prepared by Franziska Ohnsorge and Lucia Quaglietti, with contributions from Cordula Rastogi.
In the past decade and a half, global trade growth has slowed as global value chains have matured, investment weakness has weighed on goods trade, and trade tensions have emerged among major economies (World Bank 2015, 2017; chapter 3). As a result, instead of growing twice as fast as global output, as it did during 1990-2011, global trade in goods and services grew just about as fast as global output in 2011-19 (figure 6.1). The COVID-19 pandemic hit global trade particularly hard, and the latter fell by nearly 16 percent in the second quarter of 2020. It subsequently rebounded swiftly, however, especially goods trade, and much faster than it did after the 2007-09 global financial crisis. That said, in 2021, global trade growth slowed again, as lockdowns and closures in the midst of new COVID-19 outbreaks and the emergence of significant supply chain strains in a number of sectors disrupted trade. Russia’s invasion of Ukraine in February 2022, which dislocated global commodity markets and manufacturing processes that rely on specialized inputs from Russia or Ukraine dealt a further blow to supply chains and trade.

Absent a major policy effort, trade growth is likely to weaken further over the remainder of the 2020s, given the prospect of slower output growth and the fact that some of the key structural factors that supported rapid trade expansion in the past have largely run their course. Although supply chains have proven remarkably resilient given the magnitude of recent shocks, the COVID-19 pandemic and Russia’s invasion of Ukraine could accelerate changes in supply chains that were already under way, through further in-sourcing or regionalizing production networks and increasing digitalization, among other avenues (chapter 4). A contraction of supply chains might lower the output elasticity of trade further, continuing a process that has been under way since 2010 (Timmer et al. 2021). Multinational corporations operating in EMDEs have already
increased their use of digital technologies and enhanced their diversification of suppliers and production sites to increase their resilience to supply chain shocks (Saurav et al. 2020). As multinationals seek to diversify, EMDEs may have new opportunities to integrate into global supply chains, provided they can offer a conducive business environment, incorporating such elements as a skilled workforce and adequate infrastructure (Arunyanart et al. 2021; Butollo 2021).

As discussed in chapter 5, growth in potential output is expected to slow in many EMDEs in the coming decade amid unfavorable demographics and slowing investment and productivity growth. One way in which policy makers in EMDEs can boost long-term growth of output and productivity is by promoting trade integration through measures to reduce trade costs.

This chapter examines the following questions:

- What is the link between trade growth and long-term output growth?
- What are the prospects for trade growth in the coming decade?
- How large are trade costs?
- What are the correlates of trade costs?
- Which policies can help to reduce trade costs?

This chapter contributes to the literature in a number of ways. First, it expands on World Bank (2021c) with a new, comprehensive review of the theoretical and empirical literature on the links between trade and output growth. Second, it presents an event study of the evolution of trade in goods and services through global recessions, including the pandemic-induced global recession of 2020.

Third, the chapter revisits an earlier literature that reported estimates of trade costs and their correlates (Arvis et al. 2016; Novy 2013; World Bank 2021c). It uses estimates of the costs of goods trade for up to 180 economies (29 advanced economies and 151 EMDEs) from the UN Economic and Social Commission for Asia and the Pacific (ESCAP)-World Bank Trade Cost Database for 1995-2019 to estimate econometrically the drivers of the costs of goods trade, which accounts for about 75 percent of world and EMDE trade in goods and services. The chapter also quantifies the contribution of one type of services trade—logistics and shipping services—to the costs of goods trade. In addition, the chapter goes further than previously published research in assessing the role of trade policy—tariffs and participation in trade agreements—in trade costs.

Fourth, the chapter builds upon its analytical findings to discuss policy options for lowering trade costs. In particular, it offers scenarios indicating the potential impact of a range of policy measures on trade costs.

This chapter offers the following findings.
First, the theoretical literature indicates that international trade boosts the long-term growth of output and productivity by promoting a more efficient allocation of resources, technological spillovers, and human capital accumulation. The empirical literature supports this theory by finding statistically significant positive relationships between trade openness and output growth, although the statistical significance of these relationships may be conditional on the presence of sound institutions and a supportive business environment in exporting countries. Overwhelmingly, empirical studies find a positive impact of trade on productivity growth.

Second, the COVID-19-induced global recession of 2020 triggered a collapse of global trade in goods and services. Within six months, however, before the end of 2020, global goods trade had recovered to prepandemic levels, and, by September 2021, global services trade had reached prepandemic levels, even though trade in travel and tourism services was still 40 percent lower than before the pandemic. The decline in services trade was considerably more pronounced and the recovery more subdued than in past global recessions, whereas movements in goods trade were broadly comparable to those in past global recessions.

Third, global trade growth is likely to weaken further in the coming decade, owing partly to slower global output growth and partly to the further waning of structural factors that supported rapid trade expansion in the past. The disruptions caused by the pandemic and Russia’s invasion of Ukraine may also continue to dampen trade growth over the medium term. A major policy effort to reduce trade costs could help reverse the trade slowdown.

Fourth, trade costs for goods are high: On average, they are almost equivalent to a 100 percent tariff, so they roughly double the costs of internationally traded goods relative to those of domestic goods. Tariffs amount to only one-twentieth of average trade costs; the bulk of trade costs are incurred in transport and logistics, nontariff barriers, and policy-related standards and regulations. Despite a one-third decline since 1995, trade costs in EMDEs remain about one-half higher than those in advanced economies.\(^1\) Analysis of the results of a panel regression suggests that higher shipping and logistics costs can account for about two-fifths of the difference in trade costs between EMDEs and advanced economies explained by the regression, and trade policy (including uncertainty surrounding it) can account for a further two-fifths. Services trade tends to cost considerably more than goods trade; regulatory restrictions can account, to a large extent, for the difference.

Fifth, to reduce elevated trade costs in EMDEs, comprehensive reform packages are needed to streamline trade processes and customs clearance requirements, enhance infrastructure supporting domestic trade, increase competition in domestic logistics and in retail and wholesale trade, lower tariffs, lower the costs of compliance with standards and regulations, and reduce corruption. Trade agreements can also reduce trade costs

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\(^1\) Differences in trade costs across regions might also stem from differences in domestic trade costs.
and promote trade, especially if they lower nontariff barriers as well as tariffs. The chapter’s empirical analysis suggests that an EMDE in the quartile of EMDEs with the highest shipping and logistics costs could halve its trade costs if it improved these high costs to match those in the quartile of EMDEs with the lowest costs of shipping and logistics.

This chapter defines trade costs broadly to include all costs of international trade, whether at the border (such as tariffs), behind the border (such as standards and labeling requirements), or between borders (such as shipping and logistics). It defines trade costs as the excess cost of an internationally traded good compared with those of a similar good traded domestically (box 6.1). Hence, trade costs cover the full range of costs associated with trading internationally, including transportation and distribution costs, tariffs and nontariff barriers arising from policies, costs of information and contract enforcement, and legal and regulatory costs, as well as the costs of doing business across cultures, languages, and economic systems (Anderson and van Wincoop 2003).

The chapter is organized in six sections. Following the introduction presented in this first section, the second section reviews the theoretical and empirical literature on the linkages between international trade and long-term output growth and the main channels of transmission. The subsequent section discusses developments in global trade over the past decade, with a particular focus on developments during the COVID-19 pandemic. The following section presents patterns of trade costs across sectors and regions, while the penultimate section discusses the correlates of trade costs, by means of an estimated gravity panel model, among other methods. The final section focuses on policies to reduce trade costs, presenting a wide range of policy options available to policy makers.

**Trade and growth: A review of the literature**

An extensive theoretical literature has traced the channels through which international trade can lift output and productivity growth. The empirical literature has largely confirmed a positive association between growth and trade, although some studies have found that the strength of this association depends on country characteristics.

**Theoretical literature**

The link between international trade and economic activity has long been a major subject of enquiry in theories of international trade and economic growth. Much traditional trade theory explains how trade raises output levels but is silent about effects on long-term output growth (Feenstra 2003; Ricardo 1817). In contrast, more recent trade and growth theories describe a positive relationship between the two, tracing the mechanisms through which trade lifts long-term productivity and output growth (Helpman 1981; Krugman 1979; Lucas 1993).

Three main channels have been explored. First, access to foreign markets allows countries to acquire new technologies, especially when countries with different
Shipping and logistics, tariffs, and membership in regional trade agreements contribute in a statistically significant way to trade costs.

Introduction

Elevated trade costs remain a significant impediment to cross-border trade. On average, trade costs roughly double the cost of an internationally traded good over that of a similar domestic good. Emerging market and developing economies (EMDEs) have trade costs more than one-half higher than those in advanced economies, despite a decline since 1995.

This box considers the determinants of trade costs empirically by examining the following questions.

- How does the literature measure trade costs?
- What are the main determinants of trade costs empirically?

The results suggest that geographic distance and high bilateral tariff rates are positively associated with trade costs, in the manufacturing sector as well as others. In contrast, common borders (proximity), common language, and membership in a common regional trade agreement tend to reduce trade costs. Policies aimed at facilitating trade, including those promoting better maritime connectivity and stronger logistics performance, are also associated with lower bilateral trade costs.

Measures of trade costs

Conceptually, trade costs may be defined as the excess cost of an internationally traded good compared with that of a similar good traded domestically. By construction, trade costs can therefore move without any change in external costs of trading, simply as a result of changes in domestic trading costs. To measure trade costs, the literature has developed two main types of approaches: direct and indirect (Chen and Novy 2012).

Direct approaches rely on observable data that serve as proxies for individual components. For instance, measures of costs faced at a country’s border are often based on counting the average number of days needed for a good to cross the border, while transport costs are often inferred from the costs of ocean and air shipping (Hummels et al. 2007). Information regarding policy barriers such as tariffs and nontariff measures is directly available from a range of statistical sources. Direct approaches suffer from a series of limitations, including the fact the underlying variables are only partially observable and may not be easily converted to plausible ad valorem tariff equivalents, which makes it difficult to compare them, as well as difficult to aggregate them into a summary measure of
Determinants of trade costs

To estimate the contribution of different determinants of trade costs, a gravity model is estimated for a panel of up to 23 advanced economies and 72 EMDEs for which annual data for both trade costs and all determinants of trade costs are available over 2007-18. The sample includes 25 exporters of industrial commodities (energy and metals), all of which are EMDEs.

Data

The estimation relies on bilateral trade costs from the UN Economic and Social Commission for Asia and the Pacific (ESCAP)-World Bank Trade Cost Database. As is done in Novy (2013) and Arvis et al. (2013), bilateral trade costs are obtained as geometric averages of flows between countries $i$ and $j$. They are computed according to the following formula:

$$\frac{(X_{ij} X_{ji})}{(X_{ij} X_{ji})^{1/2 (\sigma-1)}},$$

in which $X_{ij}$ represents trade flows between countries $i$ and $j$ (goods produced in $i$ and sold in $j$) and $\sigma$ refers to the elasticity of substitution. This formula captures international trade costs relative to domestic trade costs. Intuitively, trade costs are higher when countries trade more domestically than they trade with each other.
other, that is, as the ratio \( \frac{X_{ii} X_{jj}}{X_{ij} X_{ji}} \) increases. The difference between gross output and total exports proxies intranational (that is, domestic) trade.

Trade costs thus computed implicitly account for a wide range of frictions associated with international trade, including transport costs, tariff and nontariff measures, and costs associated with differences in languages, currencies, and import or export procedures. Trade costs are expressed as ad valorem (tariff) equivalents of the value of traded goods and can be computed as an aggregate referring to all sectors of an economy, but also specifically for its manufacturing and agriculture sectors.

**Estimation**

Gravity equations are widely used to analyze the determinants of bilateral trade flows. Chen and Novy (2012) and Arvis et al. (2013) also employ a gravity specification to analyze the determinants of bilateral trade costs in a cross-sectional data set. In line with Moïsé, Orliac, and Minor (2011), this study estimates determinants of trade costs in a panel specification.

The regression equation takes the following form:

\[
TC_{ijt} = \beta_1 RTA_{ijt} + \beta_2 tariff_{ijt} + \beta_3 LSCI_{ijt} + \beta_4 LPI_{ijt} + \beta_5 Trade\ Policy\ Uncertainty_{ijt} + \beta_6 Gravity_{ijt} + \eta_t + \epsilon_{ijt}, \tag{B6.1.1}
\]

in which for any given country pair \( ij \), bilateral trade costs \( TC \) observed at time \( t \) are regressed on a wide range of candidate drivers. These include membership in a regional trade agreement (\( RTA \) in the equation), sector-specific bilateral tariffs, shipping connectivity (the United Nations Conference on Trade and Development’s Liner Shipping Connectivity Index \( LSCI \) in the equation) and logistics (the World Bank’s Logistics Performance Index \( LPI \) in the equation), a proxy for trade policy uncertainty, and standard gravity indicators (distance, a common language, and a common border). In line with the approach in Osnago, Piermartini, and Rocha (2018), trade policy uncertainty is defined as the gap between binding tariff commitments and applied tariffs. To ascertain the role of policies aimed at facilitating trade, indexes of logistic performance and maritime connectivity are included.

Specifically, the Logistics Performance Index is based on surveys of global freight operators and express carriers regarding customs, logistics and transport infrastructure, international shipments, logistics competence, tracking and tracing, and delays. The Liner Shipping Connectivity Index is derived from a country’s number of ships, their container-carrying capacity, maximum vessel size, the number of services provided, and the number of companies that deploy
container ships in the country’s ports. The choice of variables in the panel is informed by Arvis et al. (2013), but also by findings from the stylized facts presented in the chapter text. Table 6.1 presents full details on data and sources.  

Since trade costs data are obtained as bilateral geometric averages, trade facilitation indicators available at individual-country level are transformed into bilateral measures by taking the geometric average of each country pair direction. Therefore, the unit of analysis is each individual country pair. Time fixed effects \( \eta_t \) are included in the estimation to control for global trends. As the measures of trade costs already net out multilateral resistance components, in line with Novy (2013), the estimation does not include additional fixed effects. Instead, to control for possible correlation of error terms, clustered standard errors by country pairs are used. 

Two models are estimated: a general model for the determinants of trade costs in all sectors of the economy and a sectoral model for the determinants of trade costs in the manufacturing sector. The two models follow the specification presented in equation (B6.1.1), but trade costs and tariff rates are sector specific. Table B6.1.1 shows results from the estimations. 

**Results**

All estimated coefficients have signs and magnitudes in line with prior expectations based on the literature. Geographic distance and high bilateral tariff rates are positively associated with trade costs. In contrast, adjacency, common language, and membership in a common regional trade agreement tend to reduce trade costs. Policies aimed at facilitating trade, including those intended to increase maritime connectivity and generate stronger logistics performance, are also associated with lower bilateral trade costs, both overall and in the manufacturing sector. Trade uncertainty is also positively associated with trade costs, both overall and in the manufacturing sector. With an \( R^2 \) value above 50 percent, the regression explains most of the variation in trade costs in the sample.

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**BOX 6.1 Understanding the determinants of trade costs (continued)**

a. Nontariff barriers and exchange rate volatility would ideally have been included in the regression estimation. However, these are difficult to measure, and the panel measures available over time and across countries were too crude to yield statistically significant results. Ideally, the regression would also be applied to services; however, the database does not include trade costs for services. 

b. Multilateral resistance captures global trends. Specifically, outward multilateral resistance measures the degree to which trade flows between countries \( i \) and \( j \) depend on trade costs across all potential markets for country \( i \)’s exports, while inward multilateral resistance measures the degree to which bilateral trade depends on trade costs across all potential import markets. Therefore, the two indexes summarize third-country effects that might affect bilateral trade flows between countries \( i \) and \( j \). Novy (2013) shows that simple algebra makes it possible to eliminate the multilateral resistance terms from the gravity equations, and in so doing he derives an expression for trade costs.
The panel estimation also explains most of the difference in trade costs between the average EMDE and the average advanced economy and attributes about two-fifths of this gap to higher shipping and logistics costs in EMDEs and a further two-fifths to trade policy (including trade policy uncertainty). The regression also explains most of the decline in average trade costs between 2008 and 2018 and attributes three-fourths of it to falling shipping and logistics costs and the remaining one-fourth to trade policy.

There are significant differences in the drivers of trade costs between advanced economies (which are mostly importers of industrial commodities) and EMDEs, and between exporters and importers of industrial commodities. The regression is reestimated for several subsamples of costs of bilateral trade flows: a sample of costs of bilateral trade among EMDEs only, a sample of costs of bilateral trade among advanced economies only, and a sample of costs of bilateral trade between EMDEs and advanced economies. It is also reestimated for a sample of bilateral trade costs between importers of industrial commodities only or exporters of industrial commodities only.
**BOX 6.1 Understanding the determinants of trade costs (continued)**

industrial commodities only, as well as a sample of bilateral trade costs between exporters and importers of industrial commodities. Tables B6.1.2A and B6.1.2B show the results.

For trade among advanced economies only, logistics performance and distance are critical sources of trade costs, whereas tariffs and regional trade agreement membership play negligible roles. By comparison, better logistics performance reduces trade costs between an advanced economy and an EMDE or between a pair of EMDEs by only one-fifth as much as between a pair of advanced economies. On the other hand, membership in regional trade agreements significantly reduces trade costs between pairs of EMDEs (but not in advanced economy-EMDE country pairs or, as noted, between pairs of advanced economies).

Logistics performance and distance are also more important sources costs of trade among commodity importers than between commodity importers and exporters. For tariffs, the reverse is true. For example, an improvement in logistics performance lowers trade costs between commodity importers by almost twice as much as between commodity importers and exporters. Conversely, a cut in tariffs lower trade costs between commodity exporters and importers by twice as much as between commodity importers. These patterns are evident for trade costs both in all sectors and in manufacturing alone.

**Robustness**

The estimations are robust to different specifications, lag structures, and estimators. An alternative estimation performed with the Poisson maximum likelihood estimator, which is often employed in the literature on gravity models (Santos Silva and Tenreyro 2006) to control for heteroskedasticity, produces similar results to those presented in table B6.1.1.

Adding further variables, including bilateral real exchange rates, gross domestic product (GDP) per capita, institutional variables, and a dummy characterizing landlocked country pairs, does not alter the regression results, and the variables turn out to be statistically nonsignificant. Likewise, adding country fixed effects does not alter the stability of the model, with both the gravity and trade policy variables retaining the expected sign and statistically significant effects. While there are concerns about multicollinearity (regarding the 0.5 correlations between the Logistics Performance Index and Liner Shipping Connectivity Index, among others), a variable inflation factor test (a standard diagnostic test) does not detect the presence of significant multicollinearity among regressors.

A few caveats apply to the analysis. The effect of policies on trade costs can be difficult to disentangle. Changes in trade costs between two countries can be due
to actions taken by one government or the other or both together. The fact that the variables featuring in the regression (including the measure of trade costs) are computed as country-pair geometric averages does not allow a disentangling of the source of policy actions. In addition, because of the lack of sufficiently long time-series data, the approach taken here does not take into account the possibility that the regression coefficients have changed over time, as other studies for the effect of distance (Yotov 2012) or trade agreements (de Sousa 2012) have found.

**BOX 6.1 Understanding the determinants of trade costs (continued)**

**TABLE B6.1.2A Panel regression results for subsamples**

| Source: World Bank. Note: Robust standard errors are shown in parentheses. The table shows estimated coefficients from a gravity panel regression estimated for up to 95 countries using annual data for 2007-18 in which the dependent variable is the log of bilateral trade costs. The regression includes time fixed effects. Standard errors are clustered by country pairs. *p < 0.05, **p < 0.01, ***p < 0.001. † indicates the coefficient estimate is different, with statistical significance, from the coefficient estimate for a sample of advanced economies only. ‡ indicates the coefficient estimate is different, with statistical significance, from the coefficient estimate for a sample of commodity importers only. |

<table>
<thead>
<tr>
<th>All sectors</th>
<th>Advanced economies only</th>
<th>Advanced economies and EMDEs</th>
<th>EMDEs only</th>
<th>Commodity importers only</th>
<th>Commodity importers and exporters</th>
<th>Commodity exporters only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liner Shipping Connectivity Index</strong></td>
<td>-0.195*** [0.0237]</td>
<td>-0.230*** [0.0111]</td>
<td>-0.209*** † [0.0093]</td>
<td>-0.230*** [0.00886]</td>
<td>-0.231*** † [0.0109]</td>
<td>-0.198*** † [0.0226]</td>
</tr>
<tr>
<td><strong>Logistics Performance Index</strong></td>
<td>-1.526*** [0.107]</td>
<td>-0.298*** † [0.056]</td>
<td>-0.277*** † [0.048]</td>
<td>-0.596*** [0.0438]</td>
<td>-0.317*** † [0.0471]</td>
<td>-0.273*** ‡ [0.097]</td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td>0.343*** [0.0157]</td>
<td>0.221*** † [0.0112]</td>
<td>0.233*** † [0.00993]</td>
<td>0.306*** [0.0103]</td>
<td>0.223*** † [0.00962]</td>
<td>0.241*** ‡ [0.0202]</td>
</tr>
<tr>
<td><strong>Tariffs</strong></td>
<td>-0.0998 [0.239]</td>
<td>0.517*** † [0.0916]</td>
<td>0.203*** † [0.0488]</td>
<td>0.189** [0.0878]</td>
<td>0.453*** † [0.0647]</td>
<td>0.238*** [0.0682]</td>
</tr>
<tr>
<td><strong>Regional trade agreement membership</strong></td>
<td>-0.00793 [0.0125]</td>
<td>-0.0289*** † [0.00714]</td>
<td>-0.0850*** † [0.0117]</td>
<td>-0.0326*** † [0.00789]</td>
<td>-0.0545*** [0.00844]</td>
<td>-0.0796*** [0.0265]</td>
</tr>
<tr>
<td><strong>Trade policy uncertainty</strong></td>
<td>0.0383*** [0.0128]</td>
<td>0.0897*** † [0.00706]</td>
<td>0.0583*** † [0.00684]</td>
<td>0.0799*** [0.00633]</td>
<td>0.0794*** † [0.00666]</td>
<td>0.0103 ‡ [0.0132]</td>
</tr>
<tr>
<td><strong>Common border</strong></td>
<td>-0.389*** [0.114]</td>
<td>-0.380*** [0.136]</td>
<td>-0.453*** [0.0334]</td>
<td>-0.327*** [0.0581]</td>
<td>-0.494*** † [0.0566]</td>
<td>-0.356*** [0.0541]</td>
</tr>
<tr>
<td><strong>Common language</strong></td>
<td>-0.166*** [0.011]</td>
<td>-0.0878*** † [-0.186]</td>
<td>-0.117*** [0.00789]</td>
<td>-0.145*** [0.00844]</td>
<td>-0.273*** ‡ [0.097]</td>
<td></td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
<td>504 668 102 802 450 408</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

The estimation results suggest that policies can have a statistically significant and economically sizable impact on trade costs. Better shipping connectivity, better logistics performance, and less trade policy uncertainty are associated with trade costs that are lower with statistical significance. More challenging shipping and logistics account for about two-fifths of the predicted gap between trade costs in EMDEs and those in advanced economies, and trade policy accounts for a further two-fifths. Improved shipping and logistics also account for about three-fourths of the predicted decline in trade costs since 2008.
technological endowments trade with one another. Second, openness to international trade offers opportunities to exploit economies of scale and “learning by doing,” which enhance both productivity growth and the variety of goods produced and consumed. Third, trade generates competitive pressures that encourage innovation and factor reallocation, including the exit of the least productive firms, thus lifting overall productivity.

Technological progress, by enhancing the productivity of labor and other factors of production, is a critical driver of long-term output growth and poverty reduction. Apart from their immediate impact on productivity, the creation, application, and diffusion of technological advances tend to generate positive externalities and increasing returns to scale (Arrow 1962; Romer 1990). However, as technological innovation tends to occur in a limited number of countries, advances globally depend on international spillovers (Keller 2004). International trade, like foreign direct investment (FDI), is one of the primary channels for diffusion of new technology, as it makes available to importers processes and products that embody foreign knowledge and that would otherwise be unavailable or very costly (Grossman and Helpman 1991; Helpman 1997).

The literature identifies two types of externalities generated through trade: pure knowledge spillovers and rent spillovers. Pure knowledge spillovers arise mostly through licensing agreements or through firms that are multinational. Rent spillovers occur when the prices of imported intermediate and capital goods do not fully reflect the costs of innovation embedded in them, so that part of the rents from innovation are transferred from the innovating firm to trading partners (Keller 2021).

International trade also allows countries to exploit economies of scale and network effects in areas where they have a comparative advantage (Helpman 1981; Helpman and Krugman 1985; Krugman 1979). Trade causes output to expand and, in the presence of increasing returns to scale, firms’ fixed costs are spread over a larger number of units produced. This results in more efficient production at smaller average cost. Through a similar mechanism, the output expansion associated with trade may also allow greater product variety, which can enhance productivity (Feenstra 2010). In addition, innovations resulting from international trade often allow workers to acquire new human capital through learning by doing as workers take up new tasks. This also boosts productivity and helps countries move up the product-quality ladder (Lucas 1993).

By increasing competition, trade also promotes productivity growth by reallocating resources toward more efficient firms as the least productive firms are encouraged to exit (Bernard et al. 2007; Melitz 2003). Since entering foreign markets imposes an up-front cost for exporting firms, only relatively productive firms can generally engage in exporting. Once they have entered a new market, exporting firms can expand and attract workers and capital, thus tending to force out firms limited to the domestic market by inferior efficiency. In addition, by raising competitive pressures in the domestic market, international trade lowers firms’ markups over marginal cost and encourages organizational change and production upgrades to boost within-firm productivity (Melitz and Ottaviano 2008).
Empirical literature

A large empirical literature using cross-country and firm-level data has investigated the relationship between international trade and long-term output growth. In addition to aggregate effects, studies have identified specific channels through which trade integration boosts productivity, capital accumulation, and employment growth—the fundamental drivers of long-term economic growth.

Trade and output growth. Most cross-country studies have found a positive link between international trade and output growth (see Alesina, Spolaore, and Wacziarg 2000; Dollar and Kraay 2004; Frankel and Romer 1999; Noguer and Siscart 2005; and Sachs and Warner 1995). However, the direction of causality and the role of third factors remain matters of debate. Some studies find clear growth-enhancing effects of trade liberalization (Bhagwati and Srinivasan 2002; Dollar 1992), whereas others find that the effects depend on the measure of trade openness used (Rodríguez and Rodrik 2000). This may, in part, reflect omitted variables. For example, some authors find trade has a large positive impact on growth only when accompanied by high levels of education, well-developed financial systems, and institutional reforms (Chang, Kaltani, and Loayza 2009). Likewise, regulatory reforms have been found to enhance the impact of trade on growth (Bolaky and Freund 2004).

Trade and productivity. A number of cross-country and firm-level studies find a positive link between trade and labor or total factor productivity (see Alcala and Ciccone 2004; Chen, Imbs, and Scott 2009; Edwards 1997; and Frankel and Romer 1999). A cross-country study of 138 countries for 1985 finds that an increase of 1 percentage point in trade openness is associated with 1.2 percent higher labor productivity (Alcala and Ciccone 2004). A more recent study of a large number of advanced economies and EMDEs finds that rising trade openness accounted for about 15 percent of the increase in total factor productivity growth during 1994-2003, but it accounted for a larger proportion—32 percent—in developing countries alone (Broda, Greenfield, and Weinstein 2017). Studies that address firm heterogeneity also point to trade-induced productivity gains. For example, one study finds that firms facing international competition enjoy productivity that is 3-10 percent higher than productivity in those that sell only in domestic markets (Pavcnik 2002). A study for Brazil finds evidence of reductions in inefficiencies in firms that engage in international trade (Muendler 2004).

Trade and capital accumulation. Several studies find evidence of a positive relationship between trade openness and capital accumulation (Alvarez 2017; Sposi, Yi, and Zhang 2019). A study covering the period 1950-98 indicates that countries that liberalized their trade regimes subsequently experienced annual investment growth that was 1.5 percentage points higher than their rates before liberalization, on average (Wacziarg and Welch 2008). The literature also points to a close association between trade openness and FDI inflows, which are a source of funding for investment in addition to domestic saving (Shah and Khan 2016; Sharma and Kumar 2015; Stone and Jeon 2000). For example, one study found that among 36 developing economies between 1990 and 2008, trade openness was associated with higher FDI inflows in the long run (Liargovas
Trade policies and the quality of infrastructure have been found to affect the strength of the link between trade and FDI. Thus, a study of Asian countries during 2008-13 found that countries with fewer restrictions on imports and exports had a higher chance of attracting FDI, with an 8 percent increase in FDI inflows accompanying a 10 percent reduction in bilateral trade costs (Duval, Saggu, and Utoktham 2015).

**Trade and employment.** Theoretical models often assume long-run full employment, allowing trade to have only limited, short-term effects on jobs. But a number of empirical studies point to positive effects of trade on employment. For example, a cross-country study of member countries of the Organisation for Economic Co-operation and Development (OECD) over 1983-2003 finds that a 10 percent increase in trade openness was associated with a rate of unemployment that was 1 percentage point lower (Felbermayr, Prat, and Schmerer 2009). Country-specific evidence also suggests significant employment creation following greater trade integration, in China, Madagascar, and Singapore, among others (Hoekman and Winters 2005). Another study, however, found that in the United States, rising imports from China raised unemployment and reduced labor force participation in import-competing manufacturing industries and that such imports explained one-quarter of the decline in U.S. manufacturing employment (Autor, Dorn, and Hanson 2013). In general, trade integration has different effects on employment across countries that depend importantly on the functioning of labor markets, the efficiency of capital markets, and social policies (OECD et al. 2010).

**Recent trade growth and prospects**

The slowdown in trade growth in the decade following the global financial crisis reflected weaker global output growth as well as a lower responsiveness of international trade to global economic activity (the output elasticity of trade). The subsequent COVID-19 pandemic triggered a collapse in goods trade on par with those in earlier global recessions, but the collapse in services trade was much deeper and was followed by an exceptionally slow recovery. All major drivers of trade growth point to a period of prolonged weakness.

**Weakness of trade growth in the 2010s**

Global trade in goods and nonfactor services grew much more weakly in the prepandemic decade, at just 3.8 percent a year during 2011-19, than during 1970-2008, when it averaged 5.8 percent a year. If global trade had expanded at its 1970-2008 trend rate during 2011-19, it would have been about one-third above its actual level in 2019 (figure 6.2). With the exception of Europe and Central Asia (ECA), the slowdown in trade growth extended across all EMDE regions. Sub-Saharan Africa (SSA) experienced particularly weak trade growth, at about half the EMDE average over the 2010s. The slowdown was concentrated in goods trade; services trade continued to outpace world output growth, by 1.5 percentage points a year on average during 2011-19, before the pandemic hit.
FIGURE 6.2 Factors lowering the elasticity of global trade with respect to global output

Global trade growth has slowed since 2011, in part as a result of slowing output growth. In addition, trade has become less elastic with respect to global economic activity amid slowing global investment, maturing global value chains, and mounting trade tensions.

A. World trade, actual and trend

B. Elasticity of global trade with respect to global output

C. Aggregate demand components relative to historical trend, 2019

D. Import content of components of aggregate demand, 2014

E. Share of global-value-chain-related trade in global trade

F. New trade measures

Sources:
Auboin and Borino (2018); Constantinescu, Mattoo, and Ruta (2020); Global Trade Alert database; World Bank.
Note: EMDEs = emerging market and developing economies; excl. = excluding.
A. “World trade” refers to the average of imports and exports, indexed to 1970 = 100. The historical trend is computed over 1970-2008 and smoothed using a Hodrick-Prescott filter.
B. Estimates from an error correction model over the period 1970-2019. The model allows trade to have both a long-run elasticity with respect to income (which captures trend, or structural, factors) and a short-run elasticity (which is relevant to short-run or cyclical developments). For further details on the model specification, see Constantinescu, Mattoo, and Ruta (2020).
C. Trend levels in 2019 are obtained on the basis of the historical average trend growth computed over the period 1995-2008 and rebased to 100. Bars below 100 show deviations of actual 2019 levels from trends. Investment is aggregate investment.
D. Data for 2014 as estimated in Auboin and Borino (2018).
E. Share of global-value-chain-related trade in global trade as defined in World Bank (2020c). Data are available through 2015.
F. Data exclude late reports for the respective reporting years (the cut-off date is December 31 of each year).
Estimates of the output elasticity of trade also reflect the slowdown in trade growth. Estimates from an error correction model for 1970-2019 suggest that the long-run output elasticity of trade—the trade increase associated with a 1 percent increase in output—declined from 2.2 during 1990-2011 to about 1.0 during 2011-19.\(^2\) In EMDEs, the ratio of import growth to output growth declined from 1.7 during 1990-2008 to 0.9 during 2011-19. The decline in the global output elasticity of trade in the decade before the pandemic reflected several factors (World Bank 2015).

- **Changes in the composition of global demand.** The composition of global demand shifted away from advanced economies toward EMDEs and toward less trade-intensive components of aggregate demand. EMDEs, which typically have a lower trade intensity than advanced economies, accounted for just under two-fifths of global output during 1980-2008 but for about three-fifths during 2010-19 (Cabrillac et al. 2016; World Bank 2015). Investment, which tends to be more trade-intensive than other components of demand, has been weak over the past decade, especially in EMDEs (Bussière et al. 2013; Kose et al. 2017). This weakness has reflected a number of factors, including a policy-guided shift away from investment-led growth in China and the effects of prolonged weakness of commodity prices on investment in commodity exporters (World Bank 2017, 2019).

- **Maturing global value chains.** Over the past decade, the expansion of global value chains has slowed (Antras and Chor 2021; World Bank 2015, 2020c). The share of global-value-chain-related trade in total world trade grew significantly in the 1990s and early 2000s but has stagnated or even declined since 2011. This stagnation or decline has in part reflected rising labor costs in key emerging market economies, a greater appreciation among firms of supply risks in the wake of natural disasters, and mounting trade tensions over the past five years (Cabrillac et al. 2016; Cigna, Gunella, and Quaglietti 2022; World Bank 2020c). Trade in construction and that in services, which tend not to be embedded in deep global value chains, increased their shares of global trade after 2010 (WTO 2019b).

- **Trade tensions.** A slowing pace of trade liberalization may also have contributed to lower trade elasticity (World Bank 2015). Tariff rates leveled off in both advanced economies and EMDEs in the early 2000s. At the same time, use of regulatory measures and other nontariff barriers such as export subsidies, restrictions on licensing or foreign direct investment, and domestic clauses in public procurement increased (Niu et al. 2018).

**Pandemic-triggered collapse and recovery: Historical comparison**

The global recession of 2020 was the deepest since World War II and was accompanied by a collapse in global trade in goods and nonfactor services of nearly 16 percent in the

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\(^2\)The model allows estimation of both the long-run elasticity of trade with respect to income (which captures trend, or structural, factors) and the short-run elasticity (which is relevant to short-run or cyclical developments). For further details on the model specification, see Constantinescu, Mattoo, and Ruta (2020).
second quarter of 2020—6 percentage points steeper than the drop in the first quarter of 2009, at the nadir of the global recession triggered by the global financial crisis. In 2020 as a whole, goods trade fell by 7 percent, considerably more than in the average global recession since 1975 (figure 6.3). Unusually for global recessions, global trade in services collapsed more than global trade in goods. The decline in services trade was considerably more pronounced and the recovery more subdued than in past global recessions, with the differences partly reflecting the collapse in global tourism as countries closed their borders to stem the spread of the pandemic. In 2020, services trade fell by 20 percent, more than twice the average drop of 8 percent in global recessions since 1975.

The postpandemic trade recovery fell just a little short of the average recovery following past global recessions. For 2021 as a whole, goods trade stood at 6 percent above its prepandemic level, as compared with 8 percent in the first year of recovery after the average past global recession. The recovery in global trade since 2020 has partly reflected a rotation of global demand toward trade-intensive manufactured goods—especially durable goods—and away from services, which tend to be nontradable. Trade growth has mirrored the increase in industrial production almost one for one. This pattern is consistent with both being lifted by a common factor such as a rebound in global demand (World Bank 2022a). The recovery in goods trade has been fairly broad-based, with global imports of cars, capital goods, consumer goods, and industrial supplies all back at or above prepandemic levels by January 2021 (IMF 2021). However, global goods trade stalled in the second half of 2021, amid slowing demand growth and tightened supply bottlenecks and, in February 2022, due to the impact of Russia’s invasion of Ukraine on trade flows.

Through most of 2021, global services trade remained below prepandemic levels, in contrast with what took place in earlier global recessions, in which it typically recovered quite rapidly. Aggregate services trade reached prepandemic levels only in September
2021. By January 2022, most components of services trade, including that in telecommunications and financial services, had fully recovered to prepandemic levels, but trade in travel services remained 40 percent lower. Trade in services recovered most rapidly in East Asia and the Pacific (EAP), as China’s services trade had already returned to prepandemic levels by December 2020. Trade in services, including travel and tourism, has played an increasingly important role in the global economy. For example, since 2000, global travel and tourism revenues have nearly tripled, with the sector in 2021 accounting for 10 percent of global GDP, 30 percent of global services trade, and 10 percent of all jobs worldwide (World Bank 2020b).

Spillovers through global value chains are likely to have amplified the fall in world trade associated with the COVID-19 pandemic (Cigna, Gunnella, and Quaglietti 2022). Companies increasingly turned to digital technologies and diversified suppliers and production sites to mitigate disruptions caused by the pandemic (Saurav et al. 2020). In 2021, strains in global supply chains worsened significantly. The rapid recovery in global goods consumption from mid-2020 put acute pressure on the trade-intensive manufacturing sector. At the same time, COVID-19 outbreaks continued to disrupt production at many points along complex global value chains, creating significant obstacles to final goods production. COVID-19 outbreaks have also shut down some key port facilities, disrupting ocean shipping and air freight and leading to an unprecedented lengthening of supplier delivery times (figure 6.4). Regression analysis that controls for the effect of demand conditions suggests that global trade could have been 3.5 percent higher in 2021 were it not for supply chain strains (figure 6.4).  

Global goods and services trade was dealt a further blow in February 2022 by Russia’s invasion of Ukraine, which has disrupted trade flows from the Black Sea and especially curtailed trade in commodities. Commodity market disruptions—including delays in deliveries of natural gas and coal associated with Russia’s invasion of Ukraine—have throttled the production of electricity in several countries, curbing energy-intensive manufacturing activities. Disruptions to wheat shipments from the Black Sea have put pressure on supplies of food staples globally (World Bank 2022b). Some car production lines were temporarily closed down for lack of specific components ordinarily produced in Ukraine, such as car wiring. Shortages and unprecedented increases in the prices of key commodities produced in Russia and Ukraine have rippled through global value chains, leading to production standstills and elevated producer prices globally. Russia’s invasion of Ukraine likely dampened trade in services, which had just returned to prepandemic levels in late 2021, once again: The war has disrupted shipping, especially through the Black Sea, driven up insurance and shipping costs globally, diverted trade to more expensive routes, and discouraged tourism from and to several countries in the

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3 The impact of supply bottlenecks is estimated here in an ordinary least-squares regression of global trade on the manufacturing purchasing managers’ index (PMI) for new export orders, the manufacturing PMI for supplier delivery times (a proxy for supply bottlenecks), and relevant lags of global trade and the PMI for new export orders. Counterfactual scenarios assume that the PMI supply delivery times indicator in the period January 2020-November 2021 remained at the average 2019 level. Regressions are estimated over the period 2000-19. The estimation methodology is similar to the one developed by Celasun et al. (2022).
ECA region. A prolonged conflict in Ukraine could lead to additional dislocations and fragmentation of global value chains, further exacerbating the marked slowdown in the pace of EMDE integration into global value chains since 2008.

Prospects for global trade growth

The January 2023 Global Economic Prospects report projected that global trade growth would slow to under 4 percent in 2022 from more than 10 percent in 2021 and then slow further in 2023. This forecast reflects slower projected global output growth, but also the diminished trade intensity of global output: The structural factors that
supported the rapid expansion of trade in the decades preceding the global financial crisis seem to have largely lost their force, so that the recently reduced elasticity of global trade with respect to global output seems likely to constitute a “new normal.”

Since global output growth itself is projected to be slower by about 0.4 percentage point in the forecast period (2022-30) than in previous decade, world trade growth is also expected to slow (chapter 5; World Bank 2021b). Thus, if the elasticity of trade to output growth is assumed to remain about 1 as it was during the 2010s and no major policy change is assumed, trade growth over the remainder of the 2020s is likely to be slower by another 0.4 percentage point a year than in the preceding decade, an estimate broadly in line with the projected weakening of global growth in potential output (World Bank 2021b). The weakness may be more pronounced in the growth of goods trade. In goods trade, new technologies may allow more localized and more centralized production. In services trade, rapidly growing data services promise a return to rapid expansion as the pandemic is brought under control (chapter 7; Coulibaly and Foda 2020; World Bank 2021a; Zhan et al. 2020).

In the four decades before the global financial crisis, global economic integration through trade increased steadily, assisted partly by falling tariffs (figure 6.4). Since the global financial crisis, however, trade integration has stalled, with the COVID-19 pandemic and Russia’s invasion of Ukraine having added further obstacles. With Russia’s share of global oil production having increased considerably in recent decades, there is now a material risk that the disruptions caused by Russia’s invasion of Ukraine could lead to a major reconfiguration of global trade and investment networks, as countries look for alternative sources of energy. While this may boost trade in some parts of the global economy, it is likely to disrupt trade elsewhere. Since political and security rather than economic considerations would motivate such a reconfiguration, it would likely reduce global economic welfare as well as trade in the long term (Ruta 2022).

**Patterns in trade costs**

The fading momentum of global trade growth is diminishing its role as an engine of output and productivity growth. Countries therefore need to find new ways to reap the benefits from trade. One possibility is to cut trade costs to boost exports and encourage imports in a manner that enhances growth. A number of studies have documented the negative impact of trade costs on trade growth (for example, Anderson and van Wincoop 2003) and the boost to productivity that can result from lowering trade costs (for example, Bernard, Jensen, and Schott 2006). Trade costs have also been recognized as an important factor in firms’ decisions to choose outsourcing over insourcing (Hartman et al. 2017).

**Definition**

The analysis in this chapter relies on a comprehensive data set of bilateral trade costs, the UNESCAP-World Bank Trade Cost Database. Following Novy (2013), Arvis et al. (2013) derive measures of annual trade costs for the period 1995-2018. For any given
country pair $i$ and $j$, they obtain trade costs as geometric averages of trade flows between countries $i$ and $j$, computing them according to the formula

$$(X_{ij}X_{ji})/(X_{ij}X_{ji})^{1/2} \cdot (\sigma - 1),$$

in which $X_{ij}$ represents trade between countries $i$ and $j$ (goods produced in $i$ and sold in $j$) and $\sigma$ refers to the elasticity of substitution. This measure assumes that international trade flows relative to domestic trade flows reflect international trade costs relative to domestic trade costs: when international trade costs more than domestic trade, countries will trade more domestically than internationally, that is, the ratio $(X_{ij}X_{ji})/(X_{ij}X_{ji})$ will be greater. In the application of this methodology, the difference between gross output and total exports proxies domestic trade. Trade costs thus estimated are expressed as a proportion of the value of traded goods (comparable with an ad valorem tariff rate) and can be computed for the economy as a whole or specifically for such sectors as manufacturing and agriculture.

These trade cost estimates refer to bilateral trade. To obtain country and regional measures of multilateral trade costs, bilateral trade costs from the UNESCAP-World Bank database are aggregated using 2018 bilateral country export shares from the UNCTAD international merchandise trade database. Regional and sectoral aggregates are obtained as unweighted averages of individual-country measures.

**Literature view**

**Trade costs and trade.** A growing literature has documented evidence that lower trade costs raise trade growth (for example, Anderson and van Wincoop 2003). Jacks, Meissner, and Novy (2011) study data for the period 1870-2000 and find that declines in trade costs explain roughly 60 percent of the growth in global trade in the pre-World War I period and about 30 percent of trade growth in the period after World War II. Studies of firm-level data have found that lower trade costs encourage firms to locate abroad (for example, Amiti and Javorcik 2008) and to choose outsourcing over insourcing and intrafirm rather than arm’s-length trade.

**Trade costs and productivity.** A link between lower trade costs and higher productivity has also been substantiated. For advanced economies, Ahn et al. (2019) find that a tariff rate that was 1 percentage point lower was associated with a 2 percent gain in total factor productivity during 1997-2007. Analyses of firm-level and sector-level data have shown similar results. Industries with larger declines in trade costs are found to have stronger productivity growth; lower-productivity plants in industries with falling trade costs are more likely to close; and nonexporters are more likely to start exporting in response to falling trade costs (Bernard et al. 2007).

**Patterns across regions and sectors**

Recent data show that despite a sharp decline in the past two-and-a-half decades, trade costs in EMDEs raise the prices of goods traded internationally to more than double the prices of goods traded domestically and that these costs remain about one-half higher.
than those in advanced economies (figure 6.5). Among EMDE regions, average trade costs in tariff equivalents range from 96 percent in ECA to 142 percent in South Asia (SAR), with wide heterogeneity within regions. This heterogeneity is particularly pronounced in the Middle East and North Africa (MNA), where trade costs range from 86 to 136 percent in tariff equivalents among different countries. Trade costs have declined since 1995 in all regions except EAP, with the fastest decline occurring in SSA. Within ECA, countries that are members of the European Union or geographically close to it have trade costs that are two-thirds of the average trade costs of other countries, which are less integrated into European Union (EU) supply chains.

Trade costs remain particularly elevated in agriculture: about four-fifths higher than those in manufacturing. Agricultural trade costs are particularly high in SSA where they stand at 270 percent in tariff equivalents. Likewise, SSA and Latin America and the Caribbean (LAC) have particularly high manufacturing trade costs. Trade costs declined less in agriculture—from 194 percent to 170 percent in tariff equivalents—than in manufacturing over 1995-2019, in part because of slower progress in reducing tariffs and the narrower coverage of trade agreements.

Goods and services trade are complementary. Tradable services are key links between stages of value chains and “enablers” of trade in goods, particularly communications, finance, business, and logistics services. As a result, services account for almost one-third of the value added of manufacturing exports (Ariu et al. 2019; OECD 2020). Comparable cross-country data on the costs of trade in services and on policies affecting trade in services are scant. The few attempts in the literature to quantify trade costs in services rely either on observed trade and value-added flows, in a manner akin to the methodology embedded in the UNESCAP-World Bank Trade Cost Database for goods trade costs (Miroudot, Sauvage, and Shepherd 2010), or on an inventory of restrictions on trade in services (Benz 2017). Both types of studies suggest that services have considerably higher trade costs than goods and that unlike those for goods, trade costs for services have not fallen since the 1990s.

Correlates of trade costs

Trade costs include the full range of costs associated with trading across borders: transportation and distribution costs (Marti and Puertas 2019; Staboulis et al. 2020), trade policy barriers (Bergstrand, Larch, and Yotov 2015), the costs of information and contract enforcement (Hou, Wang, and Xue 2021), and legal and regulatory costs, as well as the cost of doing business across cultures, languages, and economic systems (Anderson and van Wincoop 2003). A number of plausible correlates may be considered.

Candidate correlates

A number of possible correlates of trade costs have been identified, including trade policies, shipping and logistics, regulations, uncertainty, and other factors.
FIGURE 6.5 International trade costs relative to domestic trade costs

On average, globally, international trade costs are roughly equivalent to a 100 percent tariff—far above actual average tariff rates. Despite declines over the past three decades, trade costs remain high, especially for agricultural products and in EMDEs. Trade costs for agricultural products are highest, among EMDE regions, in South Asia and Sub-Saharan Africa, while trade costs in the manufacturing sector are highest in Latin America and the Caribbean and Sub-Saharan Africa.

A. Average trade costs in 1995 and 2019

B. Average trade costs in EMDEs in 1995 and 2019

C. Average trade costs for agriculture in 1995 and 2019

D. Average trade costs for agriculture for EMDE regions in 1995 and 2019

E. Average trade costs for manufacturing in 1995 and 2019

F. Average trade costs for manufacturing for EMDE regions in 1995 and 2019

Sources: UN Comtrade; UN Economic and Social Commission for Asia and the Pacific (ESCAP)-World Bank Trade Cost Database; World Bank; World Trade Organization.

Note: Bilateral trade costs (as defined in the UNESCAP-World Bank Trade Cost Database) measure the costs of a good traded internationally in excess of the same good traded domestically and are expressed as ad valorem tariff equivalents. They are aggregated into individual-country measures using 2016 bilateral country exports shares from UN Comtrade. Regional and sectoral aggregates are averages of individual-country measures. Bars show unweighted averages; whiskers show interquartile ranges. Sample in 1995 includes 33 advanced economies and 46 EMDEs (4 in EAP, 8 in ECA, 15 in LAC, 4 in MNA, 2 in SAR, and 13 in SSA). Sample in 2019 includes 23 advanced economies and 53 EMDEs (9 in EAP, 12 in ECA, 16 in LAC, 4 in MNA, 2 in SAR, and 10 in SSA). EAP = East Asia and Pacific; ECA = Europe and Central Asia; EMDEs = emerging market and developing economies; LAC = Latin America and the Caribbean; MNA = Middle East and North Africa; SAR = South Asia; SSA = Sub-Saharan Africa.
**Trade policies: Tariffs and trade agreements**

Import tariffs raise trade costs. The contribution of tariffs to total trade costs has decreased in the postwar period, through steep reductions since 1990 in tariffs imposed by EMDEs, among other avenues. Thus tariffs in EMDEs averaged 7.7 percent of the value of imports in 2020, down from 16.0 percent in 1995, although this is still much higher than the average tariff of about 1.9 percent in advanced economies (figure 6.6). As a result of tariff reductions, tariffs now amount to a small portion of trade costs: about one-twentieth. Agricultural tariffs remain higher than manufacturing tariffs, by one-fifth in EMDEs and two-fifths in advanced economies.

Establishment and expansion of regional trade agreements has accompanied the decline in tariffs in recent decades. The number of such agreements more than quintupled between the early 1990s and the mid-2010s, and their focus shifted from tariff cuts to the lowering of nontariff barriers (World Bank 2016). The EU alone participates in 46 regional trade agreements, and other advanced economies are members of up to 75. Among EMDEs, membership in regional trade agreements is less common, although all but a handful are members of at least one. Such agreements are most common in ECA, where some countries are EU members and others are members of the free trade area among members of the Commonwealth of Independent States, and in LAC, where most countries are members or associates of Mercado Común del Sur (Southern Common Market, or MERCOSUR) or signatories to trade agreements with the United States, such as the U.S.-Mexico-Canada Agreement and the Dominican Republic-Central America Free Trade Agreement.

**Shipping and logistics**

The transport of goods and associated administrative border and customs procedures generate a multitude of trade costs (Moïsé and Le Bris 2013). Transport costs, much like tariffs, penalize goods produced in multiple stages across different countries, since producers have to pay to move components at each stage of the production process. They can be thought of as services costs—the costs of services related to shipping and logistics. These costs depend on the efficiency and reliability of transport facilities and the burden of administrative border and customs procedures.

Transit delays have been identified as important deterrents to trade flows, together with poor shipping connectivity and inadequate logistics infrastructure and services (Freund and Rocha 2011). For most U.S. trading partners, transport costs are higher than tariff costs, and for the broader group of advanced economies, poor logistics have resulted in larger trade costs than geographic distance alone (Martí and Puertas 2019; Staboulis et al. 2020). Transport costs, much like tariffs, penalize goods produced in multiple stages across different countries, since producers have to pay to move components at each stage of the production process. Estimates of the tariff equivalent of transit time find that each day in transit is equivalent to a 0.8 percent tariff (Hummels et al. 2007). For a 20-day sea transport route (the average for imports to the United States), this amounts to a tariff rate of 16 percent—much higher than the actual average tariff rate. Using gravity
FIGURE 6.6 International trade policy, border processes, and logistics

Tariffs declined sharply over the 1990s and early 2000s, in part because of regional and multilateral trade agreements, but began to tick upward again in 2017, especially in EMDEs. They are higher in EMDEs than in advanced economies and in agriculture than in manufacturing. Connectivity and logistics tend to be easier, and shipping connectivity better, in advanced economies than in EMDEs.

A. Tariff rates in AEs and EMDEs

B. Tariff rates by sectors

C. Trade uncertainty for AEs and EMDEs

D. Logistics Performance Index

E. Liner Shipping Connectivity Index

F. Participation in regional trade agreements

Sources: Centre d’Etudes Prospectives et d’Informations Internationales, Gravity database; Gurevich and Herman (2018); United Nations Conference on Trade and Development (UNCTAD); World Bank; World Trade Organization.

Note: AEs = advanced economies; EAP = East Asia and Pacific; ECA = Europe and Central Asia; EMDEs = emerging market and developing economies; EU = European Union; LAC = Latin America and the Caribbean; MNA = Middle East and North Africa; RTA = regional trade agreement; SAR = South Asia; SSA = Sub-Saharan Africa.

A. B. Average tariff rates are computed as unweighted cross-country averages of applied weighted tariff rates. Sample includes up to 35 advanced economies and 123 EMDEs. Primary tariffs are used as a proxy for agriculture tariffs.

C. Proxy for trade uncertainty is the difference between the bound and applied tariff rates, as defined by the World Trade Organization. Data are through 2020. Sample includes up to 27 advanced economies and 97 EMDEs.

D. The World Bank’s Logistics Performance Index is a summary indicator of logistics sector performance combining data on six core performance components into a single aggregate measure. The indicator is available for a sample of 160 countries. Sample includes 36 advanced economies and 123 EMDEs.

E. UNCTAD’s Liner Shipping Connectivity Index is an average of five components and captures how well countries are connected to global shipping networks. The index value 100 refers to the country with the highest average index score in 2004. Sample includes up to 30 advanced economies and 118 EMDEs.

F. Regional trade agreements are reciprocal agreements among two or more partners and include both free trade agreements and customs unions. The EU Treaty, United States-Mexico-Canada Agreement, and Pacific Agreement on Closer Economic Relations Plus are included. Regional aggregates are computed as averages of individual-country participation in RTAs.
models, studies find that a 10 percent increase in the time taken to transport exports reduces trade by 5-25 percent, depending on the sector and export destination (Djankov, Freund, and Pham 2010; Hausman, Lee, and Subramanian 2005; Kox and Nordas 2007; Nordas 2006).

Transport costs in real terms have declined over time, as land, sea, and air shipping costs have fallen. Technological improvements in transport services, such as jet engines and containerization, have reduced both transport costs per unit of time and transport times. The average shipping time for imports to the United States declined from 40 to 10 days between 1950 and 1998 (Hummels 2001). Evaluated at an average cost per day of 0.8 percent ad valorem (as noted earlier), this increase in the speed of transport is equivalent to a reduction in the tariff rate of 24 percentage points.

In addition, advances in communication technologies have allowed the development of more effective multimodal transport systems, which have helped both to reduce delivery times and to increase the reliability of deliveries. However, such advances have been uneven among countries, and global shipping connectivity and logistics remain considerably poorer for EMDEs than for advanced economies (figure 6.6), with trade costs correspondingly higher in EMDEs with fewer advances in these areas (figure 6.7).

**Regulations**

Streamlining trade and customs compliance procedures and processes can lower trade costs significantly (Staboulis et al. 2020). Reductions in regulations have been associated with significantly higher trade volumes: Each additional signature that has to be collected for exports has been found to cost almost as much as the average tariff (Hillberry and Zhang 2015; Sadikov 2007).

Regulatory requirements for trading across borders have been streamlined significantly over the past decade, especially in ECA, SAR, and SSA. In ECA and SSA, this development appears to be linked to automation and digitalization of trade processes in a number of countries, which have reduced the time taken for compliance assessments at the location of customs clearance. In SAR, it appears to be related to the upgrading of port infrastructure in India, coupled with the introduction of a new system of electronic submission of import documents. In EAP, better governance and less burdensome customs procedures have been associated with somewhat lower trade costs.

**Trade uncertainty**

Uncertainty about the costs associated with transport, customs and border processes, tariffs, and nontariff trade policies can impose significant burdens on investment and output as well as trade. For example, uncertainty about trade policy may have lowered U.S. investment by more than 1 percent in 2018 (Caldara et al. 2020).

One dimension of trade uncertainty is the scope that countries have to raise tariffs without violating World Trade Organization rules—that is, the difference between applied tariffs and bound (maximum) tariffs, the so-called tariff water (Osnago,
FALLING LONG-TERM GROWTH PROSPECTS

CHAPTER 6

FIGURE 6.7 International trade costs in EMDEs, by country characteristics

Trade costs are somewhat higher in EMDEs outside of regional free trade agreements, with the poorest logistics performance and the least maritime shipping connectivity. Trade facilitation is stronger in advanced economies than in EMDEs.

A. Trade costs by participation in free trade agreements

B. Trade costs by tercile of Logistics Performance Index

C. Trade costs by tercile of Liner Shipping Connectivity Index

D. Trade facilitation

Sources: Gurevich and Herman (2018); Organisation for Economic Co-operation and Development; UN Comtrade; UN Economic and Social Commission for Asia and the Pacific (ESCAP)-World Bank Trade Cost Database; World Bank; World Trade Organization.

Note: Orange whiskers indicate minimum and maximum range. Sample includes 52 EMDEs. EMDEs = emerging market and developing economies; FTA = free trade agreement; LSCI = United Nations Conference on Trade and Development (UNCTAD) Liner Shipping Connectivity Index; LPI = World Bank Logistics Performance Index.

A. Average trade costs (unweighted) of countries based on their membership in regional or global free trade agreements as defined in Gurevich and Herman (2018).

B. Average trade costs (unweighted) for countries ranked in the bottom and top quartiles of scores on the World Bank’s Logistics Performance Index.

C. Bars show average trade costs (unweighted) for countries in the bottom and top quartiles of scores on UNCTAD’s Liner Shipping Connectivity Index.

D. Unweighted average for 36 advanced economies and 122 EMDEs. The trade facilitation index is an unweighted average of 11 subindexes, all scored on a scale of 0-2. A higher index score indicates greater trade facilitation. The subindexes score countries on information availability, trade consultations, advance rulings, appeals procedures for administrative decisions by border agencies, fees and charges on imports and exports, simplicity of trade document requirements, automation of border procedures and documentation, simplicity of border procedures, cooperation between domestic agencies, cooperation with neighboring agencies, and governance and impartiality. The data are collected from publicly available sources, country submissions, and private sector feedback. Orange whiskers indicate minimum and maximum range.

Piermartini, and Rocha 2015). This dimension of trade uncertainty increased steadily in advanced economies in the two decades to 2013, but it has since declined significantly. In EMDEs, the gap between applied and bound tariffs has remained much wider than that in advanced economies, with little sign of any sustained decline.

Uncertainty about delivery times can also impose significant costs. In Africa, for example, a single-day transit delay for an exporter is estimated to be equivalent to a 2 percent tariff in importing partner countries (Freund and Rocha 2011).
**Other factors**

*Policy-related nontariff barriers* may include sanitary, phytosanitary, and other standards (often aimed at protecting consumer health and safety), preshipment inspections, licensing requirements, and quotas. These are important determinants of trade costs. Measuring nontariff barriers is difficult. A common method is to construct a measure of the prevalence of nontariff barriers, such as the percent of product lines covered by nontariff barriers. Kee and Nicita (2016) estimate the average nontariff barrier globally as equivalent to an 11.5 percent tariff, significantly higher than the average tariff rate of 4 percent. Nontariff barriers have risen over time. In 2015, about 2,850 product lines were subject to at least one nontariff barrier, about double the 1,456 product lines in 1997 (Niu et al. 2018). Nontariff barriers affect a higher share of imports in advanced economies than in EMDEs (but a lower share of exports). Almost all agricultural imports face nontariff barriers, compared with about 40 percent on average across all sectors (World Bank and UNCTAD 2018). Nontariff barriers affect low-income countries particularly, because administrative requirements are frequently applied to agricultural products, and firms in low-income countries are less able to comply with such requirements.

*Noncompetitive market structures* can drive up trade costs. In some countries in SSA, for example, it costs up to five times more to move goods domestically than in the United States (Atkin and Donaldson 2015; Donaldson, Jinhage, and Verhoogen 2017). This difference has in part been attributed to a lack of competition in the domestic transport sector. Elsewhere, excessive competition can drive down the quality of transport services, with high road mortality, deteriorated roads, and poor vehicle quality (Teravaninthorn and Raballand 2008).

*Institutional quality and economic infrastructure* affect trade costs. Better energy provisioning, more highly developed transport and communication infrastructure and services, financial development, and greater transparency of policy decisions have all been associated with lower trade costs (Calì and te Velde 2011; Hou, Wang, and Xue 2021). Analysis of data for a large sample of countries in the early 2000s indicates that more transparent and effective institutions—as indicated by factors such as the availability of trade-related information, the simplification and harmonization of documents, the streamlining of procedures, and the use of automated processes—were associated with trade costs that were lower by more than 10 percent (Moïsé and Sorescu 2013). Findings on the effects of corruption have been more ambiguous: It may raise trade costs, as when corrupt officials extort bribes, or it may lower trade costs, as when corrupt officials allow tariff evasion (Dutt and Traca 2010). Consistent with concerns about institutional quality, trade finance of a type that reduces risk of nonpayment or nondelivery (such as letters of credit) has been associated with more resilient trade flows during times of economic or financial stress (Crozet, Demir, and Javorcik 2021).

*Regulatory restrictions on services trade* can add to costs of trade, even goods trade. To a large extent, trade costs in the services sector reflect regulations that create entry barriers,
such as licensing quotas. The Organisation for Economic Co-operation and Development’s Services Trade Restrictiveness Index measures de jure regulatory restrictions on services trade in 44 countries (figure 6.8). As does goods trade, services trade remains more restricted in EMDEs than in advanced economies, especially with respect to the entry of foreign firms. Across regions, the most restrictive policies are applied in EAP and SAR, whereas countries in LAC tend to be more open.

Estimation

Gravity equations are widely used to analyze the determinants of bilateral trade flows. Chen and Novy (2012) and Arvis et al. (2013) employ a gravity specification in analyzing the determinants of bilateral trade costs in a cross-sectional data set. The determinants of trade costs, as defined earlier, are estimated here in a panel specification with time fixed effects, in line with the established literature (Moïse, Orliac, and Minor 2011). The regression equation takes the following form:

$$TC_{ijt} = \beta_1 RTA_{ijt} + \beta_2 \text{tariff}_{ijt} + \beta_3 LSCI_{ijt} + \beta_4 \text{LPI}_{ijt} + \beta_5 \text{Trade Policy Uncertainty}_{ijt} + \beta_6 \text{Gravity}_{ijt} + \eta_t + \varepsilon_{ijt}, \tag{6.1}$$

in which for any given country pair $ij$, bilateral trade costs $TC$ observed at time $t$ are regressed on a wide range of candidate drivers. These candidate drivers include membership in a regional trade agreement, sector-specific bilateral tariffs, shipping connectivity (UNCTAD’s Liner Shipping Connectivity Index) and logistics (the World Bank’s Logistics Performance Index), a proxy for trade policy uncertainty, and standard gravity indicators (distance, a common language, and a common border). In line with
Osnago, Piermartini, and Rocha (2018), trade policy uncertainty is defined as the gap between binding tariff commitments and applied tariffs. To ascertain the role of policies aimed at facilitating trade, indexes of logistic performance and maritime connectivity are included.

The model is estimated for the economy as a whole and for manufacturing separately. The regression uses bilateral trade data for 2007-18 for up to 2 advanced economies and 72 EMDEs for which data on trade costs and its determinants are available. The choice of variables in the panel is informed by Arvis et al. (2013), as well as by findings from the discussion of the drivers of trade costs presented in the previous sections. Box 6.1 presents full details on data and sources.

In the estimation results, all coefficients have signs and magnitudes consistent with expectations from the literature (table B6.1.1). Geographic distance and bilateral tariff rates are positively associated with trade costs, while proximity, common language, and membership in a common regional trade agreement tend to reduce trade costs. Specifically, membership in a common regional trade agreement lowers bilateral trade costs in a statistically significant way, by just under one-fifth. Greater trade policy uncertainty is also associated with higher trade costs, in the manufacturing sector as well as in the economy as a whole.

The regression results help shed light on the sources of the higher trade costs in EMDEs than in advanced economies and of the decline in trade costs over time. In 2018, the average EMDE in the regression sample had trade costs almost one-quarter higher than the average advanced economy in the sample. The panel estimation explains most of this gap and attributes about two-fifths of it to poorer logistics and shipping connectivity in EMDEs, a further two-fifths to trade policy (including trade policy uncertainty), and just under the remaining one-fifth to the greater remoteness (geographically and culturally) of EMDEs.

Between 2007 and 2018, trade costs fell by one-eighth, on average, in the countries in the sample, somewhat more than the regression predicts. The regression attributes almost three-fourths of this decline to improved shipping connectivity and logistics and one-fourth to trade policy (tariff cuts, membership in regional trade agreements, and uncertainty related to trade policy). This is somewhat smaller than the effect found by Bergstrand, Larch, and Yotov (2015), who estimate that an economic integration agreement lowered trade costs by 30 percent in a smaller and earlier sample (41 mostly advanced economies during 1996-2000). Qualitatively, the results are consistent with those of Brenton, Portugal-Perez, and Regolo (2014), who find that trade agreements help reduce the price differential between domestic and traded foods.

Daudin, Héricourt, and Patureau (2022) decompose the decline in transport costs over 1974-2019 into “pure transport cost” and compositional effects (that is, changes in the composition of origin countries and goods baskets) and find that the decline in pure transport cost accounted for most of the decline in global transport costs over the period studied.

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4 This is somewhat smaller than the effect found by Bergstrand, Larch, and Yotov (2015), who estimate that an economic integration agreement lowered trade costs by 30 percent in a smaller and earlier sample (41 mostly advanced economies during 1996-2000). Qualitatively, the results are consistent with those of Brenton, Portugal-Perez, and Regolo (2014), who find that trade agreements help reduce the price differential between domestic and traded foods.

5 Daudin, Héricourt, and Patureau (2022) decompose the decline in transport costs over 1974-2019 into “pure transport cost” and compositional effects (that is, changes in the composition of origin countries and goods baskets) and find that the decline in pure transport cost accounted for most of the decline in global transport costs over the period studied.
Policies to lower trade costs

A menu of policy options is available to reduce trade costs at the border (OECD and WTO 2015). Some are under the control of individual-country authorities (such as improving border and customs regulations and processes and facilitating shipping and logistics), while others require international agreements (such as regional trade agreements). While some policies can be implemented quickly, others, such as those aimed at increasing competition, can take years to establish.

- Measures that lower trade costs at the border include trade facilitation (through reform of customs and border procedures), tariff reductions, and trade agreements.

- Measures that lower trade costs between borders include improvements in transport, communications, and energy infrastructure and services networks.

- Measures that reduce trade costs behind the border include reforms of trade-related regulations and institutions, improvements in logistics and broader market governance, improvements in domestic transport infrastructure and in the market structure of domestic trucking and port operations, and the lowering of other nontariff barriers (for example, standards, accreditation procedures for standards, and quotas).

- Beyond policies to facilitate trade, a wider set of institutional policies might also be needed to ensure that the benefits are sustainable and widely shared.

At-the-border measures

Possible sources of at-the-border trade costs include tariffs, an absence of or weak trade agreements, poor trade facilitation, and burdensome border processes. A policy package that reduces these at-the-border obstacles could significantly lower trade costs.

Reductions in tariffs, often embedded in broader trade agreements, have contributed to rapid trade growth in much of the period since World War II. However, tariffs have risen over the past five years as trade tensions have mounted, and the rise has contributed to concerns about a protectionist turn among some major economies (World Bank 2021b). Reversing the increases and making further progress in regard to tariff reduction would lower trade costs. Reforms that lower import tariffs have generally been found to be associated with faster economic growth, although effects have been heterogeneous (Irwin 2019). For example, the widespread removal of trade barriers and reduction of import tariffs in the mid-1980s to mid-1990s ushered in a period of rapid global trade integration (Irwin 2022). Removing uncertainty about trade policy by reducing the gap between actual applied and bound tariffs could further lower trade costs: The regression results reported earlier suggest that a 10 percentage-point reduction in this gap would be associated with trade costs that are lower by about one-seventh.
The decline in trade costs over the past three decades has stemmed partly from new regional trade agreements and reforms to existing ones. The largest regional trade agreement in terms of the number of member countries, the African Continental Free Trade Area (AfCFTA), for example, has raised real incomes among its members mostly by lowering non-tariff barriers and implementation of trade facilitation measures (World Bank 2020a). The members of the major regional trade agreements in North America (the United States-Mexico-Canada Agreement) and Europe (the EU) account for more than 40 percent of global GDP (figure 6.9). Such agreements have fostered domestic reforms in EMDEs and generated momentum for greater liberalization and expansion of trade opportunities (Baccini and Urpelainen 2014a, 2014b; Baldwin and Jaimovich 2010).

A multitude of costs are imposed on trade by administrative border and customs procedures. Documentation and other customs compliance requirements, lengthy administrative procedures, and other delays have been estimated to increase transaction costs by 2-24 percent of the value of traded goods. In some countries, governments may lose more than 5 percent of GDP in revenues from inefficient border procedures (Moïse and Le Bris 2013).

The World Trade Organization’s Agreement on Trade Facilitation, adopted in 2014 and ratified by more than 90 percent of the organization’s members, provides a framework for streamlining inefficient control and clearance procedures among border authorities, reduce unnecessary border formalities, and cut opaque administrative costs.
Of the commitments made under the agreement to date, 72 percent have been implemented, but progress has been uneven, with that figure less than 40 percent in low-income countries. In West Africa, an initiative is under way to cut trade costs by electronically sharing customs transit data (World Bank 2021d). Guatemala and Honduras have reduced the time it takes traders to cross their common border from 10 hours to 7 minutes by integrating their trade procedures, replacing duplicative processes with a single online instrument (de Moran 2018).

**Between-borders measures**

The bulk of trade costs arise from the shipping and logistics involved in moving goods between borders. These costs depend in part on the quality of transport infrastructure and the government institutions involved in transport logistics and on market structure in the transport sector. Countries have several avenues for lowering such costs.

High-quality and well-maintained transport infrastructure—at ports, at airports, and on land—and efficient shipping services are associated with lower transport and logistics costs. Thus, policy measures to improve maritime connectivity and logistics performance should help lower trade costs. The regression results reported earlier suggest that if a country’s scores on indicators of these two factors were to move up from the bottom quartile to the highest quartile—equivalent to a shift from conditions in Sierra Leone to conditions in Poland—the country would lower its trade costs by between one-tenth and one-third (box 6.1).

Bribes and transport monopolies tend to drive up trade costs. In a pilot study of four African countries, more than two-thirds of survey respondents reported that bribery to accelerate transport services was common (Christie, Smith, and Conroy 2013). Efforts to reduce and eliminate such corruption and to increase competition in the transport sector should help lower transport costs.

Policies that strengthen regional integration can also be beneficial, particularly for small countries and countries that are geographically isolated from trade hubs. Coupled with regional institutions that help to reduce impediments to cross-border trade, improved regional infrastructure can help countries exploit the benefits of regional and global trade networks (Deichmann and Gill 2008). Regional trade agreements can also lower transport-related trade costs (Brenton, Portugal-Perez, and Regolo 2014).

Efforts to improve matching and liaison between providers of trucking services and shippers can also cut trade costs by reducing wait times and empty backhauls. High transport costs may, in part, reflect unbalanced trade flows, since shipping at full capacity in both directions of a route is least costly (Ishikawa and Tarui 2018). At any one time, two-fifths of ships have been estimated to carry no cargo (Brancaccio, Kalouptsidi, and Papageorgiou 2020). Such asymmetries in demand for shipping services have been a major cause of shipping and supply bottlenecks in the wake of the COVID-19 pandemic. While shipping costs from China to Europe and the United
States have risen to historically high levels, costs of shipping on ocean routes to China have remained low. Efforts to reduce wait times and empty backhauls may involve information and communications infrastructure and services to facilitate the timely provision of information about shipping capacity and schedules in order to allow exporters and shippers with available capacity to be matched more efficiently. Over the longer term, and in a favorable business environment more broadly, increased participation in global value chains can expand the volume of bidirectional trade and thus help lower shipping costs.

**Behind-the-border measures**

Although not included in the empirical exercise discussed earlier because of lack of data, behind-the-border policies such as those involving regulations, standards, and inspection and labeling requirements can impose considerable costs (Moïsé and Le Bris 2013). In Central America, sanitary and phytosanitary requirements, such as inspection requirements and labeling standards for meats and grains, have been estimated to raise import prices by about 30 percent on average (OECD and WTO 2015). Harmonization of standards can significantly reduce or eliminate such costs and increase trade, mutual recognition of standards or conformity assessments can also lead to smaller gains (Chen and Mattoo 2008; World Bank 2016).

A shift from trade-based taxation to income-based or consumption-based taxation can further lower barriers to trade. In middle- and high-income EMDEs, such shifts have not been associated with lasting revenue losses, but revenue losses have occurred in low-income countries (Baunsgaard and Keen 2010).

**Comprehensive reform packages**

Some of the most successful trade reform programs have covered a wide range of policies. A combination of customs and border improvements, regulatory reform, and streamlined import and export procedures helped Cambodia leap 46 rankings in the World Bank’s Logistics Performance Index between 2010 and 2014 (World Bank 2018). In Africa’s Great Lakes region, improved trade and commercial infrastructure in the border areas and simplified border-crossing procedures have been credited with improving accountability of officials, reducing rates of harassment at key borders (from 78 percent to 45 percent of survey respondents in south Lake Kivu), extending border opening hours, increasing trade flows, and doubling border crossings (World Bank 2021d).

The regression results reported earlier can be applied to a hypothetical comprehensive reform scenario focusing on pairs of countries that are in the bottom quartiles of the Logistics Performance Index and the Liner Shipping Connectivity Index; three-quarters of these countries are in SSA. The coefficients estimated from the regression suggest that improvements in average logistics performance and shipping connectivity among these country pairs sufficient to place them in the top quartile of the distribution of country pairs would halve their trade costs (figure 6.10).
Since manufacturers use services to produce and export goods, policies aimed at lowering trade costs in the services sector can help lower the costs of trading goods. Opening services markets to more competition, including those for road and rail transport services and shipping, may be an effective way to reduce trade costs. Liberal bilateral air services agreements can also help lower trade costs for many goods that form part of global value chains and for high-value-added agricultural products.

Given the perishable nature of agricultural products, measures that accelerate their movement across borders are particularly important (USAID 2019). The Agreement on Trade Facilitation includes several provisions aimed at making agricultural trade faster and more predictable. They involve simplified and more efficient requirements for risk-based document verifications, physical inspections, and laboratory testing. A centralized “Single Window” authority for document processing and coordinating across all relevant agencies can reduce paperwork, too (UNESCAP 2011). Improved storage facilities can reduce spoilage and losses of perishable agricultural goods (UNESCAP 2017; Webber and Labaste 2010). Tracking and monitoring technologies can help accelerate paperwork and improve the monitoring of environmental conditions (Beghin and Schweizer 2020). Such measures to lower agricultural trade costs can also help prevent or reduce food insecurity.

A comprehensive package could also address the potential distributional consequences of trade. The failure of some firms participating in global value chains to pass cost reductions on to consumers and the declining share of labor income in countries

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**FIGURE 6.10 Impact of policy improvements on trade costs**

Better logistics and shipping connectivity could help lower trade costs by more than one-half in the quartile of EMDEs that score worst on indicators of these characteristics.

A. Reduction in overall trade costs associated with policy improvements

<table>
<thead>
<tr>
<th>Fraction of trade costs</th>
<th>Better logistics</th>
<th>Better shipping</th>
<th>Comprehensive reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
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<tr>
<td>0.8</td>
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<td>0.6</td>
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<td>0.4</td>
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<td>0.2</td>
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<td>0.0</td>
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B. Reduction in manufacturing trade costs associated with policy improvements

<table>
<thead>
<tr>
<th>Fraction of trade costs</th>
<th>Better logistics</th>
<th>Better shipping</th>
<th>Comprehensive reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
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<tr>
<td>0.8</td>
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<td>0.0</td>
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</table>


Note: EMDEs = emerging market and developing economies.

A.B. Bars show the fraction of trade costs that would remain after policy improvements. Policy improvements assume that the average EMDE in the quartile of EMDEs with the poorest scores on the United Nations Conference on Trade and Development’s Liner Shipping Connectivity Index and the World Bank’s Logistics Performance Index improves sufficiently that its score matches the score of the average EMDE in the quartile of EMDEs with the best scores. The comprehensive package assumes that all three scores are improved simultaneously. Data refer to 2018. Orange line indicates 1 for unchanged trade costs in 2018 among the sample of EMDEs scoring in the poorest quartile on these indicators.
integrated into global value chains have contributed to the perception of unequally shared gains from trade (World Bank 2020c). Conversely, growing services trade, global supply chains, and digitalization have offered new economic opportunities to women (World Bank and WTO 2020). Labor market policies that could promote a more equitable sharing the gains from participation in global value chains include policies to facilitate labor mobility, active labor market programs, and wage insurance schemes (World Bank 2020b).

Trade can play a critical role in climate-related transition. It has the potential to shift resources to cleaner production techniques and to promote the production of goods and services necessary for transitioning to low-carbon economies. In addition, trade delivers goods and services that are key for helping countries recover from extreme weather events. However, evidence indicates that in some countries, greater carbon dioxide emissions have accompanied entry into global value chains in manufacturing and that global value chains have contributed to greater waste and increased shipping (World Bank 2020c). Shipping accounts for 7 percent of global carbon dioxide emissions and 15 percent of global emissions of sulfur dioxide and nitrogen oxides (World Bank 2020c). Being heavily concentrated in the electronics sector, global value chains have also contributed to e-waste (discarded electronic devices), which accounts for more than 70 percent of toxic waste in U.S. landfills (World Bank 2020c).

A number of policies can be implemented to reduce trade costs in a climate-friendly way, including policies that remove the current bias in many countries’ tariff schedules favoring carbon-intensive goods and that eliminate restrictions on access to environmentally friendly goods and services (Brenton and Chemutai 2021; World Bank 2020c). In addition, multilateral negotiations can focus not only on tariffs on environmental goods but also on nontariff measures and regulations affecting services—access to which is often vital for implementing the new technologies embodied in environmentally friendly goods.

Digital technologies may eventually lower trade costs behind the border, at the border, and borders through a number of channels, including improving transparency and price discovery as well as information flows among exporters, shippers, and country authorities. This may particularly support global supply chains. Robotics can help accelerate port procedures. Artificial intelligence can help lower logistics costs by optimizing route planning, storage, and inventory, as well as by improving tracking and monitoring; three-dimensional printing can help shorten and localize supply chains, thus reducing the environmental footprint of trade; and blockchain technology can help reduce time spent in customs, especially for time-sensitive goods, facilitate cross-border payments by increasing transparency and credibility, and enhance information sharing within supply chains (Fan, Weitz, and Lam 2019; WTO 2018). Such technologies may

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6 Digitization can make the enforcement of value-added tax payments of ever smaller payment transactions profitable (World Bank 2021a).
disproportionately benefit small and medium-sized enterprises, which currently face higher trade costs than large enterprises (WTO 2019a). Shipping supply chains, in particular, could benefit from digitization to improve efficiency (Song 2021).

**Conclusion**

Despite a decline over the past three decades, international trade costs remain high. In EMDEs, they amount to the equivalent of a tariff of more than 100 percent: Thus they roughly double the price of an internationally traded good relative to that of a similar domestically traded good. Trade costs are on average about four-fifths higher for agricultural products than for manufactured goods and more than one-half higher for EMDEs than for advanced economies.

Trade costs have a number of components. Tariffs amount to only about one-twentieth of trade costs. The remainder are mostly costs of transport, logistics, and adherence to regulations and thus reflect market conditions in the transport sector, administrative practices, and nontariff policy barriers. Differences in the costs of logistics and shipping account for about two-fifths of the difference in trade costs between EMDEs and advanced economies, and differences in trade policies, including trade policy uncertainty, account for another two-fifths (figure 6.11).
Comprehensive packages of reforms have often been successful in reducing trade costs. Such packages can include trade facilitation measures, bilateral and multilateral agreements aimed at deeper trade integration, coordinated efforts to streamline trade procedures and processes at and behind the border, improved domestic infrastructure, increased competition in shipping and logistics, reduced corruption, simplified trade-related procedures and regulations, and the harmonization or mutual recognition of standards. Many of these reforms, especially those relating to the business climate and governance, would stimulate private, trade-intensive investment and output growth more broadly (chapter 3).

Further research and analysis on trade costs is warranted, particularly regarding patterns and correlates of the costs of trade in services. Measures of the costs of trade in services remain scant, which makes it difficult to assess and quantify their determinants. In addition, since trade costs in services are largely associated with regulatory barriers, further analysis of the role of regulatory heterogeneity across sectors and regions seems warranted. Trade costs accumulate with multiple border crossings through global value chains. Investigating what policy measures can be most effective in reducing trade costs when countries are involved in complex value chains is also key. Finally, further research could aim to better understand the distributional and climate-related effects of reducing trade costs.
### TABLE 6.1 Data employed in the panel regression

<table>
<thead>
<tr>
<th>Data</th>
<th>Definition</th>
<th>Source</th>
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<tbody>
<tr>
<td>Trade costs</td>
<td>Logarithm of the geometric average of country i’s and country j’s bilateral trade costs</td>
<td>UN Economic and Social Commission for Asia and the Pacific (ESCAP)-World Bank Trade Cost Database</td>
</tr>
<tr>
<td>Tariff rates</td>
<td>Logarithm of the geometric average of country i’s and country j’s bilateral tariff rates</td>
<td>ESCAP-World Bank Trade Costs Database</td>
</tr>
<tr>
<td>Regional trade agreements</td>
<td>Dummy variable equal to unity if countries i and j share a common regional trade agreement</td>
<td>CEPII</td>
</tr>
<tr>
<td>Common border</td>
<td>Dummy variable equal to unity if countries i and j share a common land border (adjacency)</td>
<td>CEPII</td>
</tr>
<tr>
<td>Common language</td>
<td>Dummy variable equal to unity if countries i and j share a common language</td>
<td>CEPII</td>
</tr>
<tr>
<td>Distance</td>
<td>Logarithm of distance (in kilometers) between the largest cities in two countries</td>
<td>CEPII</td>
</tr>
<tr>
<td>Logistic Performance Index</td>
<td>Logarithm of the geometric average of country i’s and country j’s scores</td>
<td>World Bank</td>
</tr>
<tr>
<td>Liner Shipping Connectivity Index</td>
<td>Logarithm of the geometric average of country i’s and country j’s scores</td>
<td>UNCTAD</td>
</tr>
<tr>
<td>Trade policy uncertainty</td>
<td>Logarithm of the geometric average of the country i’s and country j’s gap between bounded and applied tariff rates</td>
<td>World Bank World Development Indicators database</td>
</tr>
</tbody>
</table>

**Sources:** Centre d'Etudes Prospectives et d’Informations Internationales (CEPII); United Nations Conference on Trade and Development (UNCTAD); World Bank.
References


