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Trade Costs and Development: A New Data Set

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The World Bank and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) jointly prepared a new global data set of bilateral trade costs based on trade and production data. Accessible on the World Bank Open Data Web site, it opens new analytical possibilities for policy makers and researchers working on trade integration. The data stress the importance of supply chains and connectivity constraints in explaining the higher costs and lower levels of trade integration observed in developing countries.

Why Are Trade Costs Important?

Differences in economic size and endowments are not the only reason why some countries trade more than others, or trade with a wider range of partners. The intensity of trade between countries is also dependent on many other factors that capture the degree of separation between them. One way of thinking about these factors is as the “friction” associated with trade, or the set of economic forces that tends to reduce trade. Paul Samuelson’s famous image sees trade flows being reduced by frictions in the same way that an iceberg melts while moving through the sea.

An effective way to capture this effect is in terms of trade costs between partner countries. Most theories of international trade include trade costs as the set of factors driving a wedge between export and import prices. Trade costs are the price equivalent of the reduction of international trade compared with the potential implied by domestic production and consumption in the origin and destination markets. Higher bilateral trade costs result in smaller bilateral trade flows.

In an increasingly globalized and networked world, trade costs matter as a determinant of the pattern of bilateral trade

and investment, as well as of the geographical distribution of production. Although tariffs in many countries are now at historical lows, evidence suggests that trade costs remain high.

One well-known estimate based on an exhaustive review of research findings suggests that representative rich country trade costs might be as high as 170 percent ad valorem—far in excess of the 5 percent or so accounted for by tariffs (Anderson and Van Wincoop 2004).

What Are the Sources of Trade Costs?

Trade costs measure the trade-depressing effect of separation between countries. Distance not only induces transportation costs, but also creates barriers to information and reduces the probability that a trade connection between two countries will take place. Supply-side constraints and inefficiencies in partner countries have similar effects.

Trade costs have two main categories of sources. The first has to do with entirely bilateral factors of separation between the exporter and the importer that are more dependent on exogenous factors than particular policy choices. Examples include:

- geographical distance;
- transportation costs or the lead time associated with transportation; and
- common features between trading partners, such as language, common history, sharing a border, or participation in the same economic community.

The second category of trade cost sources includes endogenous trade costs, which are factors specific to the origin or destination, and which in a sense represent the “thickness” of their borders. Examples include:

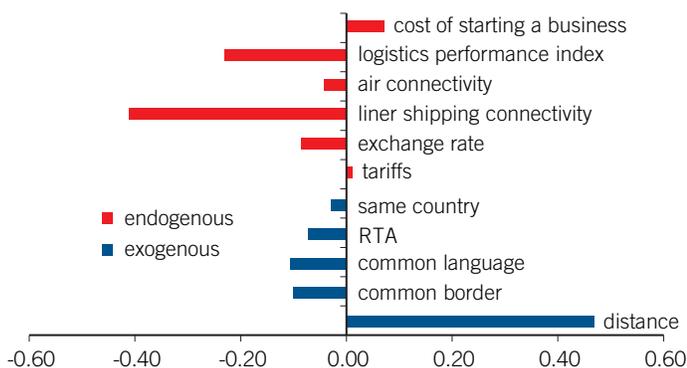
- logistics performance (cost, delay, and reliability) and trade facilitation bottlenecks (such as border control and transit systems with third countries);
- international connectivity, such as the existence of regular maritime, air or terrestrial services, notably in view of the hub-and-spoke organization of international transportation;
- tariffs; and
- nontariff measures.

Given the all-inclusive nature of this classification, trade costs in the developing world should be expected to be significantly higher than those for rich economies. Tariffs and nontariff barriers remain substantial in developing countries. Other sources of trade costs also represent significant obstacles to greater export and import volumes, particularly in areas such as poor infrastructure and dysfunctional transport and logistics services markets.

Unsurprisingly, physical separation has a major trade-reducing effect, as highlighted in figure 1, which shows the relative impact of different factors on trade costs. However, policies also have a significant influence on trade costs. Maritime transport connectivity and logistics performance are very important determinants of bilateral trade costs: in some specifications, their combined effect is comparable to that of geographical distance. Generally, traditional and nontraditional trade policies, including market entry barriers and regional

Figure 1. Relative Impact of Different Sources of Trade Costs

(normalized regression coefficients [“betas”] against the indicator measuring the cost component)



Source: Authors' illustration.

integration agreements, play a significant role in shaping the trade costs' landscape.

How to Measure Trade Costs: Inverse Gravity

Applied international trade literature has traditionally focused on using the standard gravity model to identify particular factors, such as geographical distance, as sources of trade costs, using a direct econometric approach where trade costs are proxied by a series of available indicators such as distance. This approach has two drawbacks; the first is that it does not produce an overall estimate of the level of trade costs between countries. The second drawback is that inclusion of some variables but not others immediately gives rise to concerns about omitted variables' bias, to the extent that omitted trade costs are correlated with variables included in the model.

Arvis et al. (2013) take a different approach, they use the inverse form of the gravity model developed by Novy (2013) to infer trade costs from the observed pattern of trade and production across countries. Intuitively, when a country sells relatively more goods to its own residents than to foreigners, it must be because international trade costs have increased relative to domestic trade costs, holding other factors constant. Similarly, if a country sells relatively more of its production to foreigners than to residents, it must be because international trade costs have fallen relative to domestic trade costs, again holding other factors constant.

Trade costs measured in this way are highly informative for policy purposes, and this is the first case in which the inverse gravity approach to trade costs has been applied to a wide range of developing countries. However, a number of important caveats are also in order, as described fully in Arvis et al. (2013).

The Data Set

To measure trade costs in the developing world over the 1995–2010 period, UNESCAP and the World Bank embarked on a joint data collection exercise. In addition to data on export and import flows, calculation of trade costs using the inverse gravity methodology also requires information on domestic production in each country. Usage can then be calculated as domestic production less total exports.

Trade data are easily available in harmonized format through the UN's Comtrade database, which is accessible through the World Bank's World Integrated Trade Solution (WITS) server. Obtaining data on domestic production is more challenging and requires recourse to a combination of UN national accounts data and gross domestic product (GDP) data from the World Development Indicators. A number of conversions are necessary to ensure that the data are in comparable formats. Two formats are particularly important.

First, a concordance is used to map trade data from the highly disaggregated level at which they are recorded (HS 6-digit) to the far more aggregated International Standard Industrial Classification (ISIC) that is used for national accounts. Because of the paucity of national accounts data available for most developing countries, it is only possible to use data for two macrosectors: agriculture (ISIC sectors A and B) and manufacturing (ISIC sector D). The second conversion that is necessary in many cases is to transform data from value-added terms into gross shipments. This conversion requires application of an approximate scaling-up factor based on average use of intermediate inputs in those countries where both sets of data are available.

The result of the data collection exercise is a database covering up to 178 countries, two sectors, and the 1995–2010 period. Based on the available data, trade costs data are calculated for as many bilateral pairs as possible, and interpolation used to fill in missing country-year combinations when feasible.

Recent Trends in Trade Costs

To provide a point of comparison across countries, the analysis calculated trade costs between each country for which data are available, and for the 10 largest importers. Averaging results by World Bank income group shows that, as expected, trade costs have an inverse dependence on per capita income: poorer countries tend to have much higher levels of trade costs than do richer countries (figure 2). Figure 2 also shows the position for trade in manufactured goods, but the same dynamic also emerges in the case of agricultural products.

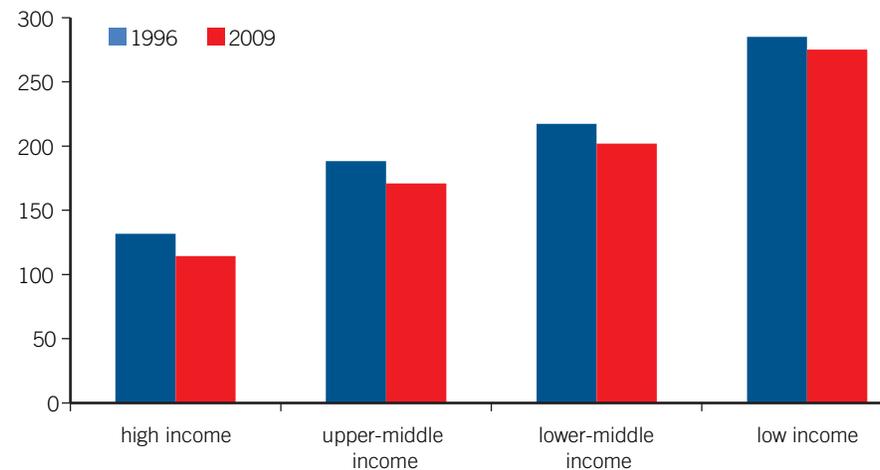
Converting ad valorem equivalent trade costs to index numbers makes it possible to see the rate at which trade costs have evolved over time in different country groups, taking into account that each group started from a different baseline in 1996. Figure 3 shows that for manufacturing, trade costs have fallen most quickly in the high-income countries. They have fallen considerably more slowly in the lower-income groups. This dynamic needs to be addressed by developing country policy makers if they want to deepen their

countries' integration into the global economy, both in an absolute and a relative sense. In agriculture, by contrast, trade costs have remained relatively flat across the board, which is consistent with the continued existence of major policy barriers in this sector.

A Practical Policy Tool

Development of the trade costs' data set was motivated in part by the informational needs of policy makers in the areas of trade policy, trade logistics, and regional integration. The trade cost patterns of a region or a country provide a snapshot that allow direct comparison of pairs of countries and an assessment of those trade costs that are high. Although individual trade costs cannot be broken down according to component factors, the data set can be used to highlight high trade

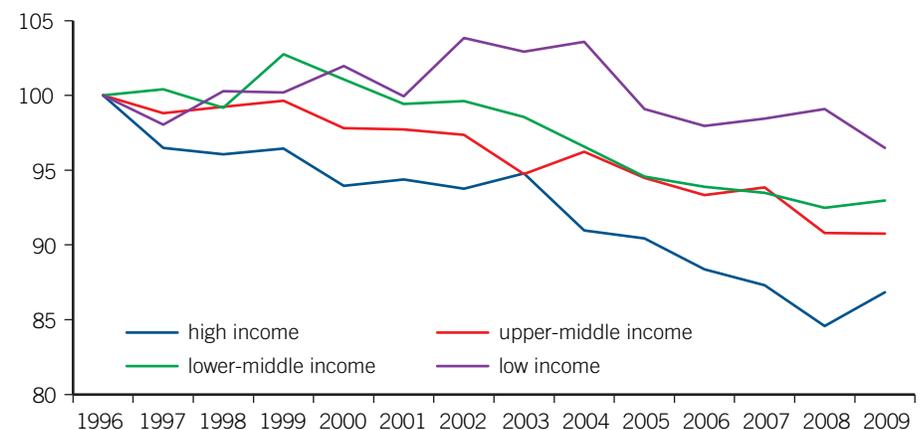
Figure 2. Trade Costs' Inverse Dependence on per Capita Income



Source: Authors' illustration.

Note: Figure shows average trade costs for manufactured goods with respect to the 10 largest importing countries, by World Bank income groups, 1996 and 2009, percent ad valorem equivalent.

Figure 3. Trade Costs Falling More Slowly in Low-Income Countries



Source: Authors' illustration.

Note: Figure shows average trade costs for manufactured goods with respect to the 10 largest importing countries, by World Bank income groups, 1996–2009, 1996=100.

costs at a bilateral level, while other tools, such as trade facilitation, trade policy and trade competitiveness assessment, can help assess the quantitative impact of bottlenecks. In addition, analyzing the links between various policy factors and the level of trade costs provides a strong alternative to the popular but controversial use of direct gravity models to estimate trade potentials.

Arvis and Shepherd have been involved in a project designing a program in trade facilitation and regional infrastructure for the Maghreb countries (Algeria, Libya, Mauritania, Morocco, and Tunisia). These countries trade very little among themselves (3–5 percent of their trade). Part of the reason is that the Maghreb countries have significantly higher trade costs among themselves than do those on the northern shore of the Mediterranean (twice as high for manufactured goods, three times as high for agricultural products; figure 4). Furthermore, intra-Maghreb trade costs remain significantly higher than for trade with the northern countries of the Med-

iterranean, even though the distances are shorter. Data show that most countries have (naturally) invested first in facilitating north–south trade with European Union (EU) countries. Within the framework of a liberal trade policy such as that of the Arab Maghreb Union (AMU) or of the Arab Free Trade Area (GAFTA), trade costs result primarily from logistical and facilitation constraints (including some border closures), combined with the impact of nontariff restrictions. Trade cost analysis¹ has provided evidence for policy makers, underscoring that high costs over relatively small distances (for the central countries Morocco, Algeria, and Tunisia) have to be addressed to boost implementation of integration measures.

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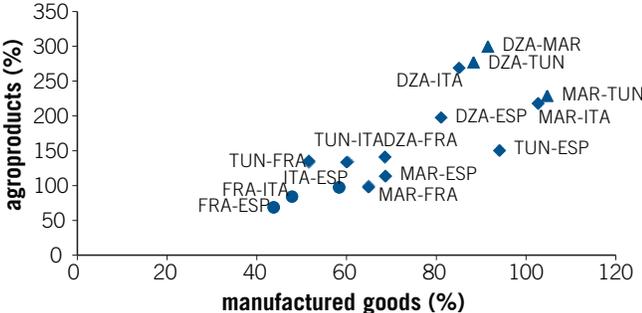
Note

1. The trade cost database is available at: [http:// data.worldbank.org/data-catalog/trade-cost](http://data.worldbank.org/data-catalog/trade-cost).

References

Anderson, J., and E. Van Wincoop. 2004. "Trade Costs." *Journal of Economic Literature* 42 (3): 691–751.
 Arvis, J.-F., Y. Duval, B. Shepherd, and C. Utoktham. 2013. "Trade Costs in the Developing World: 1995–2010." Policy Research Working Paper 6309, World Bank, Washington, DC.
 Novy, D. 2013. "Gravity Redux: Measuring International Trade Costs with Panel Data." *Economic Inquiry* 51 (1): 101–21.

Figure 4. Comparison of Bilateral Trade Costs for Maghreb Countries versus Southern Europe (2007)



Source: Authors' illustration.

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