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A STRUCTURED LITERATURE REVIEW

Contribution and Effectiveness of Trade Facilitation Measures





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Contribution and Effectiveness of Trade Facilitation Measures: A Structured Literature Review

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February 21, 2018

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Acknowledgments

Eugenia Go is a doctoral candidate in the Department of Economics at the University of Sussex. This work was supervised by Andrew H. W. Stone, adviser, Independent Evaluation Group, and John S. Wilson, consultant, as part of Independent Evaluation Group's 2018 evaluation *An Independent Evaluation of World Bank Group Support to Facilitating Trade 2006–17: Grow with the Flow*. It was peer reviewed by Ana Margarida Fernandes, senior economist, development economics, World Bank.

Executive Summary

This literature review has two main objectives. The first is to survey the findings on effectiveness of trade facilitation measures on outcomes such as trade flows, and trade costs. The second objective is to gain a detailed understanding of the contributions of different kinds of trade facilitation measures to increasing trade, and trade costs reduction. In doing so, the review provides the framework for establishing a causal relationship between trade facilitation support interventions of the World Bank Group thereby informing on the effectiveness of past interventions and improving future ones.

Trade facilitation is generally taken to encompass policy measures that aim to reduce the costs of international trade outside of traditional market access policy tools. Its objective is to examine how processes governing the movement of goods across national borders can be improved so that trade costs are minimized, without compromising border protection objectives (Grainger 2011).

Trade facilitation reforms have received growing attention as a tool of development with the recognition that trade presents a way of achieving sustained growth and poverty reduction. The area also increased in prominence in the context of lower market access barriers after rounds of multilateral and regional trade negotiations. Various estimates reveal that trade costs dwarf the impact of tariffs on trade flows (Anderson and Van Wincoop 2004; Arvis et al. 2016; Hummels 2007).

A proper analysis of the relationship between trade facilitation and trade costs requires reliable means of measuring the trade facilitation input, and the outcomes of interest. This review discusses the challenges of finding good metrics for both sets of variables, their availability, and limitations.

Trade facilitation can encompass an extensive set of activities that impinge on trade costs. But this review limits its focus on reforms aimed at “streamlining and harmonizing the activities, practices, and formalities required for international trade, and associated payments and border logistics.” They correspond to the IEG typology of measures as follows:

- Simplification of rules, procedures, and documentation;
- Cross-agency dialogue, coordination, and integration;
- Strengthening border agencies;
- Modernization of border operations; and
- Border-related infrastructure and logistics.

Each area of trade facilitation typology interacts with other aspects of the process, as a chain and network set of procedures inevitably do. Rather than a mutually exclusive classification, the typology is meant as an organizing framework for the review.

Simplification of border procedures are empirically demonstrated to reduce trade costs and increase trade flows for both exports and imports. In particular, exports of developing countries are observed to respond positively along both the intensive and extensive margins. Intensive margin refers to the additional volume of trade, whereas extensive margin refers to new products being exported, or export markets that were not previously served. In so far as simplifying border procedures reduce the fixed costs component of trading, they also lead to greater participation of smaller firms in international trade. Finally, the reduction in time spent on border procedure compliance is also associated with less corruption and higher customs revenues.

Measures aimed at improving **cross-agency dialogue, coordination, and integration** in terms of harmonizing standards relating to sanitary and phytosanitary measures and technical regulations are empirically linked to greater trade volumes and product variety. Furthermore, general information availability is found to be disproportionately beneficial to exports from small and medium enterprises compared with larger firms. However, the literature informing on benefits of other types of coordination activities and mechanism such as single windows, and one stop border posts rely more heavily on case studies.

Empirical work on the effects of **strengthening border agencies** remains very limited. At the same time, the metrics for this type of facilitation reform is also the least developed among the typologies considered. But the lacunae are also palpable even in terms of case studies because many reforms aimed at improving border agencies at both the institutional and human resource level were carried out in the wake of large country shocks such as conflicts and economic crises. Moreover, restructuring and trainings also tend to be necessary accompaniments to other types of reforms. Under these scenarios, the effects accruing to border agency improvement become hard to isolate.

Modernization of border operations, frequently taking the form of automation or adoption of information and communication technology in border procedures, is associated with lower trade costs. This in turn translates to increased trade flows. Positive effects are also observed in terms of higher customs duties collection, and shorter border clearance times. Nearly all of the evidence for this facilitation typology come from case studies.

Finally, **investments in border-related infrastructure** are empirically shown to contribute to lower trade costs, which manifest in larger trade flows both in terms of

volume and product variety. Nonetheless, studies that shed light on the particular infrastructure aspects that is most important for improving port efficiency are still very limited.

In terms of outcomes, the effect of trade facilitation measures is most established for trade costs and trade flows. The evidence on global value chain trade and participation of small and medium enterprises, although available, are less abundant; while even less evidence is available on second-order effects on employment, foreign direct investment, and poverty. At the same time, impacts on customs revenue and border clearance times tend to lean heavily on case studies.

Behind the border factors such as the general state of infrastructure, business environment, governance, and general quality of institutions interact with border trade facilitation measures, and greatly influence their efficacy and efficiency. Cross-country evidence suggests that the general quality of institutions tend to matter more in promoting trade for low-income countries, whereas hard infrastructure increases in importance as per capita incomes rise (Iwanow and Kirkpatrick 2009; Portugal-Perez and Wilson 2012). At the country level, the exact complementarities, and the order of priority among trade facilitation reforms will naturally vary based on what the key bottlenecks in the trading process of a country are. Comprehensive diagnostic tools provided by institutions such as the Bank Group can help in this regard.

The empirical literature on trade facilitation predicts substantial gains across all country groups and geographical region from bringing down trade costs (WTO 2015). The recognition of the potential gains is accompanied by an increase in official development assistance directed for trade facilitation (OECD 2017). Available cross-country studies suggest positive effects on exports (Cali and te Velde 2011; Helble et al. 2012). Nonetheless, the literature on the effectiveness of aid for trade is fairly nascent and continues to struggle with definitional scopes of aid for trade in available databases. At the same time, empirical work at the country level is particularly scant.

1. Structured Literature Review: IEG Methods

Literature

Objective and Scope (Based on the IEG Approach Paper)

This literature review has two main objectives. The first is to survey the findings on effectiveness of trade facilitation measures on outcomes such as trade flows, reduction trade of costs, and other related outcomes. Studies on the role of complementary or sequential interventions that may influence the impact of facilitation measures are also included.

The second objective is to gain a detailed understanding of the contributions of different kinds of trade facilitation measures to increasing trade or reducing trade costs. Examples include customs automation, risk-based inspections, border management, border logistics, single windows and border agency coordination.

In addressing these two objectives, the review provides the framework for establishing a causal link between trade facilitation support interventions of the World Bank Group, and trade outcomes; thereby informing on the effectiveness of past interventions and improving future ones. At the same time, the review points to areas where evidence is lacking or remain inconclusive, hence pointing to questions where future research can make meaningful contributions.

At its broadest, trade facilitation encompasses any set of undertakings that can potentially affect the speed and volume of trade flows. The IEG definition focuses on a narrow set of activities that involve “streamlining and harmonizing the activities, practices, and formalities required for international trade, and associated payments and border logistics; while safeguarding legitimate regulatory and policy objectives” (IEG Approach Paper, 2017, 1).

Search Strategy

The identification of relevant literature followed four main strategies: (i) key publications of international organizations on trade facilitation; (ii) Google Scholar; (iii) EconLit publications database; and (iv) the World Bank Open Knowledge Repository.

Key Publications

Key reports on trade facilitation of international organizations were consulted. In particular, the 2015 World Trade Report of the World Trade Organization (WTO) and the various publications of the Organisation for Economic Co-operation and

Development (OECD) are themselves reviews on trade facilitation. Forty-two journal articles, reports, and working papers were identified as references for the review based on these sources.

Google Scholar

The search exercise in Google Scholar was particularly useful in finding references that are outside mainstream economics publications such as Food Policy and the World Customs Journal. The key words used are ‘trade facilitation;’ ‘trade facilitation and trade costs;’ ‘customs automation’ or ‘customs modernization;’ ‘border procedure’ or ‘customs procedure;’ and ‘shipment inspection.’ These are listed in the first column of table 1.1.

No filters were applied for ‘trade facilitation’ and ‘trade facilitation and trade costs.’ However, for working papers of empirical nature, and for the other search words, only the more recent publications are considered (2010 onward). This is premised on the assumption that detailed customs procedures and management practices have undergone changes in the 21st century, and the most relevant publications are the ones closest to the present. As each search yielded hundreds of results, only the top 40 results were considered for the first two search phrases, whereas only the top 15 results were included for the other search phrases. This exercise gathered 125 materials as potential sources.

Table 1.1. Summary of Google Scholar Search Results

Search Phrase	Number of References	Search Filter
Trade facilitation	Top 40	No filters
Trade facilitation and trade costs	Top 40	
Customs automation /modernization	Top 15	2010 onward if nonrefereed work
Border/customs procedure	Top 15	
Shipment inspection	Top 15	

EconLit Publications Database

The EconLit search is productive in identifying most recent publications that have yet to be cited frequently because they are fairly recent. It also yielded unique articles pertaining to types of trade facilitation measures focusing on border and customs modernization and procedures.

Using the key words ‘trade facilitation;’ ‘trade facilitation and trade costs;’ ‘customs automation’ or ‘customs modernization;’ ‘border procedure’ or ‘customs procedure;’ and ‘shipment inspection’ — the search exercise produced a list of 778 publications.

Filters were not employed for journal articles, but only post-2010 publications are considered for nonrefereed papers.

Table 1.2. Summary of EconLit Search Results

Search Phrase	Number of References	Search Filter
Trade facilitation	495	No filters
Trade facilitation and trade costs	172	
Customs automation /modernization	57	2010 onward if nonrefereed work
Border/customs procedure	23	
Shipment inspection	31	

World Bank Open Knowledge Repository

The Open Knowledge Repository search was focused on the journal and working paper collections. The search produced a number of most recent works on trade facilitation. In particular, it is a good source of country-focused studies. Filters were not applied for journal articles. But only working papers published 2010 onward are considered. This is in keeping with research culture that in general, working papers that are competently done find their way into refereed publications after some time. This exercise yielded a list of 316 publications.

Table 1.3. Summary of Open Knowledge Repository Search Results

Search Phrase	Number of References		Search Filter
	Journals	Working papers	
Trade facilitation	23	113	No filters for journal articles and reports, but only 2010 onward for working papers
Trade facilitation and trade costs	11	67	
Customs automation /modernization	0	31	
Border/customs procedure	4	53	
Shipment inspection	0	14	

Inclusion or Exclusion Criteria

The four search strategies produced a list of 1,261 publications. The first step in narrowing down is to weed out duplicates. In cases where both working paper and peer-reviewed versions of the paper are available, the latter is the preferred source. This elimination process left 732 publications.

The next step involved scanning through each paper's introduction or data section (for empirical papers) to determine their definition of trade facilitation. This allowed for the exclusion of papers that do not meet either of the criteria: (i) conformity to the IEG definition of trade facilitation (for example, trade facilitation measures that pertain to

export promotion activities/agencies); and (ii) informative of complementarity and sequencing issues in trade facilitation. This narrowed the list to 243 publications.

For papers of descriptive nature, only those that are able to relate observed outcomes on trade flows and trade costs are considered. When many facilitation reforms are instituted in proximity with each other, attribution of results to particular measures becomes nearly impossible.

For empirical work, only papers that at least satisfy a set of methodological criteria for establishing causal relationships are considered. Specifically,

- i. Use panel, pooled cross section, or time series data. Cross-section data are inherently limited for inferring causal relationships;
- ii. Acknowledge and deal with issues of selection and endogeneity;
- iii. For papers using the gravity model as main tool for analyses, consideration of alternative models to ordinary least squares (OLS) that can address heteroscedasticity in multiplicative models.

The inclusion criteria are less stringent when literature in a particular area is scarce such as in port infrastructure and aid effectiveness. In such cases, findings from available literature is cited, while at the same time informing of their limitation.

The application of the full inclusion/exclusion criteria left us with 109 references to work with. Finally, back referencing of the 109 led to 18 other references.

Extraction and Synthesis

The collected literature is mainly organized according to the IEG typology of measures, distinguishing between the different areas of facilitation and a general grouping of outcomes. Other sections are used to organize the materials on (i) trade facilitation in general, (ii) the interactions of the different facilitation typologies with each other, and country infrastructure and institution contexts; and (iii) aid effectiveness.

The findings for each group of literature are summarized with a table at the end of each discussion.

2. Trade Facilitation

Definition and Scope

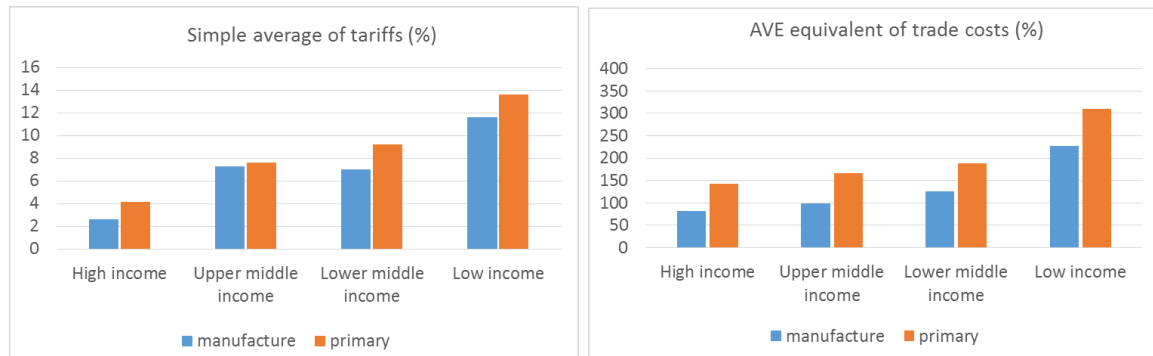
Trade facilitation encompasses policy measures that aim to reduce the costs of border crossing trade outside of traditional market access policy tools such as tariffs. It examines how processes governing the movement of goods across national borders can be improved so that trade costs are minimized while, at the same time, safeguarding border protection objectives (Grainger 2011a). Facilitation measures can include behind the border policies such as domestic business regulations and standards that traders need to fulfill even prior to exporting and importing; the logistics systems that physically convey and store the goods from origin to final destination; the infrastructure and facilities in ports; and procedures and requirements that need to be met once a shipment reaches the border of the importing country.

The scope of what constitutes trade facilitation is far from standard, and has been suited to the aspects of interest of studies (WTO 2015). For purposes of this review, trade facilitation are measures that directly affect border operations. In particular, the IEG's definition focuses on a narrow set of activities that involve "streamlining and harmonizing the activities, practices and formalities required for international trade and associated payments and border logistics ..." (IEG Approach Paper, 2017, 1). Hence, internal connectivity, and aspects that pertain to domestic business environments are not directly reviewed. But discussion of these are inevitable once the discourse turns to issues of complementarities and sequencing of trade facilitation reforms. For example, improvements in port facilities can only go so far if roads within the borders that lead to the port are very poor and logistics services in a country are uncompetitive.

Trade facilitation has grown in importance as an area of empirical and policy interest. Trade costs are found to pose more binding barriers to trade than tariffs (Anderson and Van Wincoop 2004; Hummels 2007). This possibly explains why customs unions are found to have substantially larger trade-enhancing effects even in the presence of preferential trade agreements among the same set of trading partners (Chen and Novy 2011; Duval et al. 2016; Handley and Limão 2015).

In 2010, simple average of applied MFN tariffs in the world are estimated to be around 6 percent (World Bank 2017), whereas the ad valorem equivalents of trade costs are at least 13 times more in magnitude (Arvis et al. 2016). Figure 2.1 provides a breakdown of these estimates by country and sectoral grouping. As in tariffs, trade costs tend to be lowest for high income countries and highest for low-income countries. Moreover, trade costs are substantially higher for primary or agricultural products, which is not surprising given their lower value to weight ratio.

Figure 2.1. Simple Average of Tariffs and Trade Costs, 2010



Source: Arvis et al. (2016), World Bank WDI (2017)

Note:

Simulation exercises predict increases in global trade flows of at least USD 80 billion per annum from various sets of trade facilitation reforms that cut trade costs (Hufbauer and Schott 2013; Decreux and Fontagne 2011; Iwanow and Kirkpatrick 2009; Portugal-Perez and Wilson 2012; WTO 2015; Zaki 2014). Using the Logistics Performance Index (LPI) and components of the Doing Business indicators, Portugal-Perez and Wilson (2009) also find that export gains from better trade facilitation outweigh gains of tariff cuts in importing countries for Sub-Saharan Africa.

Even when limiting to the narrower definition of trade facilitation under the WTO Trade Facilitation Agreement (TFA), global exports and GDP are predicted to increase by at least 2 percent and 0.34 percent per annum respectively under a conservative scenario (WTO 2015).¹ Beverelli et al. (2015) also forecasts export expansion in terms of product and destination diversity of at least 0.23 percent for every 1 percent improvement in TFA implementation score, with the largest gains accruing to Latin America and Sub-Saharan Africa. The emerging consensus from this set of work is that all country groups stand to gain from trade facilitation reforms. But the benefits are potentially largest for developing and least-developed countries, and this justifies this review’s focus on these groups of economies.

The importance of trade facilitation measures also appears to be recognized by policy makers. A survey from the WTO and OECD (2017) trade monitoring exercise that covers over 60 developing countries and 38 donor countries and institutions reveal that among

¹ The conservative scenario classifies the trade facilitation indicator to its maximum value of 2 if a developing country notifies 95 percent its components under the Category A commitments (WTO 2015). Category A commitments pertain to provisions that developing (or least-developed) countries designate for immediate implementation (or one year after in the case of the latter) on entry into force of the TFA.

a broad array of aid that can promote trade, both recipients and donors rank TFA areas as top priority.

The WTO (2015) reports that there is broad appreciation among WTO Members of the magnified benefits of cooperating on simplifying trade procedures, and this made for the most successful negotiations in the history of GATT/WTO in terms of inclusiveness and transparency.

Typology

Trade facilitation necessarily includes a multitude of private and public actors forming different parts of the trading chain or network because it impinges on the operational interface between these players (WTO 2015). Private stakeholders include traders, logistics and insurance providers, and customs brokers. These agents may be operating in different national territories and responsibilities of each party also shift depending on the agreed Incoterms (Grainger 2011b). Public actors involve not just agencies with border operations such as customs, but also ministries of agriculture, environment, and health, that usually have the mandates for public health and safety; and public works that may be responsible for port facilities.

In this context, it is useful to organize trade facilitation measures along typologies depending on the main set of trade transactions being targeted. Arranged along the chain sequence of a trade transaction, this can be made to coincide with the organizing framework of the World Bank's IEG portfolio of trade facilitation activities summarized in table 2.1.

Table 2.1 is employed as an organizing framework for the review. However, the categories are not mutually exclusive. A trade facilitation measure nearly always has cross-cutting impacts on several outcomes. For example, conformity assessment procedures for sanitary and phytosanitary (SPS), and technical regulations usually undergo documentary and possibly physical verification on reaching the border of the importing country. A trade facilitation reform that puts in place a mutual recognition agreement (MRA) between regulatory agencies in the importing and exporting countries involves cross-agency dialogue and coordination but will also simplify trade-related rules and procedures at the border.

Table 2.1. Typology of Trade Facilitation Measures

Trade Facilitation Type	Description
Simplification of rules, procedures, and documentation	Simplification and streamlining of trade-related rules, procedures, and documentation Simplification of standards and conformity assessments through risk-based approaches Establishing or improving single windows and collection systems
Cross-agency dialogue, coordination, integration	Policy dialogue and advisory services to encourage domestic and international cross-agency coordination
Strengthening border agencies	Technical assistance and specialized trainings to improve the organization of customs and other noncustoms agencies involved in border operations
Modernization of border operations	Investments and technical assistance in specialized software (for example, ASYCUDA), hardware (for example, scanners), and information and communication technology system (for example, payment and revenue systems, websites, and portals)
Border-related infrastructure and logistics	Investments in physical infrastructure at the border such as port facilities, and border-proximate infrastructure

Source: IEG Approach paper (2017).

3. Measuring Trade Costs and Trade Facilitation

An empirical investigation of the relationship between trade facilitation and trade costs necessarily requires reliable and comparable metrics of both the tools of facilitation and the outcomes of interest.

Trade Costs

Trade costs comprise all the costs of conveying a product from its origin to its final destination (Anderson and Van Wincoop 2004). The empirical literature has three main approaches of measuring trade costs: (i) direct measures; (ii) indirect measures from trade flows; and (iii) estimates from spatial price gaps.

Direct measures of trade costs include cost of transport, storage, and insurance which are directly incurred by firms. Although not expressed in pecuniary terms, other aspects of trading activities can also be viewed as direct cost of trade. For example, complying with border procedures can be measured as the number of steps necessary to complete a trade transaction. Other examples include the number of days or the waiting time for the release of shipments.

Measuring trade costs by each of its components is intuitively appealing. Nonetheless, good metrics of these cost components are hard to obtain. This is true even for the most observable costs such as transport and insurance. Spatial and temporal coverage are inevitably limited because this information tends to vary by origin, destination, and product. Some studies use the ratio of c.i.f. (cost, insurance, freight) to f.o.b. (free on board) as approximations of transport cost. But Hummels and Lugovskyy (2006) compared estimates using this method with direct measures transport costs for New Zealand and US, and find that information from these sources do not yield useful information for direct use in empirical studies.

Country sources of transport costs, notably those of the US, have been employed to explain the factors behind maritime and trading costs in Blonigen and Wilson (2007); Clark, Dollar, and Micco (2004); Fink, Mattoo, and Neagu (2002); and Limao and Venables (2001). Over time, country-based sources have become increasingly available with improved data collection capabilities of customs authorities in many countries. Nonetheless, such data sources inevitably fall short of comprehensive coverage in terms of costs components and country coverage. The latter follows from the fact that countries that rarely trade with the data source country will be not be represented in such information sets. Most likely, this will coincide with countries with the highest trade costs.

Aside from transport costs, the less visible components of trade costs such as delays at the border, or the number of documentary requirements to import or export, can be considerable. Moïse and Le Bris (2013) suggest that they can increase transactions costs by 2 percent to 24 percent of a shipment's value. The cost imposed by time delays are high in terms of increasing uncertainty in inventory management, and opportunity costs. Harrigan (2010) and Hummels and Schaur (2013) demonstrate the value of time by the willingness of firms to pay the premium for more expensive but faster air transport for time-sensitive products compared with cheaper but slower transport by sea. Based on transport mode choices of firms for US imports, an additional day in transit adds approximately 0.6 percent to 2.0 percent to trade costs in ad valorem terms (Hummels and Schaur 2013).

The LPI and the 'trading across borders' component of the Doing Business indicators capture some of the less directly observed trade cost elements. Both data sets are maintained by the World Bank.² These indicators have the benefit of broad coverage and comparability across countries and have been employed in many empirical work on

² In some studies, these indicators are also used as indicators of trade facilitation. For example, the number of days it takes for border clearance is used as an explanatory variable for export flows.

trade facilitation. Nonetheless, these metrics have inherent limitations. For instance, the 'trading across borders' indicators rely on the responses of freight forwarders and in a smaller proportion, customs and ports authorities (Djankov et al. 2010). In the same manner, the LPI is based on perception scores given by freight forwarders and express carriers (World Bank 2016). As such, these metrics are not as free from cultural biases of the respondents compared with information from administrative records as sources. Finally, the two sets of indicators likewise go through regular refinements that attempt to improve sample representativeness, and the coverage of the indicators (World Bank 2016, 2017). Hence, users ought to exercise care in ensuring comparability across time.

There are also various attempts to capture costs imposed by complex regulations. Kee et al. (2009) estimate AVEs of nontariff measures (NTMs) at the tariff line level. This has the advantage of comprehensively capturing the effective protection due to imposition of NTMs but its data demands and the frequently changing nature of NTMs limits its temporal coverage. Other potential sources are the World Bank European Union (EU) Standards and the TRAINS NTM Database, which map standards applied by countries to the harmonized system classification codes (Czubala et al. 2009; Fugazza 2017). The former is limited to standards imposed by the EU but has a better time series dimension, whereas the latter has broad country coverage but is only available for a single reference year within 2012 to 2016. Both data sets give information on product coverage but are more limited in informing on how onerous these NTMs are. A meta-analysis by Li and Beghin (2012) suggest that this is an important dimension of information for finding meaningful results. For example, studies that directly use information on maximum residue levels find clearer results while studies that rely on other proxies such as aggregated indexes are more likely to end up with inconclusive findings (Li and Beghin 2012).

However, the practical impediments of developing measures for all trade costs components and how they interact with each other means that even the recent developments outlined above fall short of being comprehensive. In light of this deficiency in a 'bottom up' approach to trade costs, a 'top down approach' based on the gravity model becomes convenient.

The gravity model relates observable trade flows to a host of observable trade costs proxies. The detailed composition is forfeited for the price of a comprehensive measure of trade costs, which is effectively a residual of what can be explained by traditional gravity variables such as distance, indicators of cultural affinity, tariffs, and so on. Arvis et al. (2016) exemplifies this approach, where trade costs are expressed as the ratio of domestic trade of countries to their trade with other countries. Falling trade cost would imply a shift from domestic trade toward international trade. Based on this method, the authors estimate that trade costs have been falling from 1996 to 2010 with countries in

Asia and Middle East and North Africa declining fast, and slower decline for Latin America and the Caribbean, and Sub-Saharan Africa.³

However, a limitation with indirect measures of trade costs is that it rarely informs policy makers of the key components that can attenuate its effects on trade flows. Hence, Moisé and Le Bris (2013) recommend using both indirect and direct measures of trade costs as complements for analyses.

Finally, trade costs metrics can also be derived using spatial price differences. Trade costs prevent arbitrage from occurring and drive a wedge between prices in two locations. This method is seldom used in cross-country trade facilitation studies because the necessary data are often not available—namely, comparable domestic price data that are frequently and routinely collected. Instead, price gaps are more often used to analyze the speed of price transmission, with slow price adjustments associated with higher trade costs. Nonetheless, Atkin and Donaldson's (2015) work in Ethiopia and Nigeria demonstrate that detailed price information by location, together with information on origin and destination of products, can be used to capture the main factors influencing trade costs, and how this feeds into pricing behavior of the agents involved.

Trade Facilitation Metrics

TFI have a younger history than trade cost measures, and they vary as much as researchers' definition of trade facilitation differ. The broadest scopes develop general indicators for different aspects of trade facilitation. For example, infrastructure indicators can be constructed from information on the length or quality of road networks, mobile telephony uptake, and so on.; while institutional quality indexes are constructed from indicators of governance transparency, democracy, and so on. Limao and Venables (2001) employ the mean of the normalized components as an infrastructure indicator for trade facilitation. Francois and Manchin (2013) and Portugal-Perez and Wilson (2012) develop their trade facilitation metric using principal components and factor analyses to capture the main elements driving variations in each indicator. All three studies confirm infrastructure access and good quality institutions have significant positive effects on trade flows. Developing facilitation measurements in this manner has the advantage of wide country and temporal coverage. Nonetheless, the aggregation of information limits the possibility of disentangling the effects of specific

³This approach is closely related to a class of literature that estimates border effects and home bias, which infers trade costs in terms of the tendency of a country to trade within itself compared with other countries. An example of this is Anderson and Yotov (2010).

measures of interest for policy makers. Moreover, Moisé and Le Bris (2013) caution that this approach implicitly assumes substitutability between subcomponents of each indicator which may not be the case in reality.

Many of the specific TFIs of interest to policy makers are not routinely nor systematically collected in most developing countries. Ideally, an outright survey solves this data gap. Wilson, Mann, and Otsuki (2003, 2005a, 2005b) are some of the earlier studies that conducted surveys to develop indicators on port efficiency, customs environment, regulatory environment, and e-business usage for economies of the Asia and Pacific Economic Cooperation, and later on, to a larger set of countries. Over time, the recognition of the importance of these indicators gave rise to the development of institutionalized, regular, and internationally comparable indicators compiled by the World Bank, World Economic Forum (WEF), and later by the OECD.

Since 2007, the World Bank has been conducting the surveys behind the LPI every two years, covering 160 countries by 2014. The LPI has six components that can be grouped according to trade facilitation inputs – customs, infrastructure, ease of arranging shipments; and outcomes – international shipments, timeliness, and tracking and tracing (WTO 2015). The respondents are mainly agents engaged in trade logistics.

The Enabling Trading Index (ETI) of WEF comprises seven pillars from 56 indicators collected from international organizations complemented by information from the responses of CEOs and top business leaders through the WEF Executive Opinion Survey (WEF 2016). The ETI covers 138 countries and has been updated annually since 2010.

Finally, the OECD launched the Trade Facilitation Indicators (TFIs) in 2012 (Moisé and Sorescu 2013), which was updated in 2015 to cover 152 countries. The TFIs have 16 indicators based on 97 variables collected from surveys of government and private sector stakeholders. It adopts a narrow definition of trade facilitation that is focused on capturing the main provisions of the WTO TFA.

Table 3.1. IEG Typology and Trade Facilitation Indicators

IEG Typology or Methodology	Doing Business 'Trading across Borders' and LPI (World Bank 2016, 2017)	ETI (WEF 2014)	TFI (OECD 2016)
	<p>Doing Business: Survey of freight forwards and customs and ports authorities.</p>	<p>Responses of CEOs and business leaders to WEF Executive Opinion Survey, translated into scores of 1 to 7.</p>	<p>Survey of government and private sector stakeholders mapped to a multiple binary scoring system (0, 1, and 2).</p>
	<p>LPI: Survey of professionals in multinational freight forwarding companies and express carriers that score subcomponents of LPI from 1 to 5.</p>		
Simplification of rules, procedures, and documentation	<p>Doing Business</p> <ul style="list-style-type: none"> • Border compliance (costs and hours) • Documentary requirements (costs and hours) 	<p>Efficiency and transparency of border administration.</p>	<ul style="list-style-type: none"> • Information availability • Appeal procedures • Fees and charges • Formalities (documentation and procedures) • Governance and impartiality • Transit fees and charges • Transit formalities • Transit guarantees
Cross-agency dialogue, coordination, integration	<p>LPI</p> <ul style="list-style-type: none"> • Customs • Ease of arranging shipments • Timeliness • Tracking and tracing 		<ul style="list-style-type: none"> • Advance rulings • Involvement of the trade community • Cooperation (internal and external) • Consularization • Transit agreements and cooperation
Strengthening border agencies	<p>Tracking and tracing</p>		<p>Advance rulings</p>
Modernization of border operations	<p>Timeliness</p>		<p>Formalities (automation)</p>
Border-related infrastructure and logistics	<ul style="list-style-type: none"> • Infrastructure • Quality of logistics service 		

The trade facilitation metrics of ETI, LPI, TFI, and the ‘trading across borders’ of the Doing Business indicators, exhibit statistically significant correlations with each other (WTO 2015). Moreover, a study by Sourdin and Korinek (2011) find that using ETI, LPI, and components of the Doing Business indicators lead to consistent conclusions on the importance of trade facilitation in increasing trade flows. For purposes of the review, the subcomponents of some of these indicators are mapped to the trade facilitation typology in table 2.1. Once again, the correspondences are not exclusive.

These indicators have broad and comparable coverage and are therefore useful in making cross-country studies and drawing general conclusions about the most effective trade facilitation tools. Nonetheless, country sources provide vital information when it comes to analyzing country-specific contexts and deciding priorities and synergies among its trade facilitation challenges. Looking ahead, the diagnostic tools and facilities developed by the World Bank (2010), the various Diagnostic Trade Integration Studies and the WTO-OECD trade facilitation questionnaires may provide valuable data sources if they can be organized and coded in a systematic way.

4. Gains from Trade Facilitation: Outcomes

International trade models underscore the role of trade costs on welfare gains and distribution (WTO 2015). In the Ricardian and Heckscher-Ohlin world, higher trade costs mean that conditions are closer to autarky, with less consumption than otherwise possible and therefore lower overall welfare. In the monopolistic competition set up, trade costs will have a disproportionately adverse effect on small developing countries whose primary product-dominated economies are characterized by constant returns to scale industries, in contrast to the increasing returns sectors of bigger economies that are able to surmount trade costs. In a heterogeneous firm framework, reduction of trade costs brings about reallocation of resources to more productive firms implying efficiency gains. Extending this model to distinguish between variable and fixed costs of trade, Chaney (2008) predicts that lowering variable costs leads to gains along the intensive and extensive margin, whereas declining fixed costs only affects the extensive margins. Intensive margins refer to the increase in the trade of the same product; whereas extensive margins can pertain to new products traded, new firms or countries trading, and new export destinations. Finally, in supply chain models of trade, the effects of trade costs are magnified as each stage of the global value chain trade incur these costs (Baldwin and Venables 2013; Yi 2010).

The outcomes of interest for trade facilitation measures are mostly measured in terms of export and import growth. This is where empirical evidence is most developed. But the interest in trade flows are in turn driven by its demonstrated linkages to other growth

and development outcomes such as export diversification; productivity and national output; employment; participation in global value chains (GVCs); increased participation of small and medium enterprises (SMEs) in trade; attracting foreign direct investments (FDI); improving customs revenues and governance; and achieving public health and security concerns. These are the aspects where empirical work is still very limited.

Empirical research on the relationship between trade facilitation and outcomes of interest mostly come in two forms. The first are computable general equilibrium (CGE) models which predict ex ante gains to alterations in types of trade costs. This approach has the advantage of taking into account economic linkages across sectors within an economy and across countries. Its main weakness is that predictions are highly sensitive to assumptions about the responsiveness of these linkages to each other.

The other major empirical approach is based on gravity models mostly employed for ex post analysis, although they can also be the basis of ex ante predictions. Simulations based on gravity are of a partial equilibrium nature. A review by the WTO (2015) suggest that simulations based on gravity tend to produce larger estimates of gains than CGE. But as far as ex post analyses are concerned, gravity remains the primary tool of investigation and it features heavily in this review since the focus is less on potential gains, and more on lessons about the effectiveness of different trade facilitation measures implemented.

Impact evaluation techniques can also be used for examining the trade cost – trade facilitation nexus. The application of impact evaluation methods to the literature is fairly nascent (Cadot et al. 2011). Hence, evidence based on these tools are limited at this point. Part of this is due to the nature of trade facilitation measures, which is often difficult to couch along the ‘treatment’ and ‘control’ dichotomy. For example, it is operationally cumbersome and inefficient to limit the use of single windows to some traders without extending it to everyone. Second, impact evaluation methods only became part of the mainstream tools of economic investigations in early 2000s. As such, earlier designs of trade facilitation projects of governments and international organizations did not build in the necessary treatment-control set up and data collection components into project designs. Finally, even when impact evaluation tools are possible, external validity will remain a challenge until a critical mass of the literature is accumulated (Cadot et al. 2011). Such studies are most plausible at a country-level basis and opportunities for cross-country analyses are rare. Nonetheless, impact evaluation techniques are likely to increase in importance as complementary tools of analysis for trade facilitation measures, in the same way they have in policy and program evaluations in other areas (Cadot et al. 2011).

The review of empirical literature below follows the organization of the typology set out in table 2.1 and discusses the available evidence for different trade facilitation outcomes. The findings are summarized with a table at the end of each subsection.

Simplification of Border Procedures

Among the trade facilitation typologies, empirical literature is most developed for measures aimed at simplifying border procedures. Simpler border procedures are empirically linked to trade costs reduction and increase in export and import flows. At the same time, they also lead to greater participation of smaller firms in international trade.

Trade-related procedures are in place to ensure that legitimate border protection objectives such as collection of customs duties, compliance of shipments with safety and regulatory requirements, and national security are met. But poorly-targeted and executed rules and procedures can disproportionately inflate trade costs by adding delays and administrative burdens without improving efficiency in meeting these objectives. Worse, they can contribute toward an opaque regulatory environment that encourages illegal rent-seeking. In the context of burdensome regulations, trade facilitation reforms can improve the achievement of risk management objectives while at the same time significantly lowering compliance costs.

One of the concrete ways by which border procedures can be simplified is through the adoption of single windows. A single window is a physical and potentially virtual facility that enables traders to submit all documentary requirements for release of goods as well as receive notifications of decisions regarding their shipments (WTO 2015). A spillover advantage of this mechanism is that its implementation necessarily imposes a minimum degree of coordination among domestic border agencies to reduce duplication (and/or eliminate any contradictions) of requirements. Empirical work remains limited, although preliminary work from de Sa Porto et al. (2015) indicate that trade flows increase substantially when importing countries have single windows. While the potential gains may be considerable, it is also challenging and costly to implement such that the WTO TFA Database (2017) reveals it to be the most commonly notified area under Category C. These refer to trade facilitation measures that require technical assistance of donors for implementation.

In general, available empirical evidence show that measures aimed at simplifying border procedures have positive effects on trade flows through a negative influence on trade costs. Employing the 'trading across borders' components of the Doing Business Indicator as an aggregate indicator of trade facilitation, Iwanow and Kirkpatrick (2009) find that a 1 percent improvement in this index score increases trade flows by

0.20 percent. The elasticity is even higher for African countries. A comprehensive work by Moïsé and Sorescu (2013) using the TFI in a gravity framework identify formalities relating to procedures, and formalities in documents, exhibit among the highest and most robust impacts on trade flows and trade costs for developing countries.

The findings from aggregate score measures above are confirmed using trading time as a proxy for trade facilitation. The time necessary for exporting and importing tends to rise with the number of requirements and complexity of trade procedures. Using survey information from freight forwarding companies in 148 countries, Djankov et al. (2010) estimate that each additional day of delay in shipment reduces export value by over 1 percent—an equivalent of a country crossing an additional distance of 70 km with its trading partner. In the same vein, Shepherd (2013) finds that a 1 percent increase in border clearance time reduces direct export values of firms by 0.07 percent, and increase their reliance for third party exporter by as much as 0.10 percent.

Moreover, delays are disproportionately detrimental to developing country exports of time-sensitive agricultural products, and products that are part of the GVC trade such as garments and electronics (Djankov et al. 2010). This is generally confirmed in Hoekman and Shepherd (2015) using firm-level data covering 138 countries. A study by Martinez-Zarzoso and Márquez-Ramos (2008) also find similar effects at the cross-country level with the largest impacts on high tech products, although the effects for homogenous goods are negligible. Finally, efficient export procedures mitigated the negative effects of the global financial crises of 2008 on trade flows Dennis (2010). Countries with longer export times suffered 0.5 percent more reduction in their exports to the US for each additional day of delay.

By their nature, cross-country studies abstract from heterogeneities of firms and countries. Volpe Martincus et al. (2015) examines the negative effects of customs delays in Uruguay and end up with estimates that are generally larger than those found in cross-country settings. Using transactions level export data and exploiting the random allocation of shipments to different verification channels in customs procedures to address possible endogeneity, the authors find that a one day delay reduces export flows by as much as 11 percent. As in the cross-country findings, the effect is particularly disadvantageous for time-sensitive products. But the authors also uncover negative effects for exports to new buyers, and to trading partners that are more distant. These findings are also reflected in the reduced frequency of shipments and number of buyers.

In Mexico, Carballo et al. (2016) evaluates the effect of introducing an authorized economic operator (AEO) program on trade outcomes. An authorized operator scheme confers 'trusted' status to some traders and their representatives based on a set of

criteria set by the World Customs Organization (WCO). This in turn grants these entities simplified trade procedures and faster clearance times (WTO 2015). Carballo et al. (2016) find that adoption of AEO reduced physical inspection rates which led to shorter clearance times, increased shipment frequency, and increased exports in the intensive and extensive margins. Moreover, the total increase in Mexican exports are exclusively attributable to firms under the AEO, suggesting positive reputational externalities of the program to the entire country (Carballo et al. 2016).⁴

While effects on exports are a more prominent preoccupation for developing countries, border delays also have implications for imports. In terms of consumption, the additional costs imposed by delays lead to lower consumer welfare. Liu and Yue (2013) demonstrate that this happens through reduced volume and value of imports, as well as their poorer quality. The latter is particularly true for perishable agricultural products. Hornok and Koren (2015) show that consumer welfare losses are also incurred in the form of lower frequency of shipments as traders economize on high per shipment fixed cost. The losses can be high when consumers are sensitive to the timeliness of delivery.

In Albania, Fernandes et al. (2015) links the drastic fall of physical inspection rates to shorter import clearance times. Using transactions level data from the Albanian customs agency and exploiting the risk-based selection of shipments for inspection to account for endogeneity, the authors find that reduced annual physical inspection rates cut down the median number of days spent in clearance. This in turn increased the value of imports by 7 percent and diminished the variability of clearance times. The latter has implications on mitigating costs associated with uncertainty. A back of the envelope calculation estimates that the reforms led to savings of \$12 million for 2012 alone (Fernandes et al. 2015). Meanwhile, outcomes from an in-house clearing program for imports in Serbia are more nuanced (Fernandes et al. 2016). In-house clearance is a scheme by which firms with trusted status are allowed clear their shipments in their warehouses instead of the customs office. Fernandes et al. (2016) did not find any effects on clearance times, inspection rates, and import values for 'treated' firms. Instead, the most enduring benefit is on the reduced variability of clearance times.

The impacts of trade facilitation reforms on imports are increasingly relevant in a world where GVC trade is growing. In this context, predictable and timely access to imported intermediate inputs also affects the ability of a country to export. Shepherd (2013) finds that increasing import licensing time by 1 percent reduces imports of intermediate inputs by 0.05 percent. Hummels and Schaur (2013) also demonstrate that firms are

⁴ According to the WCO 2017 AEO Compendium, there are 44 developing countries that have adopted or in the process of adopting AEO programs.

willing to pay for more expensive air transport to import products that are used in parts and components trade.

The discussion about GVC trade raises questions about the distributional implications of reducing trade costs. Would the gains from trade facilitation measures accrue disproportionately to large firms that are part of the GVC trade? Intuitively, smaller firms benefit more when a trade facilitation measure reduces the fixed costs component in trade because these costs form a larger share of their total costs compared with larger firms. The literature about trade facilitation and SMEs remains limited. Hoekman and Shepherd (2015) find that for most countries, SMEs increase exports by 0.18 percent for every 1 percent reduction in export times, whereas no change in behavior is observed for larger firms. A WTO (2015) study which extends a cross-country study by Li and Wilson (2009), finds that reducing the number of days to export imply higher increases of export shares of smaller firms, suggesting greater participation of SMEs in international trade. Nonetheless, a country-level study by Fernandes et al. (2015) did not uncover differential impacts of lower physical inspection rates across firm sizes in the case of Albania.

Evidence also points to the effects of trade facilitation on the extensive margin of trade. This dimension is important in light of its potential feedback to how comparative advantage of developing countries evolve. Dennis and Shepherd (2011) show that reducing costs related to the preparation of documents required for trading has a significant impact on the diversity of products exported by developing countries – a 10 percent reduction is on average associated with a 3 percent increase in the types of products exported. At the same time, a one standard deviation decrease in this cost is associated with a 12 percent increase in the number of export destinations of developing countries. In terms of both product and destination variety (Shepherd 2010), the effects are larger and more robust than the effects of preferential market access from EU (Shepherd 2010; Dennis and Shepherd 2011). Persson (2013) confirms these effects in finding that a 1 percent reduction in the time needed to export a shipment increases the diversity of exported products by 0.6 percent for differentiated goods, and 0.3 percent for homogenous goods. Finally, Fernandes et al. (2015) provides one of the few country-level studies based in Albania, where the reduction in physical inspection rates raised the number of importing firms per product-country pair, as well as the number of trading partners per firm-product pair.

Finally, time spent in border procedures can also affect the behavior of border officials with implications for revenue collection, and the achievement of border protection objectives. Longer times at the border imply more face-to-face interactions between traders and border officials, which give rise to opportunities for illegal rent-seeking (Moisé and Le Bris 2013). At the same time, it is rational for private firms to pay illegal

rent if the amount of the payment is less than the value of their monetary and time savings from enduring highly burdensome procedures.

Results based on firm level and cross-country-data in developing countries confirm that longer export and import times imply more trade-related corruption (Freund et al. 2016; Sequeira and Djankov 2014; Shepherd 2009). Moreover, corruption deters exports, while intensifying imports in countries with highly inefficient customs administration (de Jong and Bogmans 2011). Sequeira and Djankov (2014) also find a negative relationship between corruption and tariff revenues. And yet, customs duties remain a major source of government revenue for some developing countries in Sub-Saharan Africa, comprising over 40 percent of total government tax revenues (WCO 2017). These findings indicate potential for improved revenue collection from trade facilitation measures that simplify border procedures.

Outsourcing parts of border procedures to private third parties is seen as a possible way to curb corruption. Preshipment inspection (PSI) is one such scheme whereby private firms are hired to verify the tariff classification and value of imported shipments prior to their departure from their origin countries (WTO 2015). Nonetheless, customs officials retain discretion of whether to honor PSI reports. In a study covering 104 developing countries, (Yang 2008a) demonstrate that countries that implemented PSI increased revenue collection for the first five years after adoption. Moreover, on average, the additional revenue trumps the cost of hiring the service by 2.6 times. The benefits may be even larger once the border-procedure-simplifying impacts on firm operations are considered. Anson et al. (2006) point out that the latter effect is most conceivable when PSI leads to less harassment and delays in the importing ports. Velea et al. (2010) find evidence of this in a cross-country analysis where engagement of private inspectors increased trade volumes by 2 to 10 percent.

There is not much empirical evidence on how trade times affect the achievement of national security, public safety, and SPS objectives. Moffitt et al. (2010) explain that the economic literature on managing risks and welfare from the introduction of invasive species is fairly nascent. Nonetheless, it is reasonable to presume that a reduction in border-related corruption also improves the ability to secure these goals.

Table 4.1. Simplification of Border Procedures, Summary of Empirical Findings

Outcome	Findings
Trade costs	<ul style="list-style-type: none"> • Formalities in border procedures and documents are among the most important factors for reducing trade costs (Moisé and Sorescu 2013). • Adopting the AEO led to lower rates of physical inspection and clearance times in Mexico (Carballo et al. 2016). • The drastic reduction of annual physical inspection rates in Albania reduced the median import clearing time as well its variability (Fernandes et al. 2015). • In Serbia, an in-house clearing program reduced the variability of clearance times for ‘treated’ firms, but did not have statistically significant effect on clearance times, inspection rates, and total imports (Fernandes et al. 2016).
Intensive margin (exports) [Intensive margin refers to the additional volume of trade.]	<ul style="list-style-type: none"> • Improvement in the ‘trading across borders’ score increases trade flows, and the effects are stronger for African countries (Iwanow and Kirkpatrick 2009). • Formalities relating to procedures, and formalities in documents have among the highest and most robust impacts on trade flows for developing countries (Moisé and Sorescu 2013). • Higher time required to export, or longer border clearance procedures reduces export flows. The delay is particularly disadvantageous for time-sensitive products of agriculture and global value chains trade (Djankov et al. 2010; Hoekman and Shepherd 2015; Martinez-Zarzoso and Márquez-Ramos 2008; Shepherd 2013; Volpe Martincus et al. 2015). • Countries with more efficient export procedures suffered less reduction in their exports to the US during the global financial crisis (Dennis 2010).
Intensive margin (imports)	<ul style="list-style-type: none"> • Longer clearance times lead to reduced imports. Consumer welfare losses are also magnified for goods that have time-sensitive demands due to lower frequency shipments, and in the case of perishable products, their quality (Hornok and Koren 2015; Liu and Yue 2013). • Reduction in clearance times increased imports in Albania (Fernandes et al. 2015). • Using pre-shipment inspection services increased import volumes (Velea et al. 2010).
Extensive margin [Extensive margin refers to new products being exported, or exports to markets that were not previously served.]	<ul style="list-style-type: none"> • Export delays reduce exports to new buyers (Volpe Martincus et al. 2015). • Reducing the costs of preparation of documents increases the diversity of exported products and market destinations of developing countries. Moreover, the size of the effects trumps those from market access concessions (Dennis and Shepherd 2011; Shepherd 2010). • Reducing the time needed to export a shipment increases the diversity of exported products, with larger effects of differentiated products (Persson 2013).

Outcome	Findings
	<ul style="list-style-type: none"> • The AEO program in Mexico increased shipment frequencies and the number of market destinations (Carballo et al. 2016). • In Albania, the reduction in physical inspection rates raised the number of importing firms per product-country pair, as well as the number of trading partners per firm-product pair (Fernandes et al. 2015).
Global value chains	<ul style="list-style-type: none"> • Increasing import licensing time reduces imports of intermediate inputs (Hoekman and Shepherd 2015; Shepherd 2013). • Adopting the AEO lead to increased exports, especially of time-sensitive products that potentially serve as inputs to GVC trade (Carballo et al. 2016).
Small and medium enterprises	<ul style="list-style-type: none"> • SMEs increase their exports in response to shorter export times (Hoekman and Shepherd 2015; WTO 2015). • There are no differential impacts across firm sizes to reduced physical inspection rates of import shipments in Albania (Fernandes et al. 2015).
Revenue	<ul style="list-style-type: none"> • Longer export and import times are associated with higher levels of corruption (Freund et al. 2016; Shepherd 2009). • Corruption deters exports, but can increase imports in countries with highly inefficient customs administration (de Jong and Bogmans 2011). • Countries that implemented PSI increased revenue collection for the first five years after adoption (Yang 2008b).

Cross-Agency Dialogue, Coordination, and Integration

Measures under this typology aim to improve information availability as well as make information easier to follow through a greater degree of harmonization and integration. In general, information availability is empirically linked to greater trade flows. Similar effects are observed with greater of harmonization in the implementation of SPS measures, and technical regulations formally termed as technical barriers to trade (TBT).

Facilitation measures for coordinating and integrating rules and procedures minimize duplications in requirements and the time spent complying with them. At its simplest, such measures take the form of improving transparency by making information available readily and electronically available. The WTO (2017) suggests that this is one of the areas most notified under Category A. Moreover, 70 percent and 50 percent of the existing regional trade agreements already cover ‘exchange of customs-related information,’ and ‘publication and availability of information’ respectively (WTO 2015). The natures of these information transparency measures are such that in general the marginal costs of extending these multilaterally should be minimal. For example, once information about customs procedures, SPS and TBT measures are organized and

shared with regional trade agreement partners, sharing these with other trading partners will not be very costly.

Information availability is a potent factor in reduction trade costs. For example, a nationally representative survey of international freight forwarding firms in Serbia reveal that the largest cause of unexpected delays in the border is due to inadequate documentation, accounting for 29 percent of delays (Alcantara et al. 2015). The findings of Moïse and Sorescu (2013) suggest that information availability is one of the TFI areas that has the strongest impact for exports globally, with particularly strong effects for low and middle-income countries. Looking at firm-level data, Fontagné et al. (2016) show that information availability and advance rulings on the product classification and origin of a good, have among the largest and consistent effect on the exports of small firms in both volume and product variety, but tend not to alter the exporting behavior of larger firms. While the study involves exports of French firms, it is easy to appreciate that the findings can also apply to firms in developing countries since information availability affects the fixed cost component of trade.

But beyond information sharing, there is an observed reluctance to commit to deeper levels of information coordination. For example, the establishment of a dedicated enquiry point – an institutionalized mechanism for stakeholders and trading partners to comment on rules affecting trade and to inquire about them – is one of the least notified measures under Category A (WTO 2015). According to the United States Agency for International Development (USAID 2017), if the experience of SPS and TBT enquiry and notification points are indicative, the enquiry point in and of itself does not require a big budget or large staff numbers. Instead, the frequently cited problems of making these facilities effective involve lack of trained staff, up-to-date references, communication with stakeholders and domestic agencies with border functions, and updating of websites (USAID 2017). These are problems that have strong linkages to measures for strengthening border agencies in the next subsection.

Information availability in itself is important. But information becomes easier to use and implement with higher degrees of consistency and harmonization. In this sense, a deeper form of border agency coordination and integration involves mutual recognition agreements (MRAs) or equivalence in conformity assessments and harmonization of standards. MRAs and equivalence can facilitate trade because they eliminate duplications in certifications and tests across domestic and international agencies (Pelkmans et al. 2016). MRAs can be implemented bilaterally, or on a multilateral basis by adhering to internationally-recognized standards of the *Codex Alimentarius*, the International Organization for Standardization (ISO), International Plant Protection Convention, and the World Organization for Animal Health (OIE).

SPS and TBT measures are usually the subject of MRAs and equivalence agreements. In principle, they are felt most behind the border as they affect production and handling processes. But the imposition of SPS and TBT have implications on border operations because compliance with them entails procedural checks and requirements on reaching the borders of the importing country. Moreover, these measures have the potential of being used as barriers to trade. For example, Otsuki et al. (2001) suggest that the implementation of aflatoxin standards above and beyond the international standards could have reduced African exports to the EU by over \$600 while only reducing risk of death by less than two persons per billion.⁵ Using the ad valorem equivalents of SPS and TBT measures developed by Kee et al. (2006) in a gravity setting, Disdier, et al. (2008) find them to have a negative effect on exports of developing countries, while exports from OECD countries appear unaffected. Essaji's (2008) results from examining developing country exports to the US points to possibilities of lock-in effects from standards—poor countries, lacking investment capabilities, become limited into exporting a narrow set of products for which standards are least costly to comply with.

Various studies find that stricter maximum residue levels of pesticides and antibiotics on agricultural and fishery products reduce exports from developing countries (Disdier and Marette 2010; Ferro, Otsuki, and Wilson 2015). The trade-reducing effects of maximum residue levels outweigh the negative impact of tariffs in the case of Chinese vegetable and fishery exports (Chen et al. 2008). Maskus et al. (2013) also provides firm-level evidence that variable costs of firms in developing countries increase by 0.06 percent to 0.13 percent for every 1 percent increase in investments to comply with standards imposed by importing countries.

The imposition of standards also introduces a risk of shipment rejection at the border of the importing country, thereby affecting the exporting behavior of firms. Making use of the border rejection information in the Rapid Alert System for Food and Feed (RASFF) database of the EU, Fontagné et al. (2016) find that SPS regulations increase the turnover of Chinese firms exporting to the EU, while incumbents increase their market shares. Indeed, the stringency of standards reduces the probability of a firm's decision to export, discourages a firm from entering a new market, and increases the probability of exit of some firms (Fernandes et al. 2017). Melo et al. (2014) find similar effects for a nationally representative sample of fresh fruit exporters in Chile – a perception of stringency discourages exporters from entering a market.

Standards can also affect the variety of products exported. EU standards on textiles, clothing, and footwear reduce product variety exports from low-income countries by—

⁵ The results from the study provide an appealing story. Nonetheless, the study can benefit from the use of updated data and applying the latest developments in gravity estimation.

0.6 percent for every 1 percent increase in the number of standards imposed, whereas the corresponding elasticity for the average high income country is 0.09 percent (Shepherd 2015). Moreover, the trade-reducing effects of standard and regulation imposition fall disproportionately on small firms. Findings of Fontagné et al. (2015) using French firms export data reveal that while the overall effect of SPS measures on the intensive margins are indeed negative, the effect is attenuated when the firms involved are larger. The same story is confirmed with regards to Chinese firms exporting to the EU (Fontagné et al. 2016), and the effects of maximum residue levels from using firm-level data in developing countries (Fernandes et al. 2017).

However, other than the imposition of standards and regulations itself, empirical evidence suggest that the way they are implemented matters. In particular, standards that help overcome information asymmetries can have trade-enhancing effects that outweigh the costs of complying with them. This appears to be the case for standards that are internationally harmonized whether they be government-imposed by or are voluntary standards that are broadly applied internationally.

The negative effects of EU standards on textiles are somewhat reversed when they are harmonized with the international norms (Shepherd 2015). Similarly, voluntary product standards imposed in the EU have strong detrimental effects on exports of developing countries, but only when they are not harmonized with international standards (Czubala et al. 2009; Shepherd and Wilson 2013).

Trade-enhancing effects of internationally harmonized standards are also uncovered in various studies. In Shepherd (2015), increasing the proportion of internationally harmonized EU standards by 1 percent increases export variety by 0.8 percent in a low-income country, although associated with -0.7 percent decrease for high income countries. Positive effects are also found along the intensive margins for electronics and communications equipment sector (Portugal-Perez et al. 2010). In the same vein, voluntary standards on good agricultural practices are shown to have trade-creating effects for Chilean exports (Melo et al. 2014). Liu and Yue (2012) uncover similar trade-creating effects Hazard Analysis and Critical Control Points as well as consumer welfare effects for exports of orange juice to the EU. In the case of China which has struggled to establish itself as a supplier of safe food exports, imposing standards on its own exports increased sales abroad (Mangelsdorf et al. 2012). Moreover, the positive effects are magnified when the measures are internationally harmonized.

However, Ehrich and Mangelsdorf (2018) suggest that the trade-enhancing effects of internationally harmonized private standards on food manufactures are limited to high and middle-income countries, whereas low-income countries are left out.

Finally, for countries that share land borders, coordination and integration can take the form of one stop border posts (OSBPs). OSBPs allow border authorities from two countries to perform their joint functions in one facility (Kieck 2010). This leads to improved efficiency as what would normally require two sets of procedures from the exporting and importing border post can be combined into one, hence resulting in shorter clearance times, better use of resources, and savings in physical structure investments. One of the most often cited success stories is the Chirundu OSBP at the borders of Zambia and Zimbabwe. The Japan International Cooperation Agency (JICA 2014) documents a reduction of cargo clearing time from three days to one into Zambia since the OSBP opened in 2009. The number of trucks that clear the border also increased from 150 to around 400 per day, and UNECA (2013) estimates potential savings of \$486 million per year. More generally, OSBPs are seen as one of the ways by which trade facilitation can be improved for landlocked countries Sub-Saharan Africa (Lanz et al. 2016). In the case of the Mombasa to Burundi transport corridor, single window facilities and joint border posts spanning the route resulted to savings to inventory costs of around \$800 to \$1,000 per shipment (Arvis et al. 2010).

Table 4.2. Cross-Agency Dialogue, Coordination, and Integration, Summary of Empirical Findings

Outcome	Findings
Trade costs	<ul style="list-style-type: none"> • Variable costs of firms in developing countries increase significantly for investments to comply with SPS measures (Maskus et al. 2013).
Intensive margin	<ul style="list-style-type: none"> • Among the TFI indicators, information availability has one of the strongest impact for exports of middle and low-income countries (Moisé and Sorescu 2013). • Stricter SPS standards reduce export of developing countries to developed country markets (Disdier et al. 2008; Disdier and Marette 2010; Ferro et al. 2015; Otsuki et al. 2001). • The negative effects of maximum residue level standards outweigh the negative effects of tariffs for Chinese vegetable and fishery exports (Chen et al. 2008). • Private standards on food may have trade-enhancing effects. But low-income countries are excluded from these gains (Ehrich and Mangelsdorf 2018). • Product standards that are not internationally harmonized have negative effects on trade, while harmonized ones can have trade-creating effects as they help overcome information asymmetry about product quality (Czubala et al. 2009; Liu and Yue 2012; Melo et al. 2014; Portugal-Perez et al. 2010; Shepherd and Wilson 2013). • China's imposition of standards on its own exports helped overcome information asymmetry about product quality and increased its sales abroad. Moreover, the positive effects of the standards are larger when the measures are harmonized with international standards (Mangelsdorf et al. 2012).
Extensive margin	<ul style="list-style-type: none"> • Information availability and advance rulings have positive effects on the product variety exported by small firms (Fontagné et al. 2016). • SPS regulations increase the turnover of Chinese firms exporting to the EU, while incumbents increase their market shares (Fontagné et al. 2016). • The stringency of standards reduces the probability of a firm's decision to export, discourages a firm from entering a new market, and increases the probability of exit of some firms (Fernandes et al. 2017). • Perception of stringency discourages Chilean fruit exporters from entering an export market (Melo et al. 2014). • EU standards on textiles, clothing, and footwear reduce product variety exports from low-income countries. But increasing the proportion of EU standards harmonized with international standards have the opposite effect (Shepherd 2015).
Small and medium enterprises	<ul style="list-style-type: none"> • The effect of SPS measures on the intensive margins are more negative for smaller firms (Fernandes et al. 2017; Fontagné et al. 2015; Fontagné et al. 2016). • Information availability and advance rulings elicit positive trade flow responses from small firms (Fontagné et al. 2016).

Strengthening Border Agencies

Metrics that monitor facilitation reforms in this area remain severely underdeveloped as can be seen from table 3.1. Following this, empirical work on the trade effects of border agencies are also very limited. Nonetheless, it is easy to appreciate that it is an indispensable component of nearly all facilitation reforms. For example, automation of border procedures will not work if border officials are not trained to operate and maintain automation equipment.

Measures under this typology aim to improve border agencies at the institutional and organization level, and at the human resource level. While evidence is limited, one study suggests that that good governance, as defined in the TFA, can reduce import times by 37 percent (Hillberry and Zhang 2015).

Reforms for strengthening border agencies also include incentive designs that retain skilled personnel and encourage cooperation of officials in trade facilitation efforts. Overcoming political economy realities can prove difficult, as Grainger (2011a) cautions that the savings of one party can mean the redundancy of another. The performance contract scheme adopted in Cameroon, summarized in box 4.1, is one example of such incentive scheme.

Box 4.1. Customs Reforms in Cameroon

The experience of Cameroon in introducing a set of incentive schemes to its customs officials offers lessons on the importance of accountability systems in meeting border objectives. Cameroon implemented a system of performance contracts in 2010 in the port of Douala between the Director General and the customs inspectors. Performance contracts allow for objective measures of the adherence to good practices of front-line inspectors using a set of observable outcomes.

Following the implementation of the performance contracts. An immediate reduction of customs assessment time by at least 20 percent compared with the corresponding months in 2009 was observed. Revenue collection also increased in the 'treatment' port that accounts for 60 percent of Cameroon's customs revenue despite a fall in the volume of transactions. The reform also appears to have reduced bad practices associated with collection of illegal rents.

The documented outcomes in Cameroon are very encouraging. Unfortunately, the observed impacts cannot be conclusively attributed to the performance contracts in the sense of strict empirical causality. The small sample size is a limitation and the designation of 'treatment' ports is not random. Nonetheless, the observed improvements are very substantial, and it can reasonably be supposed that the new incentive system contributed to the observed outcomes.

Source: Cantens et al. 2010.

Michael (2012) argues that it is important to distinguish between reforms that can be adopted piecemeal, and reforms that require deep institutional changes. Analyzing

statistical relationships of bribe payments in 65 developing countries, Michael (2012) concludes that only roughly 20 percent of the countries can reduce corruption through piecemeal packaged reforms. Adoption of programs such as PSI, AEO, in and of themselves, are not statistically correlated with bribe payments. Instead, most countries need extensive organizational or leadership overhauls to overcome their tendency toward high-corruption equilibrium.⁶

Like the empirical literature, case studies of border agency-strengthening facilitation measures are also limited. There are numerous cases of restructuring of customs institutions and organizations in De Wulf and Sokol (2004); OECD (2009); and WTO repository of trade facilitation case studies (2012). However, many of the customs organization overhauls follow in the wake of violent conflicts or economic crises. Changes in legislative framework, institutional organization, manpower, automation, tariff simplification, take place simultaneously. Reorganization occurred against such backdrops in Angola, Bolivia, Bulgaria, Jamaica, Morocco, Mozambique, Peru, and Uganda (Wulf and Sokol 2004; OECD 2009). In these cases, the attribution to particular channels of trade facilitation tools are confounded with the forces of recovery, as well as with each other.

Routine skill-enhancing trainings are carried out within customs organizations, either by national governments or by aid agencies. Unfortunately, information from these are rarely collected systematically for a rigorous analysis of how effective these investments are. Looking ahead, the human resource aspect of trade facilitation is one of the areas where application of impact evaluation methods are most plausible (Cadot et al. 2011). The evaluation architecture will admittedly remain challenging for small countries with naturally small samples. But with careful design and systematic collection of information, international organizations can take advantage of their international operations to overcome this constraint.

⁶ The article does not describe its methodology clearly. It refers to a statistical appendix for description which could not be accessed readily. As such, it is best to read the results in terms of correlation rather than any causal relationship.

Table 4.3. Strengthening Border Agencies, Summary of Case Study and Empirical Findings

Outcome	Findings
Revenue	The implementation of performance contracts increased revenue collection in the largest port office in Douala, although the same was not observed in the other port where the performance contract was introduced (Cantens et al. 2010).
Time at the border	<ul style="list-style-type: none"> • The performance contracts in Cameroon led to a reduction in customs assessment time (Cantens et al. 2010). • Good governance significantly reduces time to import (Hillberry and Zhang 2015).
Illegal practices	<ul style="list-style-type: none"> • Most developing countries will not reap the benefits of piecemeal trade facilitation reforms without a structural change in institutional incentives (Michael 2012). • The performance contracts in Cameroon reduced practice of offsetting adjustments in the yellow channel (Cantens et al. 2010).

Modernization of Border Operations

Modernization of border operations aim to lower trade costs by adopting procedures hinged on automation, incorporation of information and communication technology systems, and use of modern equipment such as scanners. This has implications on the ease with which border agencies can coordinate, and the transparency of trade regulations and procedures that are discussed in Section 4.2. Empirical work on the area is still lacking, and most of the discussions of the review draws from qualitative work.

The limited empirical findings suggest that reforms in this area lead to reduction of trade costs, and thereby encourage trade flows. The most immediate impact is on trading times. Hillberry and Zhang (2015) predict that automation can reduce the time to import by 30 percent. Among TFIs, formalities relating to automation are also found to be among one of the most important predictors of trade costs and trade flows for low and middle-income countries (Moïsé and Sorescu 2013). In terms of regions, the largest effects are foreseen in Asia and Sub-Saharan Africa.

A channel by which ICT can reduce trade costs is by making information that are electronically encoded simultaneously accessible to multiple parties. This induces a virtuous effect in facilitation measures that encourage cross-agency dialogue, coordination, and integration. Moreover, ICT has implications on the ability to track a shipment’s progress along the trading chain possibly in real time. In this sense, it helps firms plan and manage inventory arrangements. In some cases, the negative effects of long border procedures can be even mitigated if ICT improves information availability.

As the WTO (2015) pointed out, long lead times are not necessarily a problem if it is predictable. This is most important for firms engaged in GVC trade.

Countries can develop their own customs ICT systems such as TradeNet in Singapore. This has the benefit of being tailored to a country's specific needs and priorities (UNCTAD 2017). But these can also be expensive to implement. Instead, there are several off-the-shelf customs software management systems that are available. The most widely used is Automatic System for Customs Data (ASYCUDA), installed in over 90 countries as of 2017 (UNCTAD). The system was developed by United Nations Conference on Trade and Development (UNCTAD) to lodge information on manifests and customs declarations, accounting procedures, transit, and suspense procedures. Because of the broad coverage of countries, the adoption ASYCUDA and other systems can also possibly function as a resource network of best practices that can be shared.

Modernization of border operations often represents a hugely expensive undertaking. Data from implementation costs collected by the WTO (2015) reveal the median expenditure of an automation project to be close to USD 9 million in real terms and are often incurred upfront. Moreover, the cost estimates of past projects exhibit wider variation than expenditures in other areas of reform (WTO 2015). The cost of installing an electronic data interchange system is \$1.6 million in Afghanistan, \$5.5 million in Jamaica, but as much as \$32 million in Turkey (World Bank 2009). The costs of modernization are also often inflated by the need to fulfill a priori requirements that dictate the absorption capacity of a country's customs institutions and its private sector. For example, aside from having the skills and manpower to sustain the automated operations, reorganization of customs processes and reallocation of manpower are necessary. In some cases, legislation reforms granting legal status to electronic documents may also be needed (OECD 2009).

Despite being expensive and complicated, case studies often suggest that benefits from automation outweigh the costs (WTO 2015). Moreover, the burden of costs can be attenuated by charging user fees. The benefits most broadly documented include time savings in border procedures and improved customs revenue collection. In Rwanda, the introduction of the electronic single window reduced release times by 50 percent from over two days to one over a span of two years (Nizeyimana and De Wulf 2016). A similar experience is associated with the adoption of Orbus – an electronic single window system – in Senegal in 2004 (Diagne 2010). According to Diagne (2010), Orbus coincided with a significant cut in the time associated with formalities and clearance from more than four days to as little as half a day, and also increased total revenue collection. In Korea, the completion of a comprehensive electronic single window project is estimated to translate to savings of \$2 billion per annum. Most of the cost savings accrue to expenditures of firms on freight storage and inventory (World Bank 2009).

The benefits that can be reaped from modernization naturally depends on the existing bottlenecks in a country and its scale of operations. Nonetheless, some crude comparisons suggest the areas and range of benefits. In Chile, New Zealand, the Philippines, and Thailand, automated lanes are on average three times faster compared with their nonautomated counterparts for different aspects of customs clearance procedures (OECD 2009). In Chile, using an electronic data interchange system reduced input errors from 14 percent to 2 percent (WTO 2003).

Cameroon's experience also demonstrates the benefits of automation. According to Cantens et al. (2010), Cameroon adopted ASYCUDA in 2007 amidst opposition from some customs employees. Nonetheless, positive effects of customs revenues were registered shortly after the system took off. The increase was at least 15 percent higher on a year-on-year basis (Cantens et al. 2010). Processing times also declined. Draper (2000) documents similar effects when Bangladesh adopted ASYCUDA, although this was coupled with introduction of preshipment inspection (PSI), and a simplification of tariff schedules. In the Philippines, the adoption of ASYCUDA++ in 1995 led to similar observed outcomes in revenues and clearing times (OECD 2009). TradeNet, an ICT system based on Singapore's electronic trade document system, is seen as one of the main factors for the increase in government revenues from airport traffic in Ghana, and the reduction of clearing times from an average of three days to four hours (De Wulf and Sokol 2004).

In all these case studies, the introduction of automation was far from a smooth process as resistance and adjustments often needed to be overcome. In Rwanda, the introduction of the electronic single window was preceded by extensive consultations with public and private stakeholders. The involvement of the latter was critical in ensuring that commercial instruments, such as electronic payment arrangements with commercial banks are in place in time for the roll out of the single window (Nizeyimana and De Wulf 2016). In Cameroon's experience, the gains from the automation failed to be sustained when traders and officials learned the systems loopholes, and when tensions between different departments within the customs related to the automation surfaced (Cantens et al. 2010). Hence, the automation was followed up with the performance contract system, which was discussed in box 4.1.

Finally, in some cases, modernization of border operations is a prerequisite for further reforms in other areas of trade facilitation. In Albania, the implementation of ASYCUDA++ in 2006, and ASYCUDAWorld subsequently in 2009 enabled the operation of a risk management system that assign risk scores for imported shipments based on an algorithm that takes into account import declaration, product, firms involved in the

transaction, country of origin (Fernandes et al. 2015). This in turn enabled customs authorities to limit physical inspection activities to higher risk shipments, thereby drastically bringing down physical inspection rates, which Fernandes et al. (2015) linked to reduced clearance times, and higher imports.

Table 4.4. Modernization of Border Operations, Summary of Case Studies and Empirical Findings

Outcome	Findings
Trade costs	<ul style="list-style-type: none"> • Among the TFI, formalities related to automation exhibit one the largest effects on trade costs for developing countries (Moisé and Sorescu 2013). • The completion of a comprehensive electronic single window project in Korea is associated with firm savings on freight storage and inventory (World Bank 2009). • Automation reduces the length of time spent at the border (Hillberry and Zhang 2015). This is confirmed in country case studies (De Wulf and Sokol 2004; Diagne 2010; Nizeyimana and De Wulf 2016; OECD 2009). • Automation enabled the adoption of risk-based management system in Albania (Fernandes et al. 2015).
Intensive margin	Among the TFIs, formalities relating to automation is among the most important predictors of trade flows for low and middle-income countries (Moisé and Sorescu 2013)
Revenue	Adopting ICT systems for border operations such as ASYCUDA and TradeNet was accompanied by increases in collected customs revenue (Cantens et al. 2010; Draper 2000; and OECD 2009).
Monitoring	Automation in Chile reduced data encoding errors (WTO 2003).

Border-Related Infrastructure and Logistics

Investments in border-related infrastructure are empirically shown to contribute to lower trade costs, which manifest in larger trade flows both in terms of volume and product variety. Nonetheless, studies that inform on the particular infrastructure aspects that is most important for improving port efficiency are still very limited.

It is easy to appreciate that actual port infrastructure has direct effects on the ability of ports to deal with trade flows and also dwell time in ports. The lack of facilities to handle containers, and port congestion often lead to higher dwell times (Arvis et al. 2010). Dwell time in ports account for over 50 percent of the time required to transport cargoes from ports to hinterland urban centers in landlocked countries of Sub-Saharan Africa (Arvis et al. 2010). Average cargo dwell time is over two weeks in Sub-Saharan Africa compared with less than one week in major ports in Asia, Europe, and Latin America (Raballand et al. 2012). Raballand et al. (2012) explain that this in turn increases congestion in port terminals that adversely impact port efficiency.

One of the key port infrastructure that is seen to be behind global expansion of trade is containerization and the ability of ports to operate them. Using the temporal variation of container adoption across countries and product-level variation in 'containerizability' and container usage, Bernhofen et al. (2016) confirm containerization to be a major driving force of globalization. In particular, the improved cargo transport interface between land and sea was identified as the main channel of cost reduction. Bernhofen et al. (2016) calculate a huge increase of dock labor productivity from 1.7 tons per hour to 30 tons per hour with container adoption. This reduced cargo handling time drastically and encouraged investment in scales through larger ship sizes. There are also dynamic effects on insurance costs and firm liquidity with reduction of capital locked up as inventory in transit. The authors also find that concurrent effects of containerization are larger for the sample that includes developing countries, although the lagged effects are larger when only trade between high income countries are considered.

Modeling shipping charges through a firm's cost and mark-up function, Clark et al. (2004) find that port efficiency is a key determinant of maritime shipping costs. Their definition of port efficiency is based on a survey of the WEF on port facilities and inland waterways. Improving port efficiency from the fourth to the first quartile in the sample of US trading partners predicts a 12 percent decrease in shipping costs. The key determinants of port efficiency are found to be excessive regulation, prevalence of organized crime, and state of a country's general infrastructure (Clark et al. 2004). At the same time, the authors also reveal a systemic inverse relationship between handling costs and port efficiency. Blonigen and Wilson (2007) extend this study into panel setting, and moreover derive port efficiency measures using US bilateral trade data at the port level. They find that a 1 percent increase in containerization reduces US port charges for imports by 0.05 percent, with larger cost reducing effects for higher value products.

Wilmsmeier et al. (2006) also confirm the importance of port infrastructure and efficiency as a determinant of intra Latin American maritime trade costs. The authors find port infrastructure and port efficiency have the greatest downward influences on maritime charges with elasticities of 0.24 percent and 0.38 percent respectively. Port connectivity is also an important factor, reducing costs by 0.11 percent for every 1 percent increase in the frequency of liner services between two ports. The extent of private participation in port operations have opposing effects for import and export freight costs – it increases import freight but reduces charges on exports. The elasticities are however small.

Both Blonigen and Wilson (2007) and Clark et al. (2004) employed gravity analyses of their port efficiency measures to trade flows and confirm them to be important determinants of trade flows. Shepherd and Wilson (2009) also examine the effects of port

facilities for trade within the Association of Southeast Asian (ASEAN) countries. Against the backdrop of limited data for some members, their findings suggest that improving air and sea port facilities can increase regional trade by up to 7.5 percent.

Following the strategy of Blonigen and Wilson (2007), Feenstra and Ma (2014) extend the study to consider the effects of port efficiency indicators on extensive margins. They find that the effect on product varieties is positive, although the results for the intensive margins are less conclusive. This can possibly be explained if port efficiency mainly captures fixed costs, which as Chaney (2008) predicts to only affect extensive margins.

Nonetheless, the findings on trade flows from Blonigen and Wilson (2007); Clark et al. (2004); and Feenstra and Ma (2014) can benefit from application of the latest estimation techniques in gravity estimation to address issues heteroscedasticity in multiplicative models, and selection through zero trade flows.

Table 4.5. Border-Related Infrastructure and Logistics, Summary of Empirical Findings

Outcome	Findings
Trade costs	<ul style="list-style-type: none"> • Excessive regulation, prevalence of organized crime, and state of a country’s general infrastructure are the key determinants of port efficiency (Clark et al. 2004). • Containerization leads to higher port efficiency, and the cost reducing effect is larger for higher value products (Blonigen and Wilson 2007). • Efficient ports and good port infrastructure reduce maritime costs in intra Latin American trade (Wilmsmeier et al. 2006).
Intensive margin	<ul style="list-style-type: none"> • Containerization was a key factor of global growth in international trade (Bernhofen et al. 2016). • Efficient ports increase trade flows (Blonigen and Wilson 2007; Clark et al. 2004; Shepherd and Wilson 2009).
Extensive margin	Efficient ports are associated with increase in product variety exported (Feenstra and Ma 2014).

Most empirical studies on the role of infrastructure on trade facilitation adopt a broad definition of infrastructure that encompass its overall state throughout the country. On the one hand, it is reasonable to expect high correlation between a country’s overall infrastructure and its port infrastructure. But it also means that that the effects captured by aggregate TFI may embody interaction effects with behind the border infrastructure. In this sense, this set of literature is discussed in the section on synergies and sequencing of facilitation measures.

Other Related Areas: Synergies and Sequencing

In some countries, trade facilitation measures were ushered in through comprehensive overhauls that covered legislation, restructuring of customs administration and personnel, automation, and tariff reforms, that usually followed in the wake of widespread turmoil in a country. The civil war in Angola, an economic crisis in Peru, and Bulgaria's accession to the EU are examples of such cases (OECD 2009). But for most countries, reforms tend to occur gradually and in particular areas in an attempt to minimize disruptions in operations. In such cases, the process of prioritization and sequencing is an integral part of implementing reforms effectively and efficiently.

The series of steps involved in completing a trade transaction mean that the process can be seen as being only as efficient as its weakest links. This implies two points to consider when implementing trade facilitation reforms. First, it is important to understand which parts of the trading process represent the most important choke points. Second, introducing reforms in one area will have an impact on other areas, and hence an intervention cannot be viewed in isolation.

A clear understanding of the existing bottlenecks in the trade process, and how each area feeds in to other links of the chain or network is important for designing effective trade facilitation reforms, not only in terms of the types of reforms but also their prioritization. Te Velde and Razzaque (2013) also emphasize the importance of having an appreciation of the nature and origins of coordination failures. A comprehensive diagnostic exercise can help inform policy makers and donor agencies of the most efficient ways to address the most pressing problems and priorities with regards to trade.

But diagnostics and needs assessment themselves entail costs involving consultations with stakeholders and national and external experts (WTO 2015). Some multilateral institutions have developed assessment tools with the aim of alleviating these costs. For example, the World Bank Trade and Transport Facilitation Assessment (TTFA) (2010) aims to help governments and aid agencies in designing and strategizing sequence of actions to improve trade facilitation through infrastructure, services, and procedures and processes. Diagnostic trade integration studies are also another potential framework for identifying needs, linkages, and deciding priorities.

Focusing more narrowly on the implementation of the TFA, the WTO (2015) also conducts needs assessment exercises for its developing country members. The results remain confidential and hence cannot be used as basis for a broad cross-country analysis of needs. Nonetheless, measures most notified under Category C are expected to coincide with those that are more complicated and costlier to implement for developing countries. The five most notified measures in Category C are single window, test

procedures, authorized operators, average release times, and risk management (WTO 2017)⁷. Country diagnostics may lead to the conclusion that these are the very areas that represent the major bottlenecks. In the broader scope of the World Bank TTFA, bottlenecks can even be more expensive and take longer to address if they turn out to be hard port and transport infrastructure or require legal and operational restructuring of organizations. In such cases, addressing second-order constraints need not be preconditioned on having addressed the first order ones (Moisé and Le Bris 2013).

For example, after analyzing the few qualitative studies of various trade facilitation measures, the WTO (2015) identified a number of reforms that could be implemented at lower costs and within shorter time periods. Among others, measures related to disciplines on fees and charges, such as the removal of consular fees; measures guaranteeing freedom of transit routes, and the abolition of the mandatory use of escorts for goods in transit, represent low hanging fruits that do not necessarily require large resources nor expertise. Many of these measures are among the most-notified Category A commitments under the TFA (WTO 2017).

A detailed understanding of operational bottlenecks can also suggest areas of reforms that are not very costly to implement. For example, small reforms such as ensuring office hours of border agency staff correspond to those of commercial operators (Grainger 2011a) can already alleviate incidences of undue delays at the border. Incentive designs such as the performance contract in Cameroon (Cantens et al. 2010), and the introduction of mechanisms for encouraging large-volume traders to internalize regulatory objectives are also implementable with minor operational disruptions and costs (Grainger 2011b).

The review by typology in the earlier sections abstracted from discussing the interactions with behind the border measures and, the general state of infrastructure and institutions in a country. These exert important influences on the types of trade facilitation challenges faced by developing countries and the most pragmatic approaches of managing them.

Sourdin and Korinek (2011) suggest that aspects of trade facilitation such as customs procedures, tracking and tracing shipments, overall infrastructure and logistics competence—exert greater influence on trade flows than distance or freight charges. While the study can benefit from data set expansion, and the application of latest developments in gravity model estimation, it is in line with the findings of Hoekman

⁷ In the context of the WTO TFA, test procedures fall under Article 5 – Measures to enhance impartiality, nondiscrimination and transparency. These procedures refer to examinations and other series of steps conducted to ascertain that shipments conform to a set of requirements.

and Nicita (2010, 2011) that trade facilitation reforms potentially yield higher trade impacts than the market access package of the Doha Round. Moreover, Hoekman and Nicita (2011) find that the improvement of LPI scores of low-income countries to middle-income country average have the greatest contribution to trade flows, increasing imports by 8.5 percent, and exports by 15.1 percent on average.

Francois and Manchin (2013) develop indicators of overall infrastructure and institution in countries through principal components analysis. They conclude these indicators to be robust in explaining trade flows, with elasticities that consistently exceed those of market access concessions. In terms of infrastructure, the indicator with information and communication technology (ICT) as the main component exhibit a slightly higher effect than the indicator with physical infrastructure as the main component. For institutions, the index reflecting lower state intervention in the economy as main component is significant in explaining increased flows, but the same is not true for the indicator with market oriented legal institutions. While the effects are positive for both exports and imports, the elasticities are consistently higher for exporters.

Portugal-Perez and Wilson (2012) classified trade facilitation measures between hard and soft. The former encompasses general physical and ICT infrastructure, and the latter pertains to the general business environment, and to border and transport efficiency. They find that hard and soft trade facilitation aspects reinforce each other in improving export flows. This supports the conclusions of Cadot et al. (2014) from a literature survey on aid for trade which highlights the importance of investment in infrastructure that is underpinned by credible competition policies for transport services. Portugal-Perez and Wilson (2012) also suggest that the importance of types of trade facilitation measure vary by levels of income. On average, the marginal effect of the soft dimensions of trade facilitation tend to decrease with higher per capita incomes, while the reverse is true for the hard dimension. This is in line with the findings of Iwanow and Kirkpatrick (2009) that in Sub-Saharan Africa, institutional quality matter more, whereas infrastructure are not necessarily more productive than in the rest of the world. One emerging implication is that issues affecting absorption capacities will generally yield higher returns at lower income levels.

Geographical characteristics also influence the types of trade facilitation challenges faced by a country. For example, having to rely on neighboring countries for access to sea ports presents considerable challenge for landlocked countries. According to Borchert et al. (2017), landlocked countries in Africa contend with an additional 40 percent in trade costs that are not observed for those with coastal access. The work of Sourdin and Korinek (2011) suggests that improving air transport and border services is a possible alternative to overcoming trade challenges in landlocked countries. And yet, Borchert et al. (2017) also find that landlocked countries tend to have the most restrictive policies on

air transport and telecommunications, which are in turn correlated with poorer political accountability.

Transport prices for landlocked countries in Sub-Saharan Africa comprise 15 to 20 percent of import costs, which is at least three times higher than developed countries (Raballand and Macchi 2008). Using data provided by freight forwarding companies in 146 countries, the analysis of Djankov et al. (2010) reveal that the trade-reducing effects of time delays are magnified for landlocked countries. In Sub-Saharan Africa, a day less spent on inland transport translates to a 7 percent increase in exports. But delays incurred at the border can also be very high. While truckers in East Africa may spend a few extra hours inland due to poor road conditions, they can spend more than day at the border crossing between Kenya and Uganda, or South Africa and Zimbabwe (Arvis et al. 2010; Raballand and Macchi 2008). Indeed, transit times are primarily determined by border delays, business environment, and road infrastructure (Freund and Rocha 2011).

For many landlocked countries, the length of time spent in land and border-crossings also increases the uncertainty that commercial operators face. This could include ad-hoc administrative hurdles such as roadblocks, breakdown of transport equipment, unpredictable road and rail conditions, and informal payment demands (Christ and Ferrantino 2011). For example, while trade delays from Mombasa to Kigali can add up to 25 days, the standard deviation is estimated at 10.5 days (Arvis et al. 2010). The long dwell times and their dispersion in Sub-Saharan Africa point to discretionary behaviors of customs officials that exacerbate uncertainties (Raballand et al. 2012).

Using various transport information from seven landlocked Sub-Saharan African countries, Christ and Ferrantino (2011) model an objective function for traders that maximize their payoffs by taking into account interactions between uncertainties in inland travel time, and costs incurred for arriving too early or too late for ship boarding. Their simulations imply that the interactions between infrastructure quality and uncertainty to a large extent depend on the situation in the rest of the system. There are low level traps where the returns to improvement in infrastructure or institutions are low, while a threshold of increasing returns can also be reached with a combination of right conditions (Christ and Ferrantino 2011). While their work abstracts from precise mechanisms of the dynamics, the authors suggest that it can form a framework for prioritizing trade facilitation interventions.

On the other hand, small island economies, such as those in the Caribbean and the Pacific, face a different type of challenge. Aside from inefficiencies in logistics and port management, severe traffic imbalance makes trade extremely costly (Cubas et al. 2016). While comprehensive analysis of key bottlenecks and synergies are difficult in the absence of established statistical collection capabilities, the importance of building scale

through hard infrastructure may be necessary to overcome disadvantages of small market size. An example is the Interchangeable Cable Network established in 2014, which provided Vanuatu reliable communication infrastructure via its larger neighbor Fiji (Lanz et al. 2016).

Turning to details of implementation, the experiences of Colombia and the Philippines offer lessons in the importance of comprehensive analysis in designing reforms. In both cases, the reforms involved the introduction of PSI. In Colombia, PSI was introduced for a subset of products in 1995, and later discarded altogether when the public administration system underwent broader changes in 1999. During the period that the PSI was in place, there was an increased incidence of traders misclassifying their products from one that is subject to PSI, to one that is free from this requirement (Datt and Yang 2011). In the Philippines, the reform occurred from 1989 to 1992, when more partner countries became covered by the PSI. At the same time, the threshold for PSI exemption was lowered to cover progressively smaller shipment values over time. Yang (2008b) exploits these series of changes as quasi-experiments and find that the expansion of PSI coverage saw increased diversion of shipments to export processing zones (EPZs). This diversionary practice is highest for products that had the highest tariffs or larger import volumes. An analysis by Anson et al. (2006) also points to the importance of understanding how PSI can alter incentives along the chain of trade procedures, showing that the introduction of PSI in Argentina and Indonesia led to increased incidence of undervaluation.

Finally, the work of Yang (2008b) brings up a gap in empirical literature relating trade facilitation measures to EPZs. In many developing countries, EPZ is a way of sidestepping infrastructure and regulatory inadequacies that will take larger resources and longer time periods to address. Export enclaves typically enjoy better infrastructure, and more benign regulatory and border procedures. These enclaves are substantial sources of exports for many low and middle-income countries, and they are also the source of much activity and trade for many Asian countries that participate in GVC trade (Taglioni and Winkler 2016). While documented positive spillovers of EPZs to the rest of the host countries are rare (Milberg and Winkler 2013), the interaction of EPZs and benefits from trade facilitation measure possibly impinges on prioritization and sequencing of reforms.

Table 4.6. Synergies and Sequencing, Summary of Empirical Findings

Outcome	Findings
Trade costs	<ul style="list-style-type: none"> Landlocked countries have higher trade costs than countries with coastal access. (Borchert et al. 2017; Djankov et al. 2010; Freund and Rocha 2011; Limao and Venables 2001 Raballand and Macchi 2008). Uncertainty is key element that drives up trade costs in landlocked Sub-Saharan Africa (Christ and Ferrantino 2011).
Intensive margin	<ul style="list-style-type: none"> Increasing overall LPI score of low-income countries to middle-income country levels lead to large increases in trade flows (Hoekman and Nicita 2011). Overall state of infrastructure and institutions are important in explaining trade flows. Their contributions exceed those that can be gained from market access concessions. Moreover, the effects of both infrastructure and institutions are larger for exporting than importing (Francois and Manchin 2013). Hard and soft infrastructure complement each other in promoting exports (Portugal-Perez and Wilson 2012). Soft aspects of trade facilitation are more important at low levels of income (Iwanow and Kirkpatrick 2009; Portugal-Perez and Wilson 2012).
Corruption	<ul style="list-style-type: none"> Increased occurrences of crime displacement were observed in Colombia and the Philippines on the implementation of PSI (Datt and Yang 2011). PSI led to increase in undervaluation practices in Argentina and Indonesia (Anson et al. 2006).

5. Aid for Trade and Aid Effectiveness

The literature on effectiveness of Aid for Trade (AfT) remains very limited and faces considerable conceptual and empirical challenges. First, as the WTO (2017) explains, there is an inherent difficulty in defining AfT because trade is such a broad and complex activity. This definitional difficulty translates to challenges in developing appropriate metrics. The most accessible AfT data set maintained by the OECD Credit Reporting System (OECD-CRS), has a broad definition of AfT such that some of its components like ‘economic infrastructure’ can encompass nontrade facilitating functions. Te Velde and Razzaque (2013) explain that instead of new funding, AfT is essentially a grouping of existing aid and technical assistance that are aimed at addressing supply-side constraints in recipient countries. Second, and related to the first point, because the variables of interest are measured broadly, effectively addressing endogeneity remains a challenge (Cadot et al. 2014).

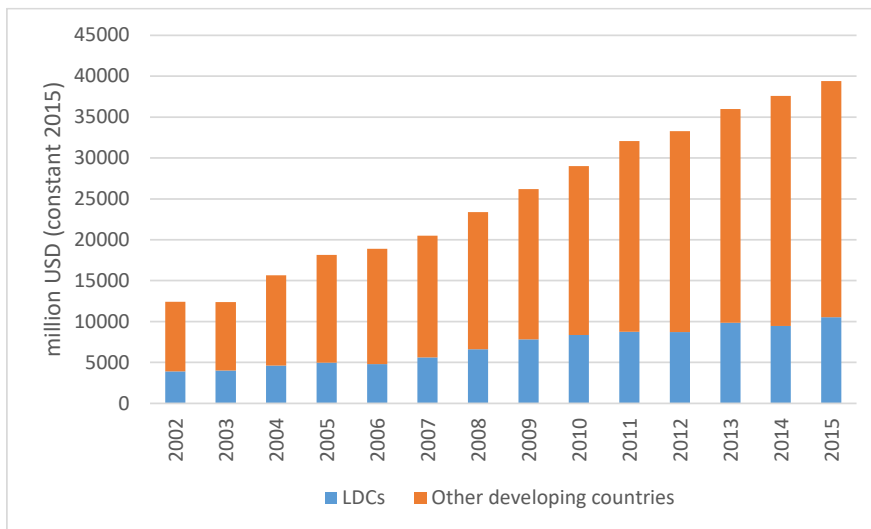
At the same time, the relationship between AfT and trade outcomes must be viewed in light of the more general challenges surrounding the empirics of aid and development outcomes. While aid addresses development needs that would otherwise have been unfulfilled or met less satisfactorily, the entry of foreign funding into the local economy can induce currency appreciation which makes an economy uncompetitive in international trade (Rajan and Subramanian 2011). This Dutch disease effect tends to happen when absorption and adjustment capacities of countries, in terms of physical and human capital, and market institutions, are very limited (Helble et al. 2012). Considering these interactions, it is no surprise that a review by Rajan and Subramanian (2005, 2011) concludes that the empirical evidence between growth and aid is far from conclusive.

Another key difficulty in empirically assessing the effectiveness of aid tied to particular policy measures or projects is the fungibility of aid money. Local or national governments typically exercise some degree of flexibility in allocating aid resources such that it is difficult to ascertain which project or purpose the aid money actually financed. Nonetheless, van de Walle and Mu (2007) empirically confirm a ‘flypaper effect,’ whereby projects for which aid money are allocated are actually implemented.

The AfT initiative was launched in 2005 with the aim of having greater participation of developing countries in international trade. As a share of official development assistance, AfT generally increased steadily from 22.6 percent in 2002 to 37.4 percent in 2015 (OECD-CRS 2017).⁸ Actual disbursements have also increased in real terms over time and this is illustrated in figure 5.1. The larger share of the disbursements go to middle-income countries, which once again highlights the issue of absorption capacities in benefiting from trade facilitation assistance. Nonetheless, 80 percent of the LDC respondents to the Fifth Global Review of Aid for Trade are of the view that international development partners have better alignment with trade costs priorities since the AfT launch (Lanz et al. 2016).

⁸ Author’s note: AfT, as currently defined in the OECD-CRS encompasses a broad array of activities not necessarily limited to trade facilitation. See note in figure 5.1.

Figure 5.1. Disbursements on Aid for Trade Facilitation (\$, millions [constant 2015])



Source: OECD International Development Statistics Online, accessed 8 December 2017

Note: AfT here comprise the following as explained in <http://www.oecd.org/dac/aft/aid-for-tradestatisticalqueries.htm>:

1. Technical assistance for trade policy and regulations

(i) trade policy and administrative management;

(ii) trade facilitation;

(iii) regional trade agreements;

(iv) multilateral trade negotiations; and,

(v) trade education/training.

2. Economic infrastructure - aid for communications, energy, transport and storage.

3. Productive capacity building

4. [Trade-related adjustment](#) - contributions to developing country budgets to assist the implementation of trade reforms and adjustments to trade policy measures by other countries, and alleviate shortfalls in balance-of-payments.

But will increases to aid allocated for trade facilitation actually translate to achieving objectives such as improved trade flows? In other words, is AfT effective? The question is particularly pertinent in light of budgetary constraints and increased demand for accountability among donor countries and institutions after the global financial crisis (WTO 2015). Moreover, even excepting humanitarian aid, developing countries face many challenges that compete for limited funding. In this sense, is AfT really worth prioritizing? And, will AfT be effective independent of improvements in areas of other development such as human capital, and governance institutions?

Calì and te Velde (2011) use the AfT disbursement in the OECD-CRS database to analyze their effect on trade costs, and export flows. Employing a generalized method of moments estimation, they find that AfT exhibit robust negative effects on import costs. There is also evidence that aid aimed at supporting countries in conducting trade policy and regulation also affects trade costs negatively although the findings are not robust to alternative specifications. The costs reduction elasticities of both components are notably larger when limiting the sample to Sub-Saharan Africa. As a second component of their

analyses, the authors use a gravity model to examine the relationship of AfT to trade flows. While the overall effect is positive, it is entirely driven by the component on aid to economic infrastructure albeit with limited robustness, whereas aid to productive capacity did not have any contributions on raising exports (Cadot et al. 2014; Cali and te Velde 2011). Using a similar data set, Vijil and Wagner (2012) examine the effectiveness of infrastructure as a channel AfT based on a gravity framework of export performance model. The authors find that aid directed to infrastructure influences the level of infrastructure in a country positively.

Finally, Ferro et al. (2014) demonstrate that aid directed to the service sector has a positive impact on manufacturing exports of developing countries. The authors use the service intensities found in input-output tables as source of variation to address endogeneity and employ a broad definition of AfT that captures aid to transportation, information, ICT, banking and financial services, and business services. The sector-specific elasticities of exports to aid are all positive and significant, although the effect is not robust for ICT. Distinguishing by income groups, the greatest effect for low-income countries are on transportation which increases exports by 0.76 percent for every 1 percent increase in aid to the transport sector, although the effect is negative for business services. Transport likewise appears to be the most important for lower middle-income countries, although the effect is negative for ICT. Finally, upper middle-income countries obtain the highest return through aid to business services and ICT (Ferro et al. 2014).

Helble et al. (2012) extend the analysis on trade flows to distinguish between exports and imports, and also include other types of aid. They also incorporate aid prior to the launch of AfT in 2005. The authors confirm that AfT has positive effects on exports, and imports. However, unlike other types of aid, AfT effects are stronger and more robust for export flows. The positive effects on exports persist even when distinguishing between narrow and broad categories of AfT. The former refers to aid for trade policy and regulation and is closer to the types of measures of interest in this review, while the latter is a catchall category of AfT. This possibly suggest that AfT, by improving productive capacities, is less likely to induce exchange rate appreciation that erode a country's export potential.

Hoekman and Nicita (2010) explain that AfT is also beneficial to donor countries since they also stand to benefit from lower trade costs with their developing country trading partners. The findings of Vijil (2014) offer some support to this where the trade-enhancing effects of AfT is magnified when countries have preferential trade agreements. In contrast to the findings of Cali and te Velde (2011), the effect is

particularly strong for aid directed toward institutional strengthening, which induces an increase of \$72 per dollar of aid directed to institutions.⁹

Overall, available evidence points to the positive effect of AfT on trade flows. Nonetheless, the results pertaining to the type of facilitation reform through which the positive effects are mixed. Moreover, these results must be appreciated in the context of the definitional issues of AfT.

An important question that follows is whether the costs of trade facilitation reforms outweigh the benefits. Unfortunately, the empirical results here are scant because the information on costs by trade facilitation measure are not systematically available (WTO 2015). Naturally, the answer depends on the particular trade facilitation tool, and the existing challenges in a country. For most of the measures that are notified under Category A of TFA, the answer is less controversial because the costs involved are smaller. The question is more relevant for complex and expensive trade facilitation measures such as advance rulings, automation, single windows, or testing procedures.

Nonetheless, anecdotal evidences and field interviews suggest that the gains outweigh the costs even for more expensive trade facilitation investments (WTO 2015). The benefits from these trade facilitation measures are likely to be felt immediately once the measure or system is in place, although the accompanying institutional mechanisms such as trainings and public consultation also take time to prepare. The costs associated with setting up can be abated by charging user fees. For example, after a set up cost of over \$6 million, Senegal's Orbus has become a financially self-sustaining operation (Diagne 2010). On the other hand, public-private-partnerships (PPPs) can be explored as a means of overcoming upfront financial demands.

Finally, even if financial resources are available, successful implementation of trade facilitation measures depend on many nonfinancial factors. The WTO (2015) collected over 150 case stories from various national and internationally supported trade facilitation projects. However, the conclusions drawn must be read with room for the likelihood of publication and reporting bias since recipients and donors are more likely to report successful outcomes than failures (WTO 2015). Nonetheless, based on their analyses, projects that were implemented successfully enjoyed strong and consistent political support, hence a strong sense of national ownership. One way this can be done

⁹ In this work, aid to trade-related institution refers to "AfT finances programs such as training courses on bilateral trade negotiations for government staff or on compliance with rules of origin. This can also include ... programs of "vaccination, surveillance and control of animal movements across borders to combat highly contagious. A one-stop border post at customs serving only EIAs members' trade, as is the case in the East African Community or in the Central American Custom Union, would be another example (Vijil 2014).

is to enshrine trade facilitation objectives in national development plans. This can impose disciplines on reforms such that quick fixes that may in the long run entrench bad practices, can be prevented in favor of more ideal structural reforms that require time and resources (Montagnat-Rentier and Parent 2012). Montagnat-Rentier and Parent (2012) explain that the frequent changing of officials created political instability and jeopardized continuity of customs reforms in Francophone Sub-Saharan Africa.

Other frequent success factors cited are coordination and cooperation between public and private stakeholders; sufficient human and material resources; careful sequencing and prioritization; and transparency and monitoring of implementation (WTO 2015). Various rounds of the biennial aid monitoring exercise of the OECD-WTO (2011, 2015) confirm these success factors.

In the final analyses, the effectiveness of aid to trade facilitation relies on a careful and comprehensive analyses of a country's constraints and needs. For example, it may not be sensible to embark on an expensive automation project, or equipping ports for handling containers for the entire country if the scale of operations in some ports are small, and skills to operate and maintain systems are not readily available. As Moisé and Le Bris (2013) caution, making expensive trade facilitation investments may end up indebting countries with little to show in terms of sustained gains. In some cases, the more important reforms may lie in the interaction areas rather than in facilitation measures the border itself. Teravaninthorn and Raballand (2008) illustrate that while transport costs in Africa are generally not higher than that of other developing countries, their transport price charges are significantly higher. The authors trace this to protective policies for trucking policies, and show that in Rwanda, the deregulation of the trucking sector in 1994 resulted to a drop of 75 percent in transport prices almost immediately.

In cases where the facilitation needs are more complex and costlier, the signing of the TFA goes a long way toward ensuring that implementation of the more difficult reforms as embodied in the Category C commitments (see para. 4.1) of developing and least-developed countries by conditioning their implementation on financial and technical support from donors.¹⁰ The TFA Facility launched in 2014 aims to coordinate the needs of developing countries and LDCs with donor capacity to supply them (WTO 2015).

Thus far, most of the empirical evidence are based on the macro level, and nearly all are focused on outcomes in terms of exports. While this is indeed important, there are other metrics by which effectiveness of AfT can be evaluated although the challenge of clearly

¹⁰ Category C commitments refer to trade facilitation reforms of developing and least-developed countries under the TFA that require technical assistance from donor countries or institutions.

identifying, monitoring, and measuring objectives of particular AfT projects needs to be overcome (te Velde and Razzaque 2013).

6. Literature Gaps and Conclusion

Trade Facilitation Outcomes

The literature on trade facilitation confirms the significant influence of its various forms in bringing down trade costs. This in turn translates to positive effects on trade. The majority of the empirical work focus on the effects on exports. But studies that consider both imports and exports consistently find stronger and more robust effects for exports. These results are largely consistent when using cross-country as well as the firm-level data, and with methods varying from CGE, firm cost functions, gravity, and impact evaluation techniques. The positive effects on exports are also observed on the dimension of product diversity although the evidence on new market destinations is more limited.

In terms of distributional aspects, there is evidence that facilitation measures that reduce the fixed cost component of trade lead to greater participation of smaller firms in international trade. For example, many costs related to compliance with border with border procedures need to be incurred regardless of shipment or firm size, or the product being shipped. In cases where reforms impinge on the scale-invariant component of costs, the increase in participation tends to be greater for small firms. Nonetheless, most of the evidence in this area are based on firm-level data analyzed at the cross-country level. The few that focus on more detailed transactions level data are based on a developed country.

The impact of trade facilitation reforms on corruption, customs revenues, and customs clearing times are mostly based on qualitative case studies, which largely document good responses. The few empirical evidence available (Fernandes et al. 2016; Sequeira and Djankov 2014; Shepherd 2009) support the general conclusions of the case studies. In most accounts, the drastic reduction in customs clearing times and increase in revenue collection shortly after the introduction of a reform.

Closely related to the border protection goal of customs revenue is achieving risk management objectives relating to SPS and TBT measures in an efficient and nondiscriminatory manner. But the absence of empirical work and case studies is particular stark in this area. This stems from the absence of systematic records of public health or safety issue that can be traced back to failure in border controls. Improved record-keeping made possible by ICT should be able to alleviate this lack in the foreseeable future.

Finally, there are very limited empirical and case studies that link of trade facilitation with second-order outcomes such as employment, FDI, growth, and poverty.

Typology of Trade Facilitation

Among the trade facilitation typology, empirical evidence that links different aspects of **trade rules, procedures and documents**, is the most developed. Most of them rely on the number of days or documentary requirements to export and import, or the cost of exporting and importing twenty-foot equivalent containers in the 'trading across borders' component of the Doing Business indicators as proxies for the complexity of border requirements. All studies confirm that improvements in these facilitation areas lead to higher trade flows, as well as in product and destination variety. These findings are confirmed using other sources of data at the country level such as those by Fernandes et al (2016), Carballo et al (2016), Volpe Martincus et al. (2015). Cross-country firm-level analysis also points to evidence of greater SME participation as border procedures typically impinge on the fixed costs component of trade. Finally, there is also evidence on reduction of corruption and increased customs revenue.

Nonetheless, the evidence with regards to the specific trade facilitation measure that simplify border procedures, or lower costs of trading are still limited. The work of Anson et al. (2006), Yang (2008b), and Velea et al. (2010) provides mixed results with regards to the use of PSI. The work of Carballo et al. (2016) provides some evidence of positive effects of using AEOs in Mexico, and finally, reforms on physical inspection rates in Albania and Serbia also have mixed results in terms of import flows. These latter set of studies rely on impact evaluation as identification strategies. Overtime, external validity can hopefully be established with similar work in other countries.

The evidence on **cross-agency dialogue, coordination and integration** relies on both case studies and empirical evidence. Existing empirical works suggest information availability enhances trade flows and is particular favorable to SMEs. But empirical evidence is most developed in terms of the effect of SPS and TBT regulations on trade. The general finding is that they reduce trade flows as well as variety in trade. However, harmonizing them with international standards can help overcome the negative effects. Moreover, a reversal of the negative effect is possible when harmonization help exporters overcome reputational asymmetries about their products.

Meanwhile, what can be known about other types of coordination and integration rely mostly on case studies such as those relating to the establishment of single windows or the operation of OSBPs. The case studies tend to show that such initiatives also lead to trade costs reduction, increased trade flows, and improvement in customs revenue collection.

Trade facilitation measures aimed at **strengthening border agencies** is the least studied among the typologies in this review. Metrics for monitoring facilitation reforms in this area is also least developed. The cited case study in this review on Cameroon report improved customs revenue and shorter border release times after the introduction of performance contracts in the major ports. A lone study by Hillberry and Zhang (2015) suggest the importance of this aspect of trade facilitation reform as embodied in good governance and impartiality. Nonetheless, institutional capacity is a necessary adjunct of all other trade facilitation reforms. It is potentially one of the reasons that it has been difficult to attribute impacts of this type of measure. The recorded cases of successful trade facilitation reforms overwhelmingly refer to instances of large-scale overhauls in the wake of major events like civil war or economic crisis such that the contributions of reorganization itself and its attendant aspects are difficult to disentangle. Nonetheless, human resource level interventions appear to be the most amenable to impact evaluation studies in the near future if project designs and data collection can be set up to accommodate them.

What is known about facilitation reforms on **border modernization measures** is heavily informed by case studies. Most of them relate to automation, which is documented to have large effects on trade flows and border clearing times. Being one of the most expensive facilitation measures, work that incorporate both the costs and timeline of recouping investments would be useful in helping countries decide its place of priority among the competing reforms that call for attention.

Finally, most of the evidence on **border-related infrastructure** use costs functions and different attributes of ports as the basis of analyses. Some of the studies proceed to find positive effects of these port attributes to trade flows. Nonetheless, most of them could benefit from incorporating the latest developments in the gravity model to present more convincing results. At the same time, evidence is still lacking on the particular types of infrastructure that yield the largest efficiency gains, and how these particular types of infrastructure interact with trade facilitation reforms in the other typologies.

A table in appendix A provides a summary of the outcomes for each trade facilitation typology.

Synergies, Sequencing, and Aid for Trade

The typology employed in this review limited its scope to measures that directly affect border operations. But interactions with domestic infrastructure network conditions and institutional characteristics are very important as they dictate the absorption capacities for trade facilitation reforms. Broadly speaking, evidence point to improvements in institutions being more important for poorer countries, while hard infrastructure

becomes more important as a country climbs up the income ladder (Portugal-Perez and Wilson 2012). Only a limited number of studies directly deal with the interaction effects in terms of income and different type of infrastructure at the cross-country level. Analysis at the country level will be informative in understanding and identifying the precise mechanisms of these interactions.

In terms of geography, being landlocked presents a special challenge on trade facilitation as a country needs to endure not only its own bottlenecks but must nearly always take its neighbor’s trade facilitation policies as parameters as well. All evidence points to the effects of trade costs being exacerbated for landlocked countries. The flip side of this however is that trade facilitation reforms may also present the largest potential gains if implemented in sensible sequence. Small island economies in the Caribbean and the Pacific face a different type of challenge that relate to the lack of scale. The lack of institutionalized data collection over a period of time pose considerable challenge in informing the precise areas of critical bottlenecks and therefore trade facilitation measures.

According to the trade facilitation typology in this review, table 6.1 gives an indication of the missing links in empirical work, by providing a count of the studies cited for each typology. The absence or scarcity of empirical work in a particular area does not mean that it is less important. Rather, the lack is attributable to the difficulty of framing the variables of interest into testable hypotheses with the available set of information. Focusing on investigating on the missing areas can give valuable information to policy makers.

Table 6.1. Summary Count of Empirical Studies by Outcome and Trade Facilitation Typology

Outcome/ Typology	Border Procedures	Cross- Agency Cooperation	Strengthening Border Agencies	Modernization of Border Infrastructure	Border- Related Infrastructure
Trade cost	4	1	1	3	3
Intensive margin	12	13		1	3
Extensive margin	7	4			1
GVCs	3				
Small and medium enterprises	3	3			
Corruption and customs revenue	5				

As emphasized in the beginning of this review, the typologies of trade facilitation measures are not independent of each other. Beyond the typologies, evidence remains limited when it comes to synergies and sequencing. While the sequencing aspect is best analyzed at the country level because this naturally depends on a country's most pressing needs, a possible way of accumulating general evidence across countries is to systematically analyze the interactions of the trading activities in terms of network theory and analyses, and spatial econometrics. Combined with comprehensive diagnostic tools from the World Bank TTFA, and the WTO TFAF, this can yield valuable insights for sequencing and planning facilitation reforms.

Finally, what is so far known about AfT effectiveness must be taken in with the definitional limitation in mind. The OECD-CRS, while comprehensive in terms of country and temporal coverage does not yet allow for a systematic identification of particular types of trade facilitation reform. Its broad scope also raise doubt on whether AfT as used in most empirical work actually captures trade facilitation. Thus far, the limited empirical work on AfT point to the beneficial impacts of on trade flows. In this sense, AfT does not appear to induce a Dutch disease effect. But the evidence thus far rely on cross-country studies, and questions about robustness of results remain. It would be ideal to have more empirical work at the country level to pin down the key factors of AfT success and failure. Working at the country level can also present opportunities to explore what impact evaluation methodologies can bring into the literature, and also deal with empirical challenges presented by aid fungibility as in the case of van de Walle and Mu (2007). In the near future, the issue of fungibility can hopefully be less problematic with the maturity of block chain application to aid transactions.

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Appendix A. Synthesis of Trade Facilitation Typology and Outcomes

Table A.1. Synthesis of Trade Facilitation Typology and Outcomes

Type of Reform	Trade Cost	Intensive Margin	Extensive Margin	GVCs	SMEs	Corruption and Customs Revenue
Simplification of border procedures	Border formalities and procedures are important factors in reducing trade costs. This is confirmed in country-level empirical studies in Albania, Mexico, and Serbia, where simplification of border procedures through risk management practices, AEOs, and in-house clearing programs reduced clearance times, their variability, or both. An empirical study of causes of border delays in Peru demonstrates the importance of distinguishing among the border processes.	Reducing the cost and the time spent in complying with border procedures lead to greater trade flows. The increase is particularly large for developing countries whose exports of time-sensitive GVC and agriculture products suffer with procedure-related delays. Imports also increase with simpler border procedures, which in turn supports GVC trade.	Reducing the cost and the time spent in complying with border procedures increases the variety of products being exported and expands the number of new firm and country buyers. The increase largely accrues to developing countries, and the size of the effects are larger than what could be gained from market access concessions.	Lengthy import licensing procedures reduce imports of intermediate products, that are used as inputs for GVC trade. Conversely, the adoption of simpler inspection procedures through an AEO in Mexico increased exports of time-sensitive GVC inputs.	A cross country study associates shorter export times with increased participation of smaller firms. However, the reduction of physical inspection rates in Albania did not have differential impacts across firm sizes.	Longer trade procedures are associated with more corruption. Corruption in turn deters exports. A cross country analysis suggests that PSI can be a tool for increasing customs revenues, although success at the country level is far from guaranteed as the case of Argentina, Columbia, Indonesia, and the Philippines demonstrate.

Type of Reform	Trade Cost	Intensive Margin	Extensive Margin	GVCs	SMEs	Corruption and Customs Revenue
Cross-agency cooperation	Variable costs of firms in developing countries increase significantly with investments to comply with SPS requirements.	Information availability is a strong predictor of trade flows for middle- and low-income countries. At the same time, the degree to which available information are harmonized with other countries affects their impact of trade. This is demonstrated in the case of SPS and TBT. Imposition of these requirements have a negative impact of trade flows. However, harmonizing them with international standards mitigate their trade-dampening effect. In cases where they help exporters overcome information asymmetry about their product, the overall effect may even be positive.	Information availability increases the range of products exported by small firms. Conversely, the imposition of strict SPS regulations reduce the variety of products exported and also discourage firms from entering a new market. The negative effect of SPS regulations are mitigated and can possibly be reversed when they are harmonized with international standards.		Small firms exhibit larger positive responses in trade volumes and export variety to information availability. But small firms also reduce their exports more when faced with SPS measures.	
Strengthening border agencies	There are very few materials for facilitation measures under this typology. The metrics are very undeveloped, and the empirical literature is naturally limited by this. At the same time, focused case studies are also few because: (i) customs re-organization tends to take place in the contexts of social and economic crises; and (ii) border strengthening measures are usually necessary accompaniments of reforms in the other typologies. A cross-country study suggests that good governance reduces import times substantially. This appears to be supported in a case study on performance contracts in Cameroon.					

Type of Reform	Trade Cost	Intensive Margin	Extensive Margin	GVCs	SMEs	Corruption and Customs Revenue
Modernization of border-related infrastructure	Automation reduces the time spent at the border and has one of the largest effects of trade costs in developing countries. This appears to be supported by experiences documented in case studies which observe savings in time, and costs associated with inventory management.	Formalities related to automation, as defined in the TFIs, is one of the strongest predictors of trade flows for low- and middle-income countries. The electronic single window in Costa Rica is associated with increased export flows.	The phased introduction of electronic single window in Costa Rica is empirically linked to the expansion of exporting firms, the number of products they export, and the number of destinations.			Case studies suggest that the adoption of border management ICT systems are usually accompanied by increased collection of customs revenues.
Border-related infrastructure and logistics	Having efficient ports is associated with lower maritime shipping charges. Port efficiency in turn is influenced by containerization, regulation, prevalence of organized crime, and a country's general infrastructure.	More efficient ports lead to higher trade flows. Globally, containerization is found to be one of the factors behind the trade expansion of the latter half of 20th century.	More efficient ports tend to export greater variety of products.			

Note: Synthesis based on Tables 4.1. to 4.

Appendix B. Summary of References and Topics

Table B.1. Summary of References and Topics

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Anderson, James E., and Eric Van Wincoop. 2004. "Trade Costs." <i>Journal of Economic Literature</i> 42 (3): 691–751.	x												
Anson, Jose, Olivier Cadot, and Marcelo Olarreaga. 2006. "Tariff Evasion and Customs Corruption: Does Pre-shipment Inspection Help?" <i>The BE Journal of Economic Analysis & Policy</i> 5 (1).		x											x
Arvis, Jean-François, Yann Duval, Ben Shepherd, Chorthip Utoktham, and Anasuya Raj. 2016. "Trade Costs in the Developing World: 1996–2010." <i>World Trade Review</i> 15 (3): 451–74.	x												
Arvis, Jean Francois, Jean-Francois Marteau, and Gael Raballand. 2010. <i>The Cost of Being Landlocked: Logistics Costs and Supply Chain Reliability</i> .								x					

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Atkin, David, and Dave Donaldson. 2015. "Who's Getting Globalized? The Size and Implications of Intra-National Trade Costs." National Bureau of Economic Research.	x												
Baldwin, Richard, and Anthony J. Venables. 2013. "Spiders and Snakes: Offshoring and Agglomeration in the Global Economy." <i>Journal of International Economics</i> 90 (2): 245–54.	x												
Bernhofen, Daniel M., Zouheir El-Sahli, and Richard Kneller. 2016. "Estimating the Effects of the Container Revolution on World Trade." <i>Journal of International Economics</i> 98 (January): 36–50.						x			x	x			
Beverelli, Cosimo, Simon Neumueller, and Robert Teh. 2015. "Export Diversification Effects of the WTO Trade Facilitation Agreement." <i>World Development</i> 76 (December): 293–310.	x										x		

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Blonigen, Bruce A., and Wesley W. Wilson. 2007. "Port Efficiency and Trade Flows": PORT EFFICIENCY AND TRADE FLOWS." <i>Review of International Economics</i> 16 (1): 21–36.						x			x				
Borchert, Ingo, Batshur Gootiiz, Arti Grover Goswami, and Aaditya Mattoo. 2017. "Services Trade Protection and Economic Isolation." <i>The World Economy</i> 40 (3): 632–52.							x		x				
Cadot, Olivier, ed. 2011. <i>Where to Spend the next Million? Applying Impact Evaluation to Trade Assistance</i> . London: Centre for Economic Policy Research [u.a].	x												
Cadot, Olivier, Ana Fernandes, Julien Gourdon, Aaditya Mattoo, and Jaime de Melo. 2014. "Evaluating Aid for Trade: A Survey of Recent Studies." <i>The World Economy</i> 37 (4): 516–29.								x					

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Cali, Massimiliano, and Dirk Willem te Velde. 2011. "Does Aid for Trade Really Improve Trade Performance?" <i>World Development</i> 39 (5): 725–40.								x					
Cantens, Thomas, Gaël Raballand, and Samson Bilangna. 2010. "Reforming Customs by Measuring Performance: A Cameroon Case Study." <i>World Customs Journal</i> 4 (2): 55–74.					x				x				x
Carballo, Jerónimo, Alejandro Graziano, Georg Schaur, and Christian Volpe Martincus. 2016a. "Endogenous Border Times." IDB Working Paper Series, IDB-WP-702.	x	x					x		x	x	x	x	
Carballo, Jerónimo, Georg Schaur, and Christian Volpe Martincus. 2016b. "Trust No One? Security and International Trade." IDB Working Paper Series, IDP-WP-703.		x							x	x	x	x	

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Carballo, Jerónimo, Alejandro Graziano, Georg Schaur, and Christian Volpe Martincus. 2016c. "The Border Labyrinth: Information Technologies and Trade in the Presence of Multiple Agencies." IDB Working Paper Series, IDB-WP-706.				x						x	x		
Chaney, Thomas. 2008. "Distorted Gravity: The Intensive and Extensive Margins of International Trade." <i>American Economic Review</i> 98 (4): 1707–21.	x								x				
Chen, Chunlai, Jun Yang, and Christopher Findlay. 2008. "Measuring the Effect of Food Safety Standards on China's Agricultural Exports." <i>Review of World Economics</i> 144 (1): 83–106.			x							x			

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Chen, Natalie, and Dennis Novy. 2011. "Gravity, Trade Integration, and Heterogeneity across Industries." <i>Journal of International Economics</i> 85 (2): 206–21.	x									x			
Christ, Nannette, and Michael J. Ferrantino. 2011. "Land Transport for Export: The Effects of Cost, Time, and Uncertainty in Sub-Saharan Africa." <i>World Development</i> 39 (10): 1749–59.							x		x				
Clark, Ximena, David Dollar, and Alejandro Micco. 2004. "Port Efficiency, Maritime Transport Costs, and Bilateral Trade." <i>Journal of Development Economics</i> 75 (2): 417–50.						x			x				
Cubas, Diana, Briceno-Garmendia, and Bofinger. 2016. "OECS Ports: An Efficiency and Performance Assessment." World Bank.						x	x						

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
Czubala, W., B. Shepherd, and J. S. Wilson. 2009. "Help or Hindrance? The Impact of Harmonised Standards on African Exports." <i>Journal of African Economies</i> 18 (5): 711–44.			x							x			
Datt, Mohini and Dean Yang. 2011. "Half-Baked Interventions: Staggered Pre-Shipment Inspections in the Philippines and Colombia. In Cadot, Olivier, ed. 2011. <i>Where to Spend the next Million? Applying Impact Evaluation to Trade Assistance</i> . London: Centre for Economic Policy Research		x					x						
Dennis, Allen. 2010. "Global Economic Crisis and Trade: The Role of Trade Facilitation." <i>Applied Economics Letters</i> 17 (18): 1753–57.		x								x			
Dennis, Allen, and Ben Shepherd. 2011. "Trade Facilitation and Export Diversification." <i>The World Economy</i> 34 (1): 101–22.		x									x		

Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Modernization of border operations	Strengthening border agencies	Border-related infrastructure	Interactions	Aid for Trade	Trade costs	Intensive margin	Extensive margin	GVC and SMEs	Corruption and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Strengthening border agencies	Border-related infrastructure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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Reference	Inputs								Outcomes				
	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Moder-nization of border operations	Streng-thening border agencies	Border-related infra-structure	Inter-actions	Aid for Trade	Trade costs	Inten-sive margin	Exten-sive margin	GVC and SMEs	Corrup-tion and customs revenue
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	Trade costs and trade facilitation metrics	Simplification of border procedures	Cross-agency dialogue, coordination, integration	Modernization of border operations	Strengthening border agencies	Border-related infrastructure	Interactions	Aid for Trade	Trade costs	Intensive margin	Extensive margin	GVC and SMEs	Corruption and customs revenue
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