

viewpoint

PUBLIC POLICY FOR THE PRIVATE SECTOR

Trade Logistics Reforms

Linking Business to Global Markets

This Note reviews the literature on the effects of reforms improving trade logistics systems and services. Three key insights emerge. First, trade logistics reforms have a notable effect on the ability of countries to export and import cost-effectively and to become effective players in competitive global and regional markets. Second, trade facilitation enhances the productivity of firms. And third, targeted reforms can enable firms to use scarce working capital more effectively by allowing leaner inventories, lowering the carrying charges in transit and storage, and reducing pilferage and damage.

Trade drives economic growth. And advances in transport as well as information and communication technology have opened up important opportunities for developing countries to participate in global and regional markets, offering value added goods and services and creating new jobs along value chains. But survival in a competitive global economy requires lean, rapid, and responsive supply chains. Firms increasingly use global sourcing strategies that demand speedy, flexible, and cost-effective solutions. This demand has motivated governments to improve trade logistics services and provide simple and efficient import and export policies and procedures—with the aim of expanding access to world markets.

The literature examining the effect of trade facilitation is relatively new. Many of the studies rely on cross-country analysis, and it would be useful to develop in-depth country studies

that look at effects of reforms over time. But the existing literature nevertheless shows that trade logistics reforms offer notable benefits for developing countries.

Trade challenges in developing countries

A country's export performance depends in part on its ability to produce goods of high quality at competitive prices. But it also depends on its ability to deliver these goods into complex global supply chains in a timely and cost-effective fashion. In Chad it takes firms 75 days on average to export a 20-foot container through the closest port; in Bangladesh it takes 26 days (World Bank 2011). Firms that take this long to deliver goods to markets cannot be internationally competitive. Similarly, for firms in Côte d'Ivoire the cost of all export-related transactions for a 20-foot container, including inland transport from the factory gate to ocean vessel, amounts to almost

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US\$2,000 on average. For firms in El Salvador the cost is less than US\$900. For those in OECD countries it is much lower—in Denmark a little over US\$700, for example, and in Finland only US\$540 (World Bank 2011).

On the other side of the coin, many developing countries, particularly in Africa and South Asia, depend heavily on imports. For African countries, agricultural and staple food imports are dominant. There is much potential for imports from surplus African countries to complement and perhaps replace international imports. But a range of nontariff barriers impose significant constraints on seamless intraregional movement of staples (World Bank 2012). These constraints include high transport costs due to fragmented transport and logistics services, transport cartels, small markets that cannot capture economies of scale, and road blocks along major intraregional corridors. They also include restrictive rules of origin, poor and uncoordinated valuation regimes, lack of clarity on harmonized cross-border standards on key products such as fertilizer and seeds, and excessive technical controls such as phytosanitary inspections and trade licenses and permits.

Effect of better institutional quality

A fairly well-established body of literature has found a clear link between the quality of infrastructure and transport costs in international trade (Limão and Venables 2001; Clark, Dollar, and Micco 2004). But inefficient ports and poor transport and logistics services are not the only impediments for exporting and importing firms in developing countries. These firms also face policy and institutional constraints in the form of complex laws, burdensome regulations, inadequate enforcement of contracts, poor definition and enforcement of rules of engagement, onerous documentation and other procedures causing delays at customs and border crossings, pilferage in transit, and highly restrictive protocols on movement of cargo (Subramanian 2001).

A few researchers have studied the effects of institutional quality on trade. Anderson and Marcouiller (2002) find that higher transactions costs associated with poorly enforced commercial contracts and lack of transparency and impartiality in government policies significantly impede international trade. They find that a 10 percent

increase in a country's index of transparency and impartiality (a composite index defined by the authors) leads to a 5 percent increase in its import volume, other things equal. De Groot and others (2004) examine institutional quality as reflected by such dimensions as effectiveness of governance, regulatory quality, voice and accountability, rule of law, and control of corruption. They find a positive and significant link between improved regulatory quality and increase in bilateral trade.

Hoekman and Nicita (2008) find that tariffs and nontariff measures remain a significant source of trade restrictiveness for developing economies despite preferential access programs. Their research shows that the value of trade preferences as reflected by a measure of the relative preference margin is very low for most country pairs. The authors conclude that measures to improve logistics performance and facilitate trade are likely to have the greatest positive effects in expanding developing country trade, increasing the trade impacts of lowering remaining border barriers by a factor of two or more.

High transactions costs related to trade are driven by how public policies, regulations, and procedures interact with import and export supply chains. Indeed, “software” issues—such as processing trade-related documents and fulfilling clearance requirements by customs and other technical control agencies—account for more than 50–60 percent of the total time to export and import in many countries around the world. Port and terminal handling and inland transport account for about 40 percent or less (World Bank 2011).

While infrastructure investments are important for export-led economic growth, reforms of the legal, regulatory, and (more broadly) institutional framework governing trade facilitation clearly are important complements and could provide significant support to trade competitiveness. Portugal-Perez and Wilson (2010) find that while investments in physical infrastructure and regulatory reform to improve the business environment both enhance trade performance for developing economies, the marginal effect of infrastructure investments on exports appears to decline with per capita income. But while policy and regulatory reforms are relatively cost-effective compared with infrastructure investments, “software” reforms can sometimes be hard

to implement—especially if they involve bilateral or multilateral decision making, as reforms at the border often do.

Effect of time and cost reductions

Simplifying and harmonizing laws and regulations, rationalizing clearance and inspection regimes through the adoption of risk-based approaches, reducing administrative barriers, making broader use of information and communication technology to support transparency and fewer human interactions—all help enhance the ability of developing economies to trade by reducing the time and cost to do so. Several studies have examined the effect of reducing the time and cost of trade transactions in promoting trade growth (table 1).

In a cross-country study of 146 countries Freund and Rocha (2011) find that a one-day reduction in inland transport time leads to a 7 percent increase in exports or, in other words, is equivalent to a 1.5 percentage point reduction in all importing-country tariffs. This effect is greater for goods that are time sensitive than for those

that are not. Along the same lines, Hummels (2007) finds that one extra day in transit for time-sensitive products such as fruit and vegetables is equivalent to lowering their price by 0.9 percent. Hummels and Schaur (2012) show that one day saved in shipping time is equivalent to a 0.6–2.3 percent reduction in the ad valorem tariff for manufactured goods. They also find that long transit times reduce the probability that a country will export.

Hausman, Lee, and Subramanian (2012) as well as Djankov, Freund, and Pham (2010) find, in two separate studies, that a 1 percent reduction in the time to export increases exports by roughly 0.4 percent. Using a multinomial probit model on a cross-section of 98 countries, Subramanian, Anderson, and Lee (2012) estimate the effect of reducing trade transactions time on export growth. They find that the effect varies across countries, depending on baseline performance in trade logistics. Their results show that reducing the time to export by 1 percent could potentially increase trade by 0.64 percent on average for Sub-Saharan African countries, by 0.61 percent

Table Effect of trade logistics reform on trade, tariffs and prices, and income

1	Study	Reform	Effect
	Trade		
	Subramanian, Anderson, and Lee 2012	Reduction of 1% in time to export through targeted reforms	Potential increase in bilateral trade ranging from 0.64% for Sub-Saharan Africa to 0.18% for OECD countries, with increases for other regions falling in between
	Djankov, Freund, and Pham 2010	Reduction in transit time resulting in reduction of 1% in overall time to export	Increase in exports of 0.4% on average
	Hausman, Lee, and Subramanian 2012	Reduction of 1% in processing time for exports	Increase in exports of 0.37%
	Tariffs and prices		
	Hummels and Schaur 2012	Reduction of 1 day in shipping time	Equivalent to ad valorem tariff reduction of 0.6–2.3%
	Hummels 2007	Increase of 1 day in delivery time	For time-sensitive products such as fruit and vegetables, equivalent to lowering price by 0.9%
	Freund and Rocha 2011	Reduction of 1 day in inland transport time	Equivalent to a reduction of 1.5 percentage points in all importing-country tariffs
	Income		
	APEC 2002	Reduction of 5% in trade costs over 5 years	Increase in GDP of 0.98%
	Walkenhorst and Yasui 2003	Reduction of 1% in trade costs	Increase in GDP of 0.27% for the Middle East and North Africa, 0.25% for non-OECD Asia Pacific, and 0.18% for Sub-Saharan Africa

for South Asian countries, but by only 0.37 percent for Latin American and Caribbean countries. More generally, trade logistics reforms have greater effects in the poorest countries.

Improving trade logistics not only affects international trade but also increases intra-regional trade. Using panel data for 18 countries between 1988 and 1999, an APEC study (2004) finds that simplifying customs procedures by 10 percent could increase imports within APEC by 0.5 percent.

Potential for productivity gains

Do firms that export have higher productivity than firms that do not? A number of studies have examined this question (table 2). Mengistae and Pattillo (2004) find that manufacturing export firms in Ethiopia, Ghana, and Kenya have a total factor productivity premium of 17 percent. Van Biesebroeck (2005) obtains similar results in a study of nine Sub-Saharan African countries, finding that exporters are on average 28 percent more productive than nonexporters and have a higher rate of productivity growth. He also shows that firms increase their productivity after they start exporting. A study by Bigsten and others (2004), using panel data from four Sub-Saharan African countries, suggests that firms learn by exporting, leading to productivity gains of 6 percent.

Using World Bank Enterprise Survey data, Subramanian, Anderson, and Lee (2005) find that a one-day reduction in customs clearance time for exports in China would result in an increase in total factor productivity of 2 percent for the apparel and leather goods industry and more than 6 percent for the consumer goods industry. In Brazil they find that reducing the

customs clearance time for apparel exports to the average customs clearance time in China would increase total factor productivity for the apparel industry by 5 percent. In both countries the effects are even more pronounced in interior locations.

Potential for lower inventory and other indirect costs

Inventory levels are often taken as indicators of sophistication in trade-related institutions and services. Efficient systems support “just in time” production and delivery, allowing firms to streamline their input and output inventories. Inventory levels may be related to the capacity and quality of transport infrastructure (Shirley and Winston 2004), but in developing economies they are also related to the regulatory regime for trade (Guasch and Kogan 2001).

Preliminary field data from ongoing research by the author suggest that firms in developing economies, to offset uncertainties in the supply of imported raw material, hold four to five times as much inventory as those in OECD countries. In addition, these firms are forced to maintain high levels of finished goods inventories in warehouses and in transit, waiting for clearance by technical control agencies and for transport. Given the high cost of capital in most developing countries, these high inventory levels have a significant effect on the productivity, competitiveness, and cost of doing business for these firms. Effective regulation, simplified and harmonized procedures, and the development and deregulation of associated markets could significantly reduce inventory levels (and thus the cost of doing business), especially when accompanied by improvements in infrastructure.

Table Effect of trade and trade logistics reform on firm productivity

Study	Finding
Mengistae and Pattillo 2004	Exporting firms in 3 Sub-Saharan African countries have 17% total factor productivity premium.
Van Biesebroeck 2005	Exporting firms in 9 Sub-Saharan African countries have 28% higher productivity than nonexporting firms.
Bigsten and others 2004	Exporting firms in 4 Sub-Saharan African countries have 6% higher productivity than nonexporting firms.
Subramanian, Anderson, and Lee 2005	One-day reduction in customs clearance time for exports in China leads to increase in total factor productivity of 2% for apparel and leather goods industry and more than 6% for consumer goods industry.

Other indirect costs are incurred when delivery times and reliability are uncompetitive, severely affecting a country's position in highly competitive international markets that demand just-in-time delivery. The value of products often declines with time while in transit. For perishable products, spoilage and waste increase with transit time. These costs can also reflect lost opportunities, as when critical inputs cannot reach manufacturing plants in time or perishable commodities cannot reach markets in time—or when production plants must hold higher-than-optimal levels of raw material inventories to cover for logistics delays. Reforms supporting agile, lean supply chains through seamless trade facilitation systems and services would bring significant benefits to firms by allowing leaner inventories and reducing damage and waste.

Conclusion

The literature on the effect of reforms in trade logistics systems and services provides evidence that improving the policy, regulatory, and procedural environment for trade supports the development and operation of lean, efficient supply chains, helps boost the competitiveness of developing economies, and increases export potential. To support the existing evidence in the literature, selected in-depth country studies are needed to complement what is largely cross-section analysis—studies that evaluate the effect of trade logistics reforms over time.

Note

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References

Anderson, James E., and Douglas Marcouiller. 2002. "Insecurity and the Pattern of Trade: An Empirical

Investigation." *The Review of Economics and Statistics* 84 (2): 342–52.

APEC (Asia-Pacific Economic Cooperation). 2002. *The Benefits of Trade and Investment Liberalization and Facilitation*. APEC Economic Committee. Singapore: APEC.

———. 2004. *Trade Facilitation and Trade Liberalization: From Shanghai to Bogor*. Singapore: APEC.

Bigsten, Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Willem Gunning, Abena Oduro, and others. 2004. "Do African Manufacturing Firms Learn from Exporting?" *Journal of Development Studies* 40 (3): 115–41.

Clark, Ximena, David Dollar, and Alejandro Micco. 2004. "Port Efficiency, Maritime Transport Costs, and Bilateral Trade." *Journal of Development Economics* 75 (2): 417–50.

De Groot, Henri, Gert-Jan Linders, Piet Rietveld, and Uma Subramanian. 2004. "The Institutional Determinants of Bilateral Trade Patterns." *Kyklos* 57: 103–24.

Djankov, Simeon, Caroline Freund, and Cong S. Pham. 2010. "Trading on Time." *The Review of Economics and Statistics* 92 (1): 166–73.

Freund, Caroline, and Nadia Rocha. 2011. "What Constrains Africa's Exports?" *World Bank Economic Review* 25 (3): 361–86.

Guasch, Jose L., and Joseph Kogan. 2001. "Inventories in Developing Countries: Levels and Determinants—a Red Flag for Competitiveness and Growth." Policy Research Working Paper 2552, World Bank, Washington, DC.

Hausman, Warren H., Hau L. Lee, and Uma Subramanian. 2012. "The Impact of Logistics Performance on Trade." *Production and Operations Management Journal*. First published online January 18. DOI: 10.1111/j.1937-5956.2011.01312.x.

Hoekman, Bernard, and Alessandro Nicita. 2008. "Trade Policy, Trade Costs, and Developing Country Trade." Policy Research Working Paper 4797, World Bank, Washington, DC.

Hummels, David. 2007. "Calculating Tariff Equivalents for Time in Trade." Nathan Associates for U.S. Agency for International Development, Washington, DC.

Hummels, David, and Georg Schaur. 2012. "Time as a Trade Barrier." NBER Working Paper 17758, National Bureau of Economic Research, Cambridge, MA.

Limão, Nuno, and Anthony J. Venables. 2001. "Infrastructure, Geographical Disadvantage, Transport

- Costs, and Trade.” *World Bank Economic Review* 15 (3): 451–79.
- Mengistae, Taye, and Catherine Pattillo. 2004. “Export Orientation and Productivity in Sub-Saharan Africa.” *IMF Staff Papers* 51 (2).
- Portugal-Perez, Alberto, and John S. Wilson. 2010. “Export Performance and Trade Facilitation Reform: Hard and Soft Infrastructure.” Policy Research Working Paper 5261, World Bank, Washington, DC.
- Shirley, Chad, and Clifford Winston. 2004. “Firm Inventory Behavior and the Returns from Highway Infrastructure Investments.” *Journal of Urban Economics* 55: 398–415.
- Subramanian, Uma. 2001. “Transport, Logistics, and Trade Facilitation in the South Asia Subregion.” In *Integration of Transport and Trade Facilitation: Selected Regional Case Studies*, ed. T. R. Lakshmanan and others. Directions in Development. Washington, DC: World Bank.
- Subramanian, Uma, William Anderson, and Kihoon Lee. 2005. “Measuring the Impact of the Investment Climate on Total Factor Productivity: The Cases of China and Brazil.” Policy Research Working Paper 3792, World Bank, Washington, DC.
- . 2012. “Less Time, More Trade: Results from an Export Logistics Model.” Draft, Investment Climate Department, World Bank Group, Washington, DC.
- Van Biesebroeck, Johannes. 2005. “Exporting Raises Productivity in Sub-Saharan African Manufacturing Plants.” *Journal of International Economics* 67 (2): 373–91.
- Walkenhorst, Peter, and Tadashi Yasui. 2003. “Quantitative Assessment of the Benefits of Trade Facilitation.” OECD Working Paper 31, Organisation for Economic Co-operation and Development, Paris.
- World Bank. 2011. *Doing Business 2012: Doing Business in a More Transparent World*. Washington, DC: World Bank.
- . 2012. “Africa Can Help Feed Africa: Removing Barriers to Regional Trade in Food Staples.” Report 66500-AFR, World Bank, Washington, DC.

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