



Express Delivery and Trade Facilitation: Impacts on the Global Economy

**A REPORT PREPARED FOR THE GLOBAL EXPRESS
ASSOCIATION**

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Executive Summary

Background and objective

Express delivery is a critical component to many businesses as it allows them to exchange goods, parts, contracts, etc., quickly and securely anywhere in the world. At the level of a single firm, the role of express delivery can be easily illustrated. However, it is less clear what the overall impact of international express delivery services is on the global economy.

The Global Express Association (GEA), the global trade association of the express delivery industry, has commissioned Frontier Economics to assess the impact of the express delivery industry on the global economy. The objective of this project is to research the following questions:

- What is the economic impact of the express delivery industry today?
- What is the relationship between customs capability, trade and international express delivery?
- How will the role of international express delivery in facilitating economic growth change in the context of e-commerce?

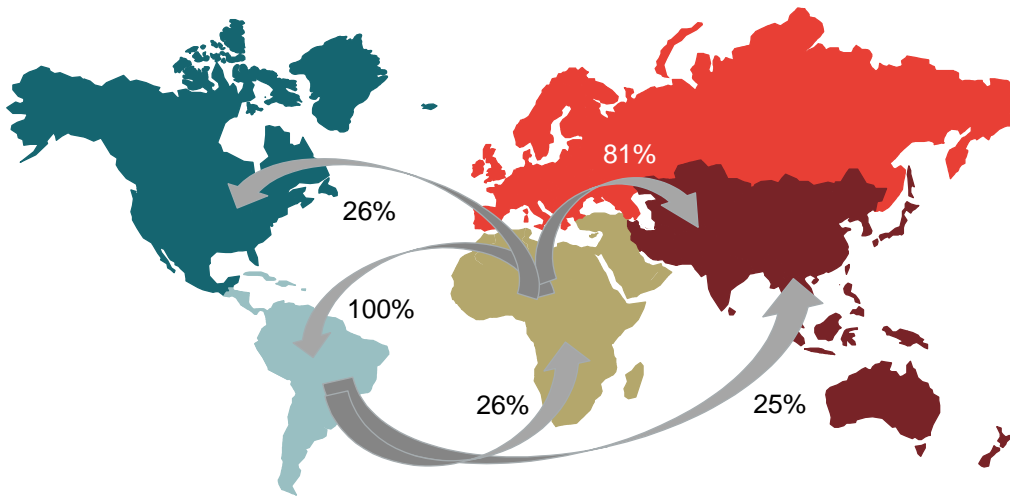
We have conducted independent research to develop answers to each of these questions. Our analysis is based on data from GEA members as well as publicly available sources.

Overview of express delivery industry

Express delivery operators provide a range of services to meet customer needs. The services include door-to-door, customs-cleared, next-day and time-defined delivery services and deferred services (i.e. a slower delivery) with track and trace services. Companies and individuals generally use express delivery services because they value five main attributes of the service: its global reach; reliability; transparency; speed and security.

The main users of express delivery services are businesses, with the engineering and manufacturing sector as the largest user followed by transportation services, consumer goods and retail.

Despite the global financial crisis, international express delivery volumes have grown on average by 7% over the past 5 years. Considering a regional breakdown, volume growth has been strongest in regions outside of Europe and North America as shown in **Figure 1**. Volume growth has generally been higher than growth in trade.

Figure 1. The top 5 inter-regional flows with fastest growth, 2011-2013

Source: Based on GEA members' data

Economic footprint

Overall, the express delivery industry facilitated around three million jobs worldwide in 2013. This represented 0.19% of global GDP or over \$140 billion. Our results are based on GEA members' data only and should therefore be viewed as a conservative estimate of the overall footprint of the express delivery industry. We have not "grossed up" the figures to account for other express delivery service providers as the assumptions required to do this would reduce the reliability of our analysis.

Table 1 below shows the breakdown of our results for the direct, indirect, and induced impacts; both in terms of employment and as a proportion of GDP. The express delivery industry provides almost 600,000 direct jobs¹ and supports over 1,800,000 indirect jobs and over 570,000 induced jobs.

¹ We report jobs as full-time-equivalent (FTEs) to provide a comparable metric. In Oxford Economics' report for the GEA in 2009, they reported the total number of direct jobs as 1.3m. That figure is based on head count (i.e. the number of people employed) rather than FTEs.

Table 1. DII impact of express delivery industry

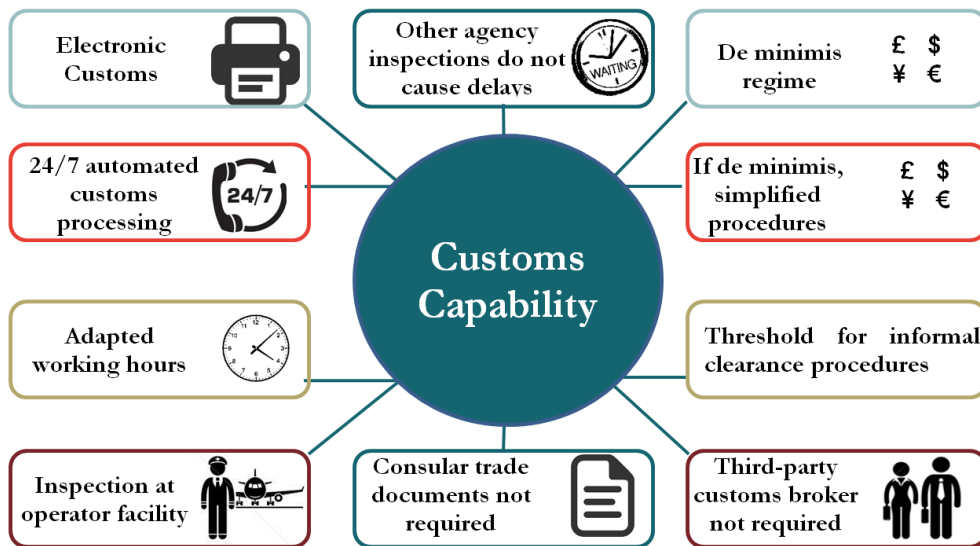
	Global employment	Global GDP Impact (%)
Direct impact	585,000	0.04%
Indirect impact	1,815,000	0.11%
Induced impact	571,000	0.04%
Total	2,971,000	0.19%

Source: Frontier Economics estimates based on data from GEA members and publicly available sources.

Relationship between customs capability, trade and international express delivery

We have analysed the relationship between customs capability, trade and international express delivery. Our analysis focussed on ten specific measures of customs capability from the GEA’s database. These are shown in **Figure 2**. We have constructed a Customs Capability Index (CCI) index based on these measures that records how many of the measures have been implemented by each country.

Figure 2. Overview of customs capability measures



We found that even after controlling for a range of expected drivers we find there remains a robust and statistically significant relationship between the Customs Capability Index and trade flows to and from any given country. **Specifically, we found that implementing any one additional measure from the 10 measures making up the CCI (e.g. 24/7 automated processing) increases trade *on average* by 4.4% for the country improving its customs capability.** Note that we expect this effect to happen over a reasonable period of time. For example, if Bolivia introduced two of the customs capabilities measures (e.g. 24/7 automated processing and adapted working hours), we project that trade to and from Bolivia would increase by 8.8% or \$2.03bn. Similarly if Cameroon implemented electronic customs, we project that its trade would increase by over \$670m or 4.3%. Our robustness checks confirm that:

- Statistical tests indicate that the impact of improvements in the Customs Capability Index is linear, i.e. introducing two measures has twice the effect of introducing one. However, economic models of this type may not be very good as a means of predicting dramatic change so while a linear specification provides the best fit, this should be viewed with caution.
- Improvements in these customs capability measures are equally beneficial to high and low income countries.
- There are also no significant variations in the scale of this effect between regions.
- The most appropriate weighting of the components of the CCI index is to assign equal weights.

A further, important question that we researched as a second step is: what role does the express delivery industry play in facilitating the additional trade that can be unlocked by improvements in these customs capabilities? This analysis shows conclusively that international express delivery is one of the key channels that enable an improvement in the CCI to facilitate an increase in trade. **Our results show that international express volumes play a significant role in facilitating trade promoted by improvements in the CCI and that up to two-thirds of this trade is directly facilitated by international express, with 50% as representing a reasonable mid estimate of the effect.**

Role of international express delivery in the context of e-commerce

Customers shopping habits have changed tremendously over the last decade with the wide take-up of the internet. Going forward, e-commerce is expected to:

- continue to grow substantially in the future, with double-digit growth expected to be the norm and;
- become increasingly global with regions outside of Europe and North America growing faster than the average.

These trends suggest that international express delivery services are likely to play an increasing role in facilitating internationalisation of businesses, particularly small and medium enterprises (SMEs) who are unlikely to set up their own supply chains.

However, in the context of the emergence of international e-commerce there are signs that there may be a return to some form of protectionism. The rise in protectionism or delays in reform could hinder the realisation of the e-commerce expansion, which is expected to be a key driver of economic growth.

Policy implications

We conclude that improvements in customs capabilities for goods requiring immediate release provide substantial direct benefits to countries by increasing trade. Policy-makers around the world should therefore consider steps they could take to improve their score (provided in Annexe 3) so as to avoid losing out on economic value. The benefits of improving customs capabilities depend strongly on the existence of international express delivery services. As a result, policy-makers should ensure that any improvements in customs capabilities are considered in the context of enabling international express delivery services. As international express delivery is likely to play an increasing role in facilitating benefits from international e-commerce (particularly to SMEs), improvements in customs capabilities may have an even bigger impact on trade in the future.

1 Introduction

1.1 Background

The members of the Global Express Association are large multinational businesses that provide express delivery services to customers around the world. They support firms in their communications and trade with business partners or final customers in more than 200 countries and territories.



Express delivery is a critical component to many businesses as it allows them to exchange goods, parts, contracts, etc., quickly and securely anywhere in the world. At the level of a single firm, the role of express delivery can be easily illustrated. For example, consider a bespoke tailoring service in Eastern Europe with customers all over the world. The tailoring process usually requires a number of fittings and suits need to be adjusted as quickly as possible to reduce the overall production time. Suits need to be transported carefully so they arrive in perfect condition no matter how far away the destination. International express delivery can meet all these requirements and therefore enable the company to reach customers throughout the world.

However, it is less clear what the overall impact of international express delivery services is on the global economy. This is partly because it requires a careful analysis of the economic value added that can be truly attributed to the sector, whilst taking account of the environmental factors that may hinder the sector's ability to perform and deliver its services to the highest standards.

1.2 What is the project's objective?

The Global Express Association, the global trade association of the express delivery industry, has commissioned Frontier Economics to assess the impact of the express delivery industry on the global economy. The objective of this project is to research the following questions:

- What is the economic impact of the express delivery industry today?
- What is the relationship between customs capability, trade and international express delivery?

- How will the role of international express delivery in facilitating economic growth change in the context of e-commerce?

We have conducted independent research to develop answers to each of these questions. Our analysis is based on data from GEA members as well as publicly available sources.

1.3 What is the economic impact of the express delivery industry?

Our analysis quantifies the economic impact of the express delivery industry. We consider two types of economic impacts.

- **Economic footprint:** We measure the economic value created by all the individuals involved directly or indirectly in the provision of express delivery services. In order to provide its services, the express delivery industry directly employs many people across the world. In addition it purchases significant goods (such as aircraft) and services from other sectors. This expenditure creates indirect employment in the sectors that produce inputs to the express delivery industry. Expenditure by direct and indirect employees in turn creates more economic activity and more employment in the form of induced jobs. This type of economic impacts is commonly referred to as the ‘direct, indirect and induced economic impacts’.
- **Facilitating trade:** We measure the impact of the express delivery services on the rest of the economy with a focus on trade. Express delivery services play an important role in supporting firms and governments in their communications and trade with business partners or final customers across the world.

This report sets out the methodology and results our research.

1.4 How is the report structured?

This report is structured as follows:

- **Section 2** provides an overview of the express delivery industry;
- **Section 3** describes the economic footprint of the express delivery industry;
- **Section 4** describes the relationship between customs capability, trade and international express delivery;
- **Section 5** discusses the changing role of international express deliveries in the context of increasing global e-commerce;

- **Section 6** provides the policy implications that follow from our findings.

Technical details on our methodology and key assumptions are provided in the Annexes. Annexe 1 provides the detailed methodology and assumptions on the estimation of the economic footprint of the express delivery industry. Annexe 2 provides more detail on our econometric analysis described in Section 4. Annexe 3 provides the level of the Customs Capability Index by country.

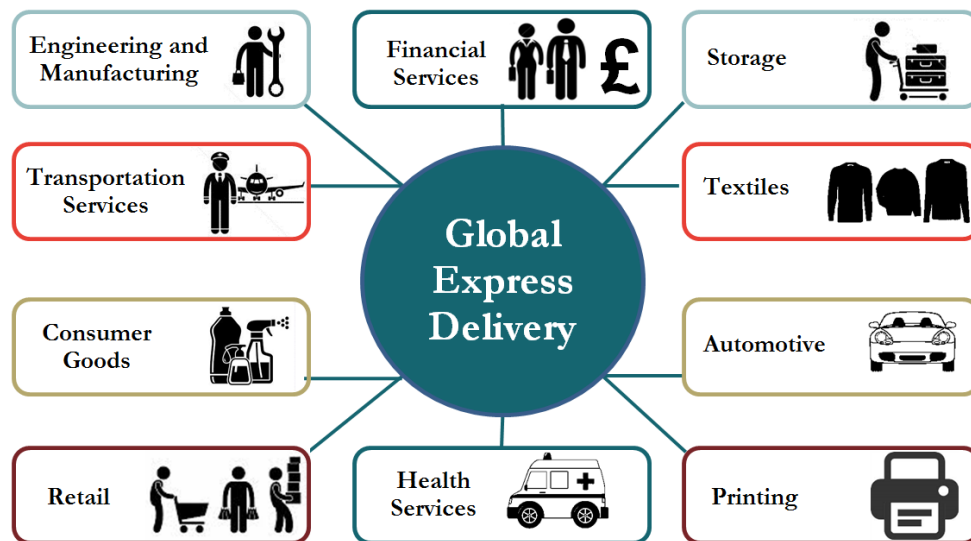
2 Overview of the express delivery industry

For the purpose of our study, express delivery services refer to door-to-door deliveries of shipments on a same day, next day (i.e. 24 hours) or a deferred service (i.e. a slower service with a transit time between two or three days). Express delivery service providers offer these services for both domestic and international (cross-border) deliveries. Adrenale (2010) estimates that domestic express delivery services account for a significant (75% or so) amount of the express delivery industry as a whole.² However, our study focuses on the role of international express delivery as we are interested in the effect on the global economy.

2.1 Who are the main users of express delivery?

The main customers of express delivery service providers are companies. These companies can be small and medium businesses, with occasional or regular shipping needs or larger volume businesses. Based on the information provided by members of the GEA, we find that these companies operate in different sectors, of which the top ten users are illustrated in **Figure 3**.

² Report by Adrenale Corporation for the Universal Postal Union (2010). Available: http://www.jcampbell.com/ref_upu_doha/upu/20100325_UPU_Adrenale.pdf

Figure 3. Overview of key sectors that use express delivery

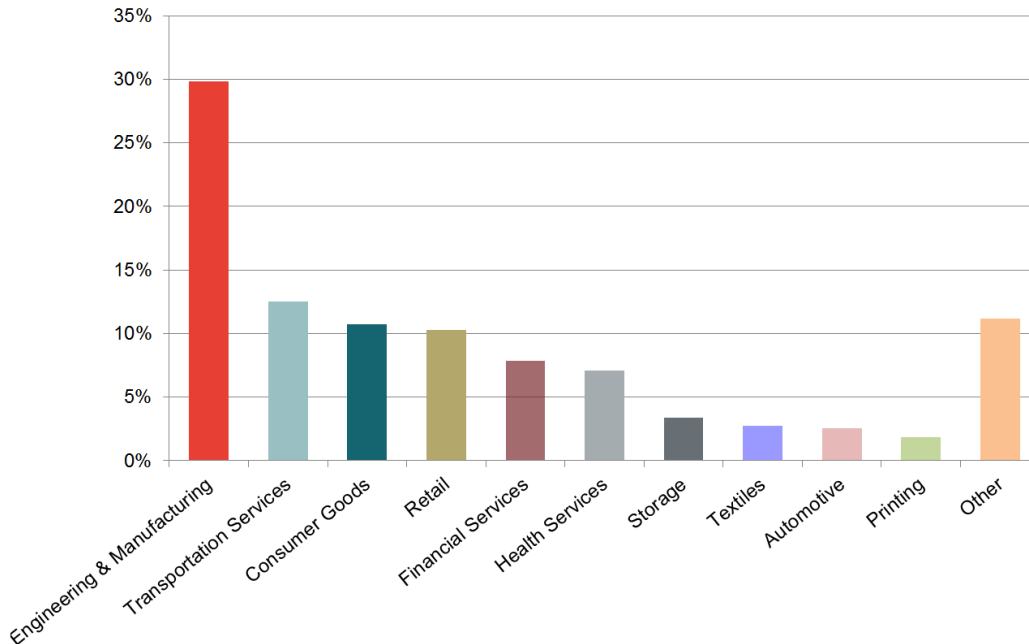
Source: Frontier analysis based on the data of members of the Global Express Association

The demand for express delivery services is not evenly distributed across sectors. **Figure 4** shows that companies in the engineering and manufacturing sector are the largest users of express delivery services, and accounted for 30% of cross border volumes in 2013. These companies manufacture electrical goods, computer equipment such as microprocessors and other high-tech goods.

The next three most important sectors, transportation services, retail and consumer goods account for approximately another 30% of volumes. The latter two involve companies that send their goods to consumers rather than to businesses. Consumer goods include perishable goods and groceries that need to reach retail markets quickly. Retailers specialising in toys, home furnishing, jewellery and sport/recreational products also regularly rely on express delivery. Transportation services include express delivery of spare parts for aircraft.

The express delivery operators also carry the goods or services of companies in a range of other sectors such as financial services, healthcare and pharmaceuticals, textiles, automotive and printing (including publishing).

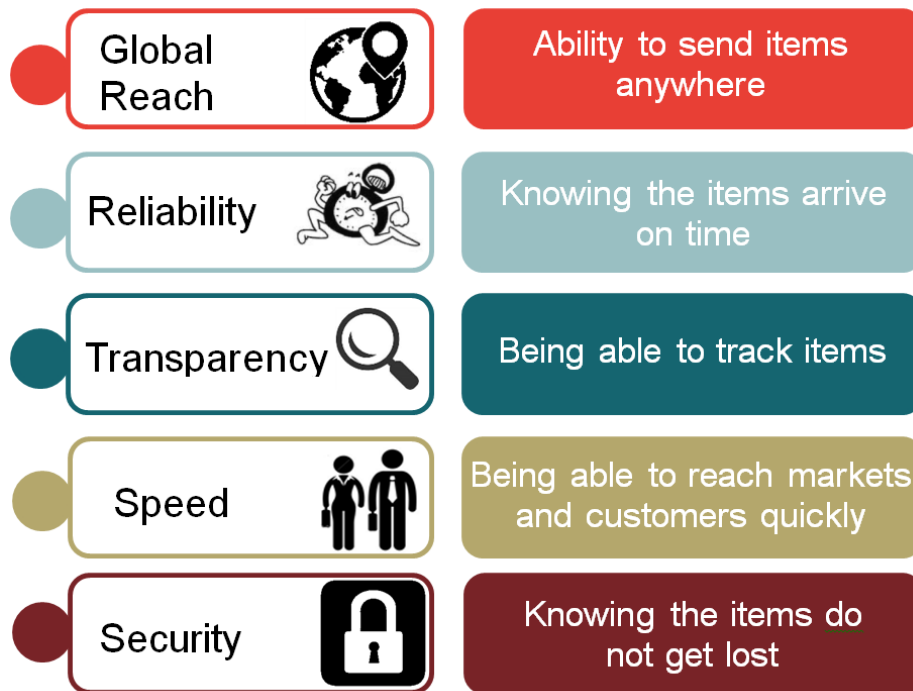
Figure 4. Global breakdown of international express delivery users by sector of activity, 2013



Source: Frontier analysis based on the data of the members of the Global Express Association

2.2 Why do customers choose express delivery services?

Companies generally use express delivery services because they value the attributes of the service shown in **Figure 5**. Companies value the direct access to an international customer base through a guaranteed door-to-door service. They value the ability to have visibility of their items in transit due to multiple checkpoints and tracking systems. The speed of delivery is critical for their time-sensitive products and/or the production of their goods and services under tight schedules. Lastly, they appreciate the security that an integrated delivery operator can provide.

Figure 5. Overview of attributes that customers value in express delivery services

With these attributes, the express delivery services support different types of companies.

- **Global companies:** With globalisation, companies have been increasingly organising production of goods and services through global supply chains. Products are processed – and value is added – in many different countries. These companies have chosen to outsource their delivery and logistics to express delivery operators who ship their products between plants allowing them focus on their core domain of activity.
- **Just-in-time manufacturers:** These companies purchase from suppliers the necessary goods and material for their production to meet just demand (i.e. with no surplus production) and so avoid excess inventory. Express deliveries support firms who adopt this production model.
- **Companies sourcing material globally:** These firms take advantage of the benefits of market globalisation and search for cheaper inputs or better technologies that are not available domestically.

- **Wholesale and E-retailers:** Through their online e-commerce platforms, wholesale and retailing companies increasingly offer international and fast deliveries to their customers. Delivery services are a critical part of their e-commerce operations.

2.3 How do international express delivery providers operate?

The supply chain for international express delivery services involves a number of different steps shown in **Figure 6**. The figure provides a stylised overview of the steps involved. The international express delivery provider picks up the item from the shipper and usually takes it to a local station where items are consolidated. Items are then processed via the outbound customs clearance before being taken to the airport hub for consolidation by destination. Upon arrival in the destination country, items have to be processed through the inbound customs clearance. From there items are generally taken to the local destination station and then delivered to the consignee.

The figure shows that the outbound and inbound customs clearance plays an important role for international express delivery. As express delivery items generally require immediate release, the customs clearance processes can affect speed and reliability of delivery. International express delivery providers therefore depend on efficient customs processes. In contrast, all of the other parts of the supply chain are generally within express delivery providers' control.

Figure 6. Steps involved in providing express delivery services



Source: GEA,

2.4 How have international express delivery services evolved in the recent past?

Overview of the express delivery industry

As mentioned earlier, express delivery operators provide both international and domestic express delivery services. International express delivery services are distinct from domestic delivery services. Where items are shipped internationally, express delivery providers are involved in customs clearance procedures, including the payment of required duties and taxes which we consider in more detail in Section 4. Since we focus our study on the wider economic impact of international express delivery services, it is useful to consider how the international segment of the express delivery industry has evolved over the past years.



2.4.1 Volume trends of cross-border express delivery services

Figure 7 illustrates how demand for cross-border express delivery services has evolved over the past 5 years. Cross-border volumes have grown strongly with an average year on year growth of 7% for the period. Volumes grew faster in the earlier part of this period (2009-2011) and achieved 4 and 5% annual growths in 2012 and 2013 respectively.

These growth estimates are based on the data provided by the GEA members. These integrators, DHL, FedEx, TNT and UPS, are key cross-border parcel delivery providers with full operational control over the logistics of the parcel delivery from origin to destination, including air transport.

Clearly there are a number of other operators active in the industry. Some national postal operators in addition to their own domestic networks are present in international operations. In Europe, for example, Royal Mail (United Kingdom), through its subsidiary GLS, and La Poste (France), through its subsidiary DPD, as well as PostNL (Netherlands) and Austrian Post (Austria), act as international network operators. La Poste, in particular in France and Spain, offers international intra-EEA express deliveries for many EEA countries, as does Royal Mail in the UK. In Asia, Japan Post provides cross border services with its international parcel-express delivery network run by GeoPost, which operates through brands including DPD, SEUR, Chronopost and Exapaq.³ In the Middle East cross-border express operators with a global reach include for example Aramex.⁴ For all these operators, however, there is limited publicly available data preventing the establishment of a robust time series of total cross

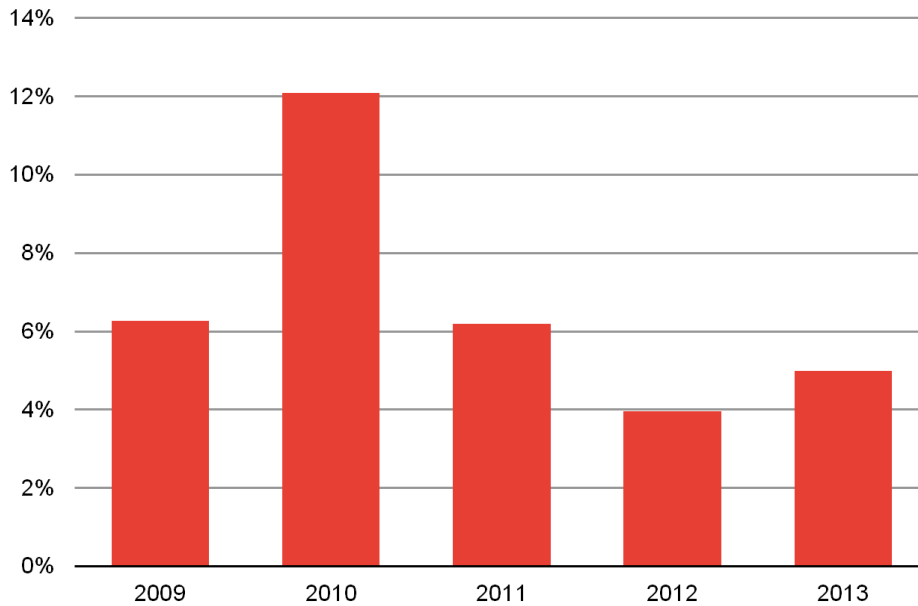
³ Available: <http://postandparcel.info/63014/news/companies/japan-post-allies-with-geopost-to-launch-cross-border-e-commerce-service/>

⁴ Available : <http://postandparcel.info/63157/news/16-net-profit-growth-for-aramex-thanks-to-international-express-and-e-commerce> / and <http://www.aramex.com/express/default.aspx>

Overview of the express delivery industry

border volumes over time⁵. So in this report, we use the data provided by the GEA members to provide data that is consistent in terms of product range and over time.

Figure 7. Growth of international express delivery volumes⁶, % change year on year



Source: Based on GEA members' data; volumes includes next day, time definite and deferred items.

2.4.2 Volume trends of international express delivery services by region

A large share of international express deliveries is delivered within the same region as illustrated in **Figure 8**. For example nearly 40% of express deliveries originating in Asia Pacific are delivered in Asia Pacific. The figure for North America is around 45%. Europe has the highest intra-region traffic with more than 80% of European express deliveries shipped to another destination in Europe.

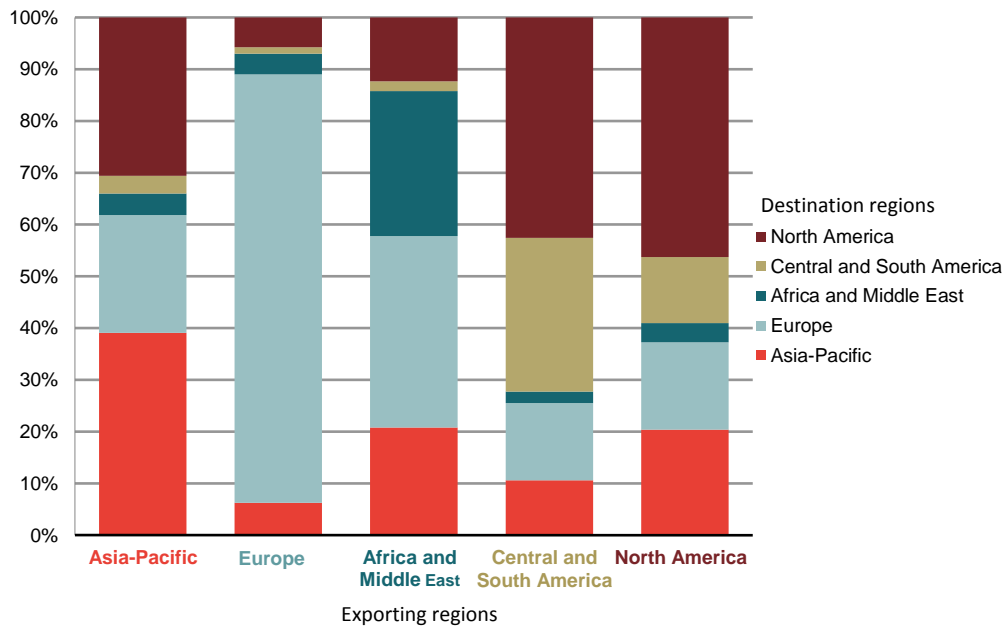
Figure 8 also highlights the primary destination region outside of each region:

⁵ The Adrenale Corporation estimates cross-border parcels volumes and revenues combining express and non-express services. Available: http://www.jcampbell.com/ref_upu_doha/upu/20100325_UPU_Adrenale.pdf

⁶ Includes intra-EU volumes

- North America is the top destination region for express shipments originating in the Asia Pacific (31%) and Central and South America regions (43%).
- Europe is the top destination region for express shipments originating in the Africa and Middle East region (37% of shipments).
- North America and Asia Pacific are the top destination regions for Europe with 6% of European express shipments delivered in each region.
- Asia Pacific is the top destination region for North American express shipments (20% of shipments).

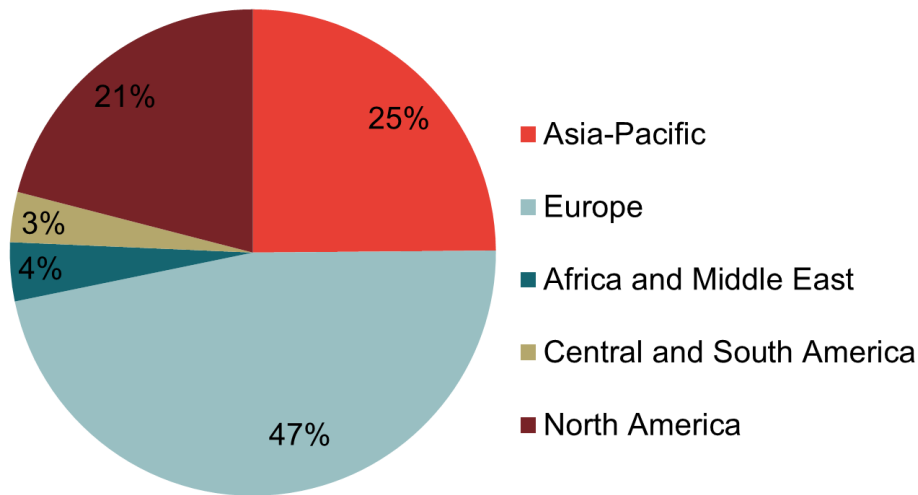
Figure 8. International express deliveries between regions, 2013



Source: Based on GEA members' data; Intra-EU items are treated as cross-border express items

Figure 9 shows the share of total international express traffic by region. Based on the sum of outbound and inbound cross-border volumes per region, Europe is the largest market and accounts for 47% of the total market.

Figure 9. Share of total international express items by region, 2013



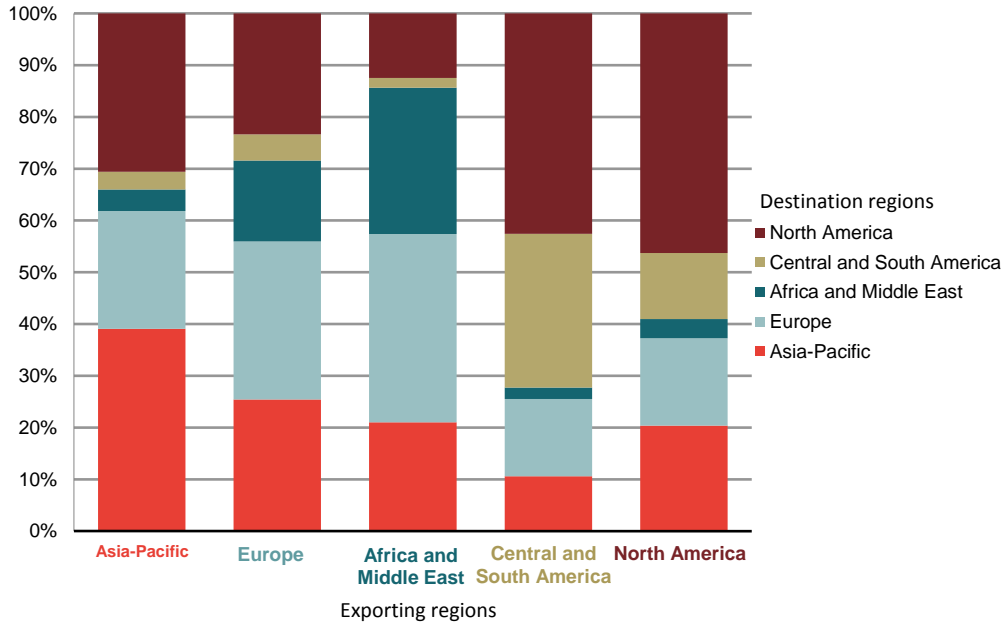
Source: Based on GEA members' data

Note: the volume per region is given by the sum of exported and imported cross-border express items. Intra-EU items are treated as cross-border express items.

Regarding Europe, a substantial number of shipments are between Members States of the European Union (EU) – hence the substantial share of Europe to Europe cross-border items shown in **Figure 8**. If the intra-EU shipments are treated as domestic items, **Figure 10** shows that the share of Europe to Europe volumes accounts for under a third of all shipments originating in Europe and the next two largest destinations regions for Europe are the Asia Pacific and North America regions with each a share of 25% or so⁷.

⁷ In this instance the export Europe region to the Europe destination region is made of the EU originating shipments to non-EU countries and cross-border items between non-EU countries.

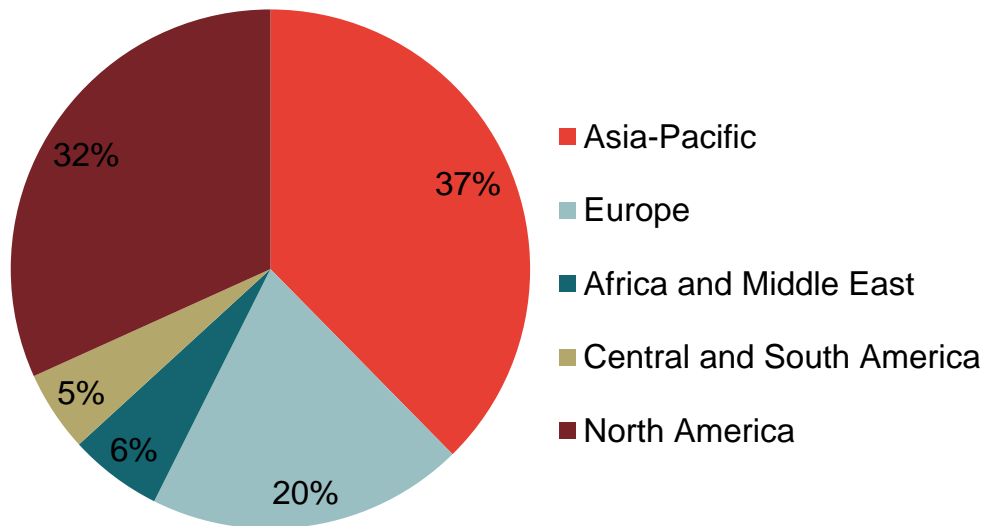
Figure 10. International express deliveries between regions with the European Union treated as a single market, 2013



Source: Based on GEA members' data; Intra-EU items are treated as domestic express items. In this instance the export Europe region to the destination Europe region is made of the EU originating shipments to non-EU countries and cross-border items between non-EU countries.

Similarly, **Figure 11** shows the share of total international express traffic by region if the intra-EU shipments are treated as domestic items. On this basis Asia Pacific is the largest market and accounts for 37% of the total market on the basis of the sum of outbound and inbound cross-border volumes per region.

Figure 11. Share of total international express items by region with the European Union treated as a single market, 2013

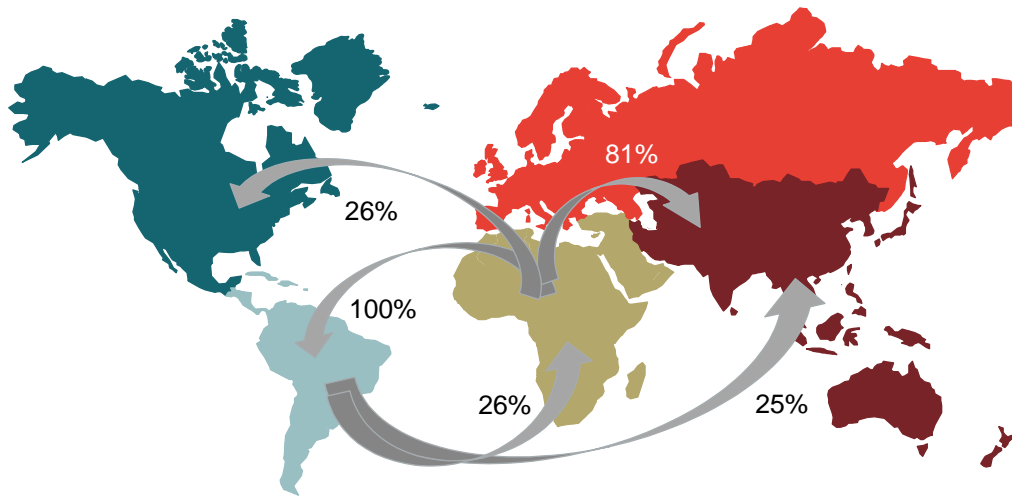


Source: Based on GEA members' data

Note: the volume per region is given by the sum of exported and imported cross-border express items. Intra-EU items are treated as domestic express items.

Over the period 2011-2013, the inter-regional flows of express parcels grew the fastest in the regions of Africa/Middle East and Central and South America as illustrated in **Figure 12** which shows the top 5 inter-regional growth in flows. Note that these are one-way flows. The fastest growth in inter-regional flows can be observed to and from the Africa and Middle East region. This is likely to be the case as volumes are growing from a low base. Its volumes of express deliveries to Central and South America grew by 100%, those to Asia Pacific by 81%, those to North America by 26%. The Central and South America region also saw a large increase in volumes sent towards Africa (26%) and Asia Pacific (25%).

Figure 12. The top five inter-regional flows with fastest growth, 2011-2013



Source: Based on GEA members' data

Table 2 provides inter-regional growth rates for all regions. It shows that the picture is rather mixed. For example, in addition to Africa and the Middle East, Asia has also been a region with a sharp increase in cross-border express services to reach the regions of Europe (22%) and Central and South America (18%). In contrast, Europe and North America have experienced lower growth over the last two years, as shown in **Table 2**.

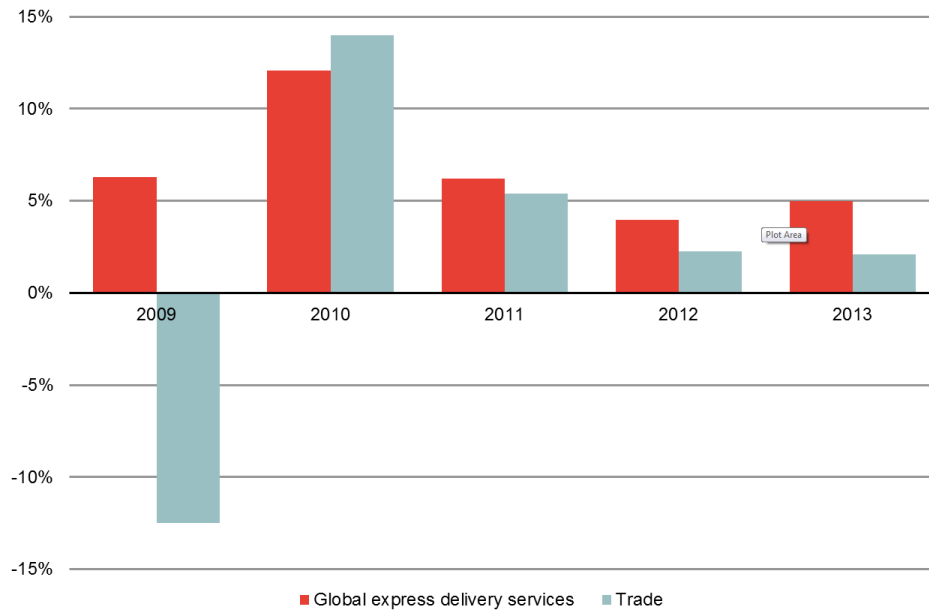
Table 2. Inter-regional flows, growth over 2011-2013

From	To	Asia-Pacific	Europe	Africa and Middle East	Central and South America	North America
Africa and Middle East		81%	15%	14%	100%	27%
Central and South America		25%	0%	26%	-4%	-2%
Asia-Pacific		11%	22%	21%	18%	4%
Europe		5%	12%	5%	-5%	8%
North America		4%	-2%	4%	0%	0%

Source: Based on GEA members data ; Intra-EU items are treated as cross-border express items for the Europe region

2.5 How have international express delivery services evolved relative to trade?

The long run average of growth in world trade in merchandise has been 5.3% (1983-2013). But recently world trade growth has been modest at 2% and below this long run average as illustrated in **Figure 13**. Set against this sluggish backdrop, cross-border express volumes have performed remarkably well. For example, in 2009, global trade declined around 12-13% while international express volumes continued to grow at about 6%. In the following year (2010), trade recovered with a strong positive growth of about 14% and international express volumes also grew more strongly at about 12%. In most years, growth in international express volumes has been higher than the growth in global trade.

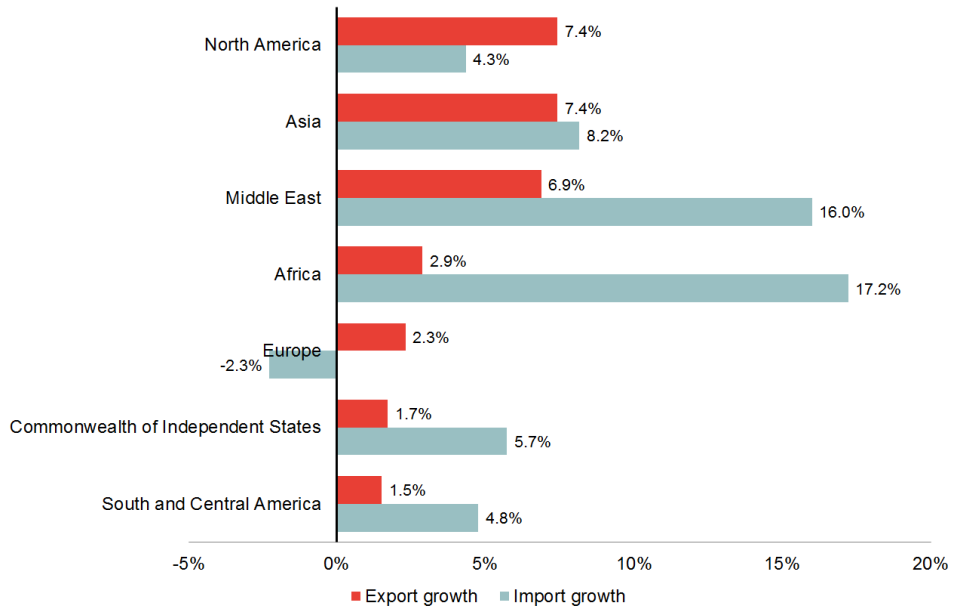
Figure 13. Trade and international express delivery services, % year on year change

Source: WTO and GEA members' data

In terms of trade flows by region, **Figure 14** shows that the regions with the fastest growth in exports have been the Middle East, North America and Asia over the period 2011-2013. Exports have been sluggish in Europe, the Commonwealth of Independent States and South and Central America. The leading regions for imports have been the regions of Africa, and the Middle East.

These trade results present overall export or import growth for a region. However, this may mask the wide variations in exports by region. For example, the global export growth of South and Central America may consist of fast export growth to some regions and slow export growth to other regions. In our study of the impact of customs capability and trade, we use country pair data for express volume, customs performance, and exports and imports. This allows a richer analysis of the statistical relationships between these variables. We now turn to this analysis in Section 4.

Figure 14. Exports and imports by region, growth over 2011-2013



Source: WTO

3 Economic footprint

Direct, indirect and induced employment figures are a useful metric to measure the economic footprint of the express delivery industry. This section provides a short description of our approach and results. More detail is provided in Annex 1.

While the focus of this study is on international express delivery, the economic footprint of the GEA members is based on their total (international and domestic) employment and expenditure, as in many cases employment and expenditure cannot easily be split between domestic and international services as they are provided jointly.

3.1 What is DII employment?

In order to provide its core service, express delivery providers employ people and use goods and services in each of the countries in which they operate. This creates a ripple effect down the supply chain, which in turn creates indirect and induced jobs. More specifically:

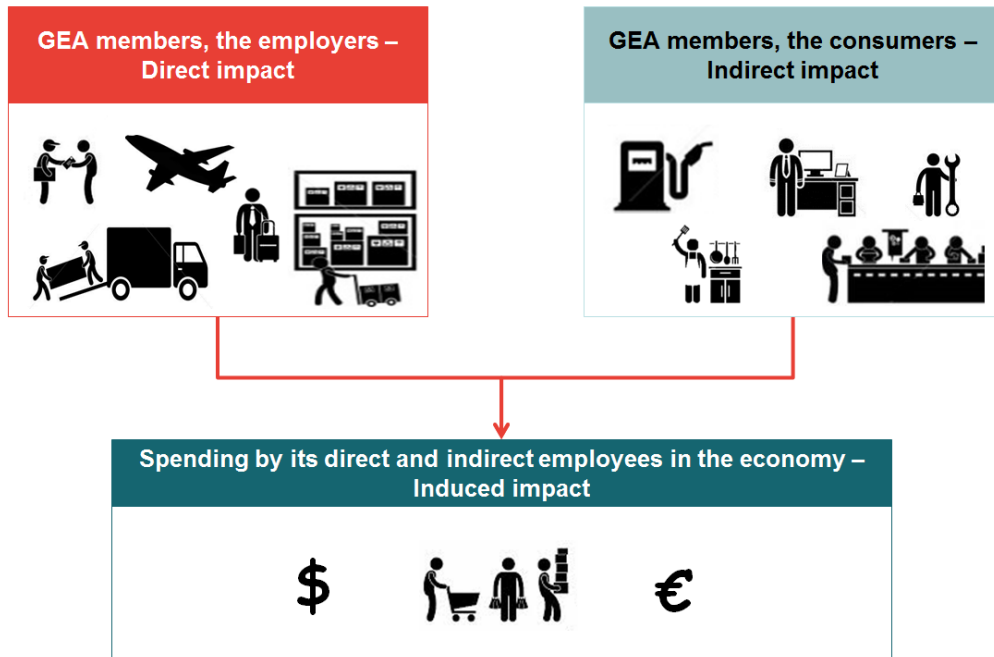
- **Direct employment** measures employees that are on the pay-roll of GEA members or work directly in the express delivery industry. For example, delivery staff, administrative staff, and sub-contractors.
- **Indirect employment** measures employees along the supply chain that produce the goods and services that express delivery providers buy. In order to carry out their operations, express delivery providers incur expenses on inputs such as aircraft, motor vehicles, fuel, etc. This expenditure creates indirect employment in the sectors that produce these inputs.
- **Induced employment** measures employment across the economy that is sustained by the demand created by direct and indirect jobs. Expenditure by direct and indirect employees in turn creates economic activity and more employment in the form of induced jobs.

Figure 15 illustrates the concept. As shown in the figure, direct employment looks at the GEA members as employers, hiring their staff and thus directly creating jobs. Indirect employment looks at GEA members as consumers of intermediate goods, that require employment in the companies that provide these goods. Induced employment looks at the spending by direct and indirect GEA employees, and tries to measure the employment necessary to produce goods and services.

The DII economic impact assessment is based on a counterfactual of no alternative direct employment and expenditure. As a result, the impact needs to be interpreted not as the true additional economic value but simply as an estimate

of the economic value associated with the express delivery activities in the world today.

Figure 15. Overview of direct, indirect and induced impact



Source: Frontier analysis

3.2 Our results

Overall, the express delivery industry facilitated around three million jobs in the world in 2013. This represented 0.19% of global GDP or over \$140 billion. Our results are based on GEA members’ data only and should therefore be viewed as a conservative estimate of the overall footprint of the express delivery industry. We have not ‘grossed up’ the figures as the assumptions required to do this would reduce the reliability of our analysis.

Table 3 below shows the breakdown of our results in direct, indirect, and induced impact; both in terms of employment and proportion of GDP. The global express delivery industry provides almost 600,000 direct jobs⁸ and supports over 1,800,000 indirect jobs and over 570,000 induced jobs.

⁸ We report jobs as full-time-equivalent (FTEs) to provide a comparable metric. In Oxford Economics’ report for the GEA in 2009, they reported the total number of direct jobs as 1.3m. This figure is based on head count (i.e. the number of people employed) rather than FTEs which explains the difference.

Table 3. DII impact of express delivery industry

	Global employment (full-time equivalent)	Global GDP Impact (%)
Direct impact	585,000	0.04%
Indirect impact	1,815,000	0.11%
Induced	571,000	0.04%
Total	2,971,000	0.19%

Source: Frontier Economics estimates based on data from GEA members and publicly available sources⁹.

Table 4 provides an overview of the distribution of the total results by region. North America is the region with the biggest employment impact followed by Europe. It is worth noting how the relative proportions are not the same within the employment and the GDP impact figures. The reason for this difference lays within the fact that GDP impact metrics are calculated using region specific assumptions.

Table 4. DII impact of express delivery industry by region

	Total DII employment (full-time equivalent)	Regional GDP Impact (%)
Europe	658,000	0.037%
North America	1,390,000	0.124%
Asia-Pacific	457,000	0.016%
Central and South America	228,000	0.006%
Africa and Middle East	238,000	0.006%

Source: Frontier Economics estimates based on data from GEA members and publicly available source.

⁹ We cannot provide the trend of DII economic impacts as we only have the relevant data for 2013.

4 Relationship between customs capabilities, trade and international express delivery

In this section we discuss our approach and results to analysing the relationship between customs capabilities, trade and international express delivery. We first consider the relationship between institutions and trade in general, then analyse the relationship between certain specific border clearance policies and levels of trade between countries, and finally describe the particular role of international express delivery services in facilitating this trade.

4.1 How does global express facilitate wider economic value?

The previous section estimates the economic footprint that relates to the activities of the express delivery industry itself. While clearly important, it is possible to quantify the direct, indirect and induced impacts of any commercial activity. These are measures of the scale of the companies that make up global express supply chain.

These DII measures alone, however, do not measure the full economic contribution of global express delivery, because global express plays an essential role for its customers in helping those companies to create further economic value by their activities. This economic activity which is *enabled* or *facilitated* by global express can be referred to as its ‘catalytic’ value.

For example, companies that sell perishable food or companies that sell radio-pharmaceutical treatment with a short half-life need express delivery services to access markets so that the speed of delivery is aligned with the product life. This illustrates how the express delivery providers enable or facilitate trade rather than creating it.

For the avoidance of doubt, the economic value enabled by global express is not necessarily the value of goods and services carried by global express providers. Rather, it is what the wider economy would lose if international express services were not available. As with efficient customs policies at borders, international express delivery services improve the efficiency with which companies can do business across borders and across significant distances. More efficient delivery services can increase the volume of trade between countries by making the service faster, cheaper and more reliable. These properties can be expected to lead to an increase in the level of trade activity which then boosts overall economic activity in the wider economy.

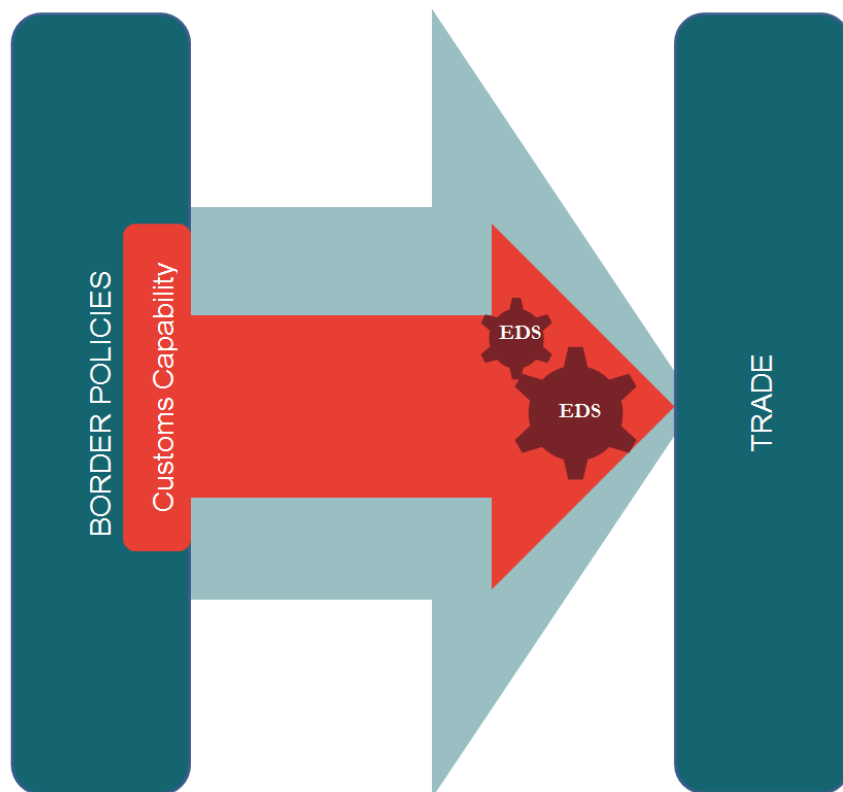
In conducting this analysis we recognise that the relationship between trade and global express volumes is obviously two-way. To a large extent express volumes

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grow *because* trade grows. Nevertheless, the growth in trade also relies to a significant extent on efficient international express delivery services: the presence of secure, reliable and fast delivery options does not create the demand for companies to trade. But it does make it easier; hence it is to be expected that improved international express delivery results in higher volumes of trade. For this reason it is incorrect to say that international express delivery *creates* additional trade, but it is perfectly reasonable to say that it *facilitates* it.

Figure 16 illustrates that we consider the role that international express delivery plays in facilitating trade, particularly in the context of improvements in customs capabilities. As a result, we first consider the overall relationship between border policies and trade, then the specific relationship between customs capability and trade, and finally the role of express delivery services in facilitating trade.

Figure 16. Overview of conceptual framework – Catalytic impact of international express delivery services



Source: Frontier Economics; EDS : Express Delivery Services

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4.2 The relationship between institutions and trade

With the growth in world trade and reductions in traditional forms of protectionism – such as tariffs and quotas – a body of research has developed that considers the importance of trade facilitation, in particular, the effects of administrative processes and institutions on the flow of goods.



The focus of this research ranges from customs processes, narrowly defined, to broader issues including transport and communications infrastructure, as well as various regulatory institutions (such as standards and testing bodies). Barriers considered also include informal and tacit barriers such as measures of corruption.

The form of this research varies from paper to paper. A common approach is to identify key barriers to the movement of goods, and compute trade transactions costs in dollar terms. Alternatively, the restrictiveness of border processes can be measured by indices (such as the Logistics Performance Index developed by the World Bank). The impact of these trade transactions costs or measures of restrictiveness on trade flows has been estimated in various ways, either econometrically, or by using computable general equilibrium modelling.

The OECD provides an overview of recent research into the impacts of trade facilitation, using various measures and methodologies.¹⁰ This review suggests that even a modest reduction (1%) in trade transactions costs could increase global welfare by US\$40bn annually. Another OECD study focuses specifically on measures of customs efficiency, as captured by the number of days required for goods clearance at the border, the number of signatures and documents needed. The results suggest that trade volumes respond substantially to reductions in each of these three metrics – a 10% reduction in the time that goods are held at the border was estimated to increase imports by around 6%,

¹⁰ Peter Walkenhorst and Tadashi Yasui “Quantitative assessments of the benefits of trade facilitation” in OECD (2009), *Overcoming Border Bottlenecks – The Costs and Benefits of Trade Facilitation* pp 19-49

while a 10% reduction in the number of signatures or documents, was estimated to lead to increases in imports of around 10%.¹¹

Similarly, the World Economic Forum¹² has found that reducing supply chain barriers facilitates trade and increases world GDP by several times more than removing all tariffs. Simulation, based on computable general equilibrium modelling, indicates that an improvement in two aspects of trade facilitation (border administration and transport and communication infrastructure) from current levels halfway to global best practice would increase global trade by 14.5% and global GDP by 4.7%.

Finally, the WTO's "Global value chains in a changing world" suggests that a 10% improvement in flow of efficiency in across-the-border operations can boost GDP of APEC economies by US\$21bn annually.¹³

Overall, the existing research points to the fact that trade transaction costs can arise from a number of sources and can be substantial; and therefore that reforms that reduce these costs can be expected to have a significant positive impact on trade and growth. The relationships are identified as clearly causal – lower transaction costs increase trade.

4.3 The Customs Capability Index

Considering the specific relationship between custom capability and trade, research suggests that customs capability is one of the institutional factors that have an important impact on trade. Customs capabilities can be defined in general terms as including all quality aspects of the customs services.

General research on the relationship between customs capability and trade finds a positive relationship. For example, the research commissioned by the World Economic Forum (WEF) found a positive causal relation between customs barriers and unit handling costs. Delays arising from customs clearance bottlenecks and border administration inefficiencies are the major barriers express delivery companies encounter, particularly in less-developed countries where a lack of investment and weaker institutions hamper efficiency. Similarly, the US International Trade Commission (2003) found that for countries that

¹¹ Norbert Wilson, "Examining the effect of certain customs and administrative procedures on trade" in OECD (2009), op.cit, pp 51-80

¹² Available: <http://www.weforum.org/news/report-reducing-supply-chain-barriers-could-increase-global-gdp-six-times-more-removing-all-imp>

¹³ Available: http://www.wto.org/english/res_e/booksp_e/aid4tradeglobalvalue13_e.pdf

already import a particular good from the United States, customs improvements would increase the level of trade by as much as 17% in some countries.¹⁴

To add to this body of evidence, we have performed our own detailed econometric analysis of the impact of customs capabilities on trade. For this analysis we used data from the Customs Capability Database which is collated by the GEA.¹⁵

How is the index measured?

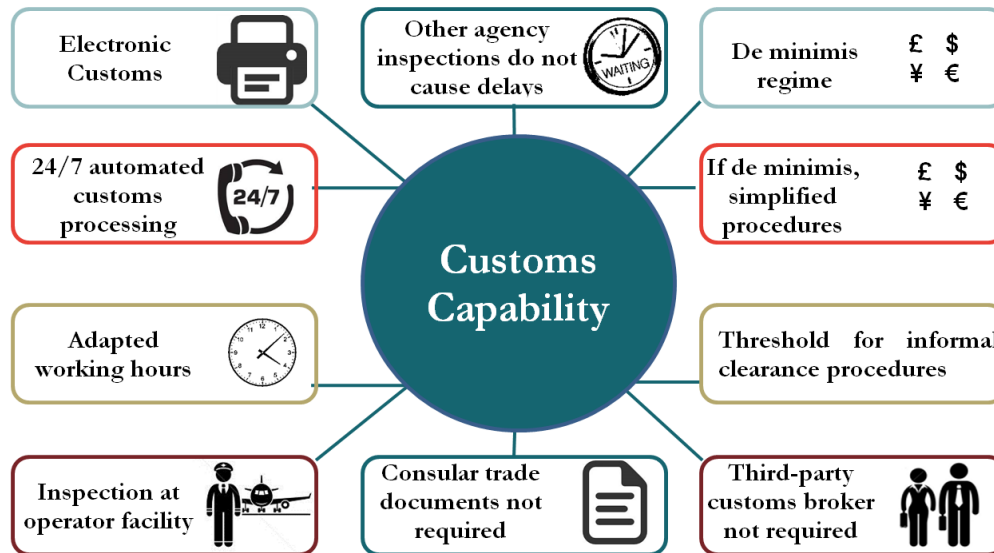
Our analysis focussed on ten specific measures of customs capability from the GEA's database. These are shown in **Figure 17**. We have constructed an index based on these measures that records how many of the measures have been implemented by each country. After testing various specifications, we found that the data was best described by defining a Customs Capability Index (CCI) for each country on a scale of 1 to 10 based on how many of the 10 mechanisms that country already has in place.¹⁶ The CCI score represents those policy measures that are important for goods requiring immediate release. A country with a score of 10 therefore has implemented all of the measures that facilitate shipments of express items whereas a country with a low score has only implemented a small number of measures.

¹⁴ US International Trade Commission (2003), Express Delivery Services: Competitive conditions facing US-based firms in foreign markets

¹⁵ The database can be accessed on the GEA's website: <http://www.global-express.org/index.php?id=271>

¹⁶ In Annexe 2 we provide more detail on testing alternative weightings of the CCI.

Figure 17. Overview of customs capability measures for shipment requiring immediate release



Annexe 2 provides the full list of questions that we included. In summary, the CCI index includes:

- **Electronic customs:** this captures whether customs accept and process data electronically so shipments can be released prior to or immediately after arrival.
- **24/7 automated customs processing and adapted working hours:** this captures whether automated processing is available around the clock and working hours of customs personnel are adapted to commercial needs.
- **Inspection at operator facility or transfer and other agency inspection:** – this captures whether customs inspect and release goods at the operator’s facility or require their transfer to another facility and whether other (non-customs) agencies cause delays to releasing shipments.
- **Necessity to provide a consular trade document and third-party customs broker:** this covers whether customs or other agencies require documentation such as consular invoice or other trade documents and whether clearance requires involvement of a third-party customs broker.
- ***de minimis* related measures and threshold for informal clearance procedures:** The first *de minimis* measure checks whether a country has a *de*

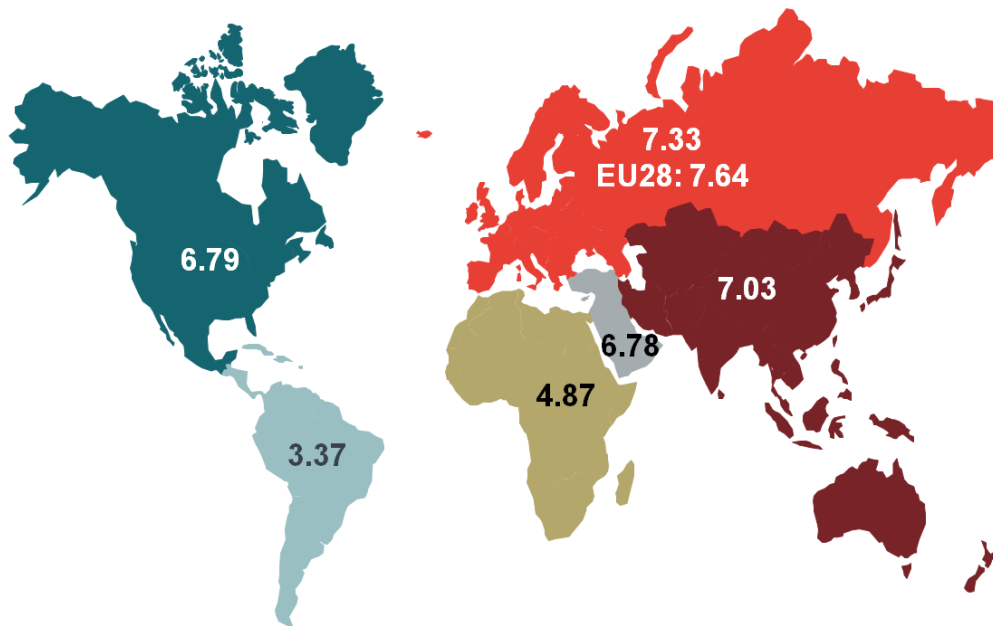
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de minimis regime in place at all. The second *de minimis* measure checks whether, in cases where such a regime is in place, the customs procedures are simplified. The last measure checks whether there is a threshold for informal clearance procedures.

How does the CCI differ by region?

In Annexe 3 we present the Customs Capability Index score calculated for each country in the database. **Figure 18** below shows the CCI average score weighted by GDP for each region. The figure shows that the regional averages are relatively close. The highest weighted average score is recorded for Europe followed by North America and Asia. The Middle East has a slightly lower score than the top three regions. With a weighted average score of 4.87, Africa's score is significantly lower and Central and South America's score is less than half of the top four regions. A simple average instead of weighted average exhibits a narrower range but the same relativities.

Figure 18. Weighted average CCI by Region (weights based on national GDP)



Source: GEA data, Frontier calculations

Interestingly, the regional averages mask significant variation across countries. For example, Africa, Asia, Europe and Central and South America all have individual country scores ranging from 1 to at least 8.5 and scores for countries in the Middle East range between 3 and 8. North America only includes three countries so it has a smaller range.

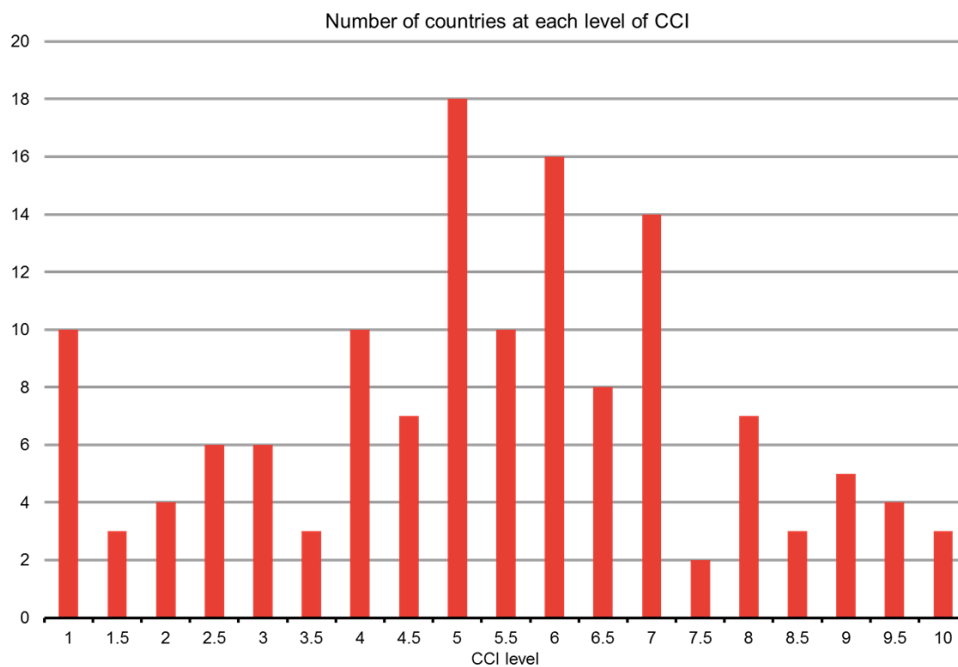
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When comparing the CCI scores in **Figure 18** above against **Figure 12** it is clear that, in the recent past, countries with lower CCI scores have seen greater growth in international express volumes. However, this does not imply in any way that a lower CCI index leads to higher growth in express volumes. Instead, it suggests that countries in Africa and Central and South America are growing from a low base.

How is the CCI score distributed across countries?

To get an idea of how CCI scores vary across countries, **Figure 19** shows the distribution of scores by country. This shows that the most frequent score is in the range 5-6 and the distribution is roughly symmetric, except for a concentration of poor performers with a score of 1.

Figure 19. Distribution of countries across CCI levels



Source: GEA data, Frontier calculations

4.4 Measuring the relationship between customs capability and trade

How did we measure the impact of the CCI on trade?

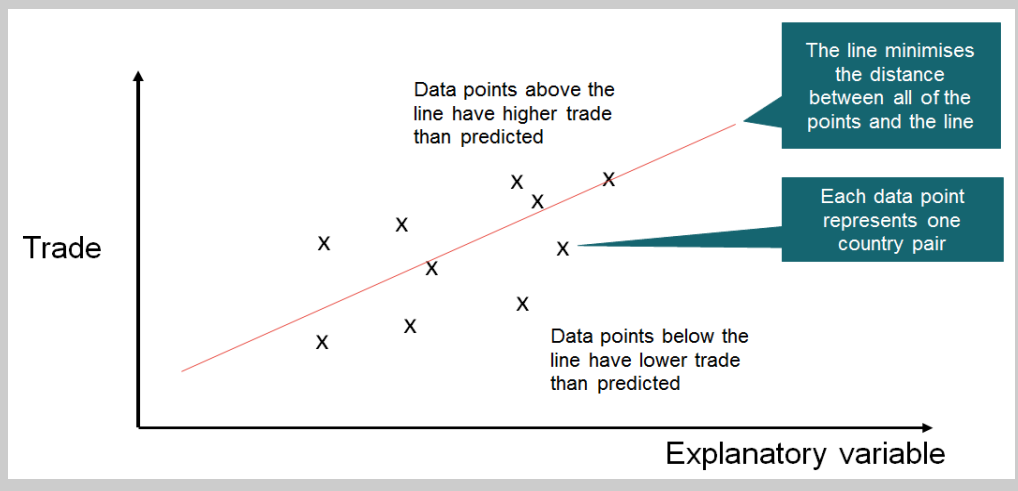
Our hypothesis is that a country with a higher CCI score is likely to trade more as transaction costs for goods requiring immediate release are lower, after accounting for a range of control variables. To test this hypothesis, we have constructed a dataset with more than 10,000 country pair observations. For each country pair, the dataset includes the CCI score (for the origin and destination country), population, per capita income, distance, World Bank LPI index, World Bank Ease of doing business index score and a range of other variables that can explain trade flows between two countries (e.g. whether the country pair has historic colonial links). All of the data refers to 2013.

We use econometric techniques to test to what extent the differences in CCI score can explain differences in trade flows after controlling for a range of other variables. Full details of our analysis are presented in Annexe 2.¹⁷ It shows that we tested different datasets, different control variables and a range of specifications.

¹⁷ To further ensure the robustness of our findings, all our econometric work has been over-seen and peer reviewed by Prof. Ron Smith, Professor of Applied Economics at Birkbeck College, London.

How regression analysis works

In statistics, regression analysis is an econometric technique or a statistical process for estimating the relationships among variables when the focus is on the relationship between a dependent variable and one or more independent variables. Regression analysis is commonly used in trade analysis. The basic idea is to identify the way in which one variable influences another. The figure below plots trade against an explanatory independent variable, e.g. GDP per capita. The crosses each represent a country pair. Regression analysis involves determining a line that best fits the data. In this simple example below this is achieved when the total vertical distance between the line and the crosses is minimised. The slope of the line can then be used to determine the average impact of an additional unit of the explanatory variable.



What are our overall results?

We found that, even after controlling for a range of expected drivers, there is a robust and statistically significant relationship between the Customs Capability Index and trade flows to and from any given country. In summary, we found that implementing any one additional measure from the 10 measures making up the CCI increases trade *on average* by **4.4%** for the country improving its customs capability. Note that we expect this effect to happen over a reasonable period of time. This result is highly significant from a statistical point of view, meaning that using the standard 95% confidence limit test, we can rule out the possibility that this finding is coincidental.

Table 5 shows a breakdown of our results. It shows our results for three different specifications which include different control variables that relate to the quality of institutions and ease of trading. **Table 5** shows that, on average, improving its CCI score by 1 can increase a country's trade by between 4.4% and 5.3%. We therefore use the lower figure as it is most conservative.

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Table 5. Average impact of improving CCI score by 1 on exports, imports and trade

Institutions-related control variable:	World Bank Ease of Business	World Bank LPI Infrastructure	Including both institution related control variables
CCI Export	4.8%	6.0%	5.0%
CCI Import	4.5%	4.6%	3.7%
Average Impact on Trade	4.7%	5.3%	4.4%

Source: Frontier Analysis

For example, if Bolivia introduced two of the customs capabilities measures (e.g. 24/7 automated processing and adapted working hours), we project that trade to and from Bolivia would increase by 8.8% or \$2.03bn. This is based on an increase in exports of \$1.3bn and an increase in imports by \$760m. Similarly if Cameroon implemented electronic customs, we project that its trade would increase by over \$670m or 4.3%. This is based on a \$370m increase in exports and a \$300m increase in imports.¹⁸

The models show that the impact of improving CCI is consistently stronger for exports than for imports, with the range being 4.8% to 6%. This indicates that introducing a new CCI measure, other things being equal, can be expected to improve trade and, on balance, strengthen the balance of payments of the country in question. While the CCI measures generally have a more direct impact on imports, the stronger effect on exports can be explained by a range of factors.

- One of the most notable developments of the last two decades has been the emergence of global supply chains. Various stages of production, that previously might have been clustered together, can now be coordinated over greater physical distances. In addition to trade in goods, there is now ‘trade in tasks’, that is, specialisation in particular stages of production as opposed to the production of particular goods.¹⁹ As a result, trade balances are more closely linked with imports leading to exports with an additional ‘layer’ of value added.

¹⁸ The total increase in trade depends on each country’s starting trade balance so these figures reflect these.

¹⁹ Baldwin, Richard & Lopez-Gonzalez, Javier, (2013) “Supply-chain trade: A portrait of global patterns and several testable hypotheses”, CEPR Discussion Papers9421, C.E.P.R. Discussion Papers.

- Trade relationships are often characterised by two-way flows as both trading partners want to benefit. As a result, improvements to the ease of importing are likely to have an impact on both imports and exports.
- Research by the World Bank²⁰ on the benefits of trade facilitation came to a similar conclusion. The paper found that “the results suggest that the scope and benefit of unilateral trade facilitation reforms are very large and that the gains fall disproportionately on exports”.

While the impact of improved border processes on trade in general is well-established, our results extend this general observation to show that improvements in the specific customs activities and processes covered by the GEA’s Customs Capability Database have a measurable effect on unlocking additional international trade. As the measures covered by the database are only a subset of possible customs process improvements (i.e. those that are important for goods requiring immediate release), establishing a relationship between the CCI and overall levels of trade was not a foregone conclusion. Instead our data analysis shows a robust and significant relationship, which indicates that these specific customs measures have a measurable effect.

Are the results generally applicable?

We have tested the specification of our models carefully to ensure that the functional form of our model has the best possible fit of the data, combined with a meaningful economic interpretation. It is important to emphasise that our results apply on average and should be viewed as an increase in trade over time. We have undertaken further tests to confirm that our results apply equally – on average – to all countries.

First, we find that the impact of improvements in the CCI is linear. Improving a score from 6 to 7 or from 2 to 3 can both be expected to raise trade for the relevant country, on average by c. 4.4%. The logical extension of this is that if a country raises its score by 6 it can increase its trade by $6 * 4.4\%$, i.e. c. 27%. However, we need to be careful about drawing such inferences from this data. Economic models of this type may not be very good as a means of predicting dramatic change. The model shows the typical relationship between a county scoring 5 and one scoring 6; between one scoring 6 and one scoring 7, etc.. Although the finding that a linear relationship is the best fit of the data is robust, it would be unwise to infer from this that any country, regardless of its starting point and other circumstances, would automatically achieve the cumulative benefit the model implies for a significant increase.

²⁰ Wilson, Mann, Otsuki, (2004), Assessing the Potential Benefit of Trade Facilitation: A Global Perspective World Bank Policy Research Working Paper 3224

On the other hand, improvements of this kind are by no means impossible in particular circumstances. If a country has a very low CCI score and trade in line with the low level predicted then it is not necessarily unreasonable to posit that the country can raise its trade significantly by radically overhauling its border processes. For example, Sri Lanka currently scores 1.5 in the CCI – lacking electronic customs, 24/7 automated customs processing and a *de minimis* regime. Our results imply that if Sri Lanka jumps from a 1.5 to a 7.5 in the CCI it could increase its exports by 30% and its imports by 22%. These figures correspond to less than \$5billion each. To put it into perspective, they each correspond to around 0.003% of total world exports and imports. Such a change does not look impossible for a country that transforms its trade-related processes. It would not happen overnight, but over a period of a few years, the levels of trade could adapt significantly.

Second, improvements in customs capability measures are equally beneficial to high and low income countries. We tested the models by segmenting flows into OECD and non-OECD blocks. These tests suggest that the strength of the effect on trade between non-OECD countries is on average the same as for the sample as a whole. This suggests that there is little variation in the effect between high income countries and low income countries.

However, this segmentation fails to find a significant effect of CCI on trade when at least one of the trading countries is in the OECD. This result is driven to large extent by the small sample size of OECD countries and the relatively small variation in CCI measures between them. However, it does indicate that the role of non-OECD to non-OECD trade is significant in our overall result and provides some evidence that the power of improving border procedures may be greater for non-OECD countries.

Third, there are also no significant variations in the scale of this effect between regions. Although splitting the model into regions produced somewhat different average effects by region, these differences could not be identified to be statistically significant. We have found that this impact is relatively stable between high and low income countries so there are no significant geographical differences in the effect.

In addition to considering whether the results apply equally to all countries, we have also tested whether different weightings of the components of the CCI index change the results. Our tests show that equal weights are most appropriate, as the fit of the model does not improve when allowing each component to assign its own weight (by including them separately).

How do our results compare against other studies?

Comparing the scale of the impact, 4.4% of trade for the implementation of one measure, to the effects identified in the literature, we find that our estimate is in line with other results:

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- As mentioned above, the WEF found that moving all countries halfway toward best practice in respect to two measures (border administration and transport and communication infrastructure) would increase global trade by 14.5%. Our results suggest that moving all countries halfway toward best practice (i.e. moving all countries with a CCI score below 5 to a score of 5), would increase trade by 2.2%. It makes sense that the impact we measure is lower than the one estimated by the WEF as we only consider a subset of the measures they analyse. Our findings are therefore in line with previous research by the WEF.
- An OECD study mentioned above, estimates that a 10% reduction in time of goods held at the border would increase imports by around 6%.²¹ In comparison, our results suggest that adding one of the CCI measures would result in an increase in imports of 3.7% on average. We consider our results to be conservative when compared against the OECD study.
- A study on Sub-Saharan Africa estimates that reducing export costs by 10% through improvements in the efficiency of the trading process increases exports by 4.7%.²² In this context, our results appear to be reasonable.

Overall, we conclude that the magnitude of our results is in line with previous studies and, if anything, appears to be more conservative than most cross-country studies.

4.6 The role of international express delivery in facilitating catalytic impacts

The analysis above identifies clearly the benefits that improving specific customs capabilities can have in terms of encouraging increased levels of trade between countries. A further, important question that we researched as a second step is: what role does the express delivery industry play in facilitating the additional trade that can be unlocked by improvements in these customs capabilities?

In Annexe 2 we describe an additional econometric analysis in which we test for the ‘channel’ by which improvements in the CCI result in increases in trade. This was done by expanding the previous model to include volumes of goods carried by members of the GEA as an additional factor used to explain differences in trade between country pairs in our data matrix. This analysis shows conclusively

²¹ Norbert Wilson, “Examining the effect of certain customs and administrative procedures on trade” in OECD (2009), op.cit, pp 51-80

²² Hoekman, Bernard, and Alessandro Nicita. (2011) “Trade Policy, Trade Cost and Developing Country Trade.” *World Development* 39 (12): 2069–79.

that international express delivery is one of the key channels that enable an improvement in the CCI to facilitate an increase in trade. Depending on the model specifications discussed in Annexe 2, the parameter on the CCI is reduced by between 33% and 66%, with a reduction of 50% for the preferred model. This implies that international express volumes play a significant role in facilitating trade promoted by improvements in the CCI and that up to two-thirds of this trade is directly facilitated by international express, with 50% as representing a reasonable mid estimate of the effect.

A useful analogy can be found in the introduction of the transatlantic telegraph and shipping in the 19th century. Following the laying of the telegraph there was a sharp and significant rise in the volume of US/UK trade. This change is analogous to improving customs capabilities: the telegraph did not ‘create’ the latent demand to trade, but it made it very much easier, leading to a surge in demand. But in practice this surge in trade would not have been possible without also having ships able to carry the traded goods across the Atlantic. Hence while the trigger for increased trade was the telegraph, the availability of shipping capacity was a necessary condition to allow the increase to happen.

However, one important difference between this analogy and the present case is that it is not necessary, and we are not stating, that all the value of goods traded as a consequence of improvements to the CCI would be carried by express delivery services. This will be true for a proportion of goods. But in other cases express delivery may be providing a more focussed contribution. For instance, international express operators may be carrying the samples between trading companies that are necessary to approve production runs, even if the bulk produce traded ultimately travels by an alternative means. Nevertheless, express delivery plays a necessary part of the transaction, because in this case the goods would not be traded without the ability to transfer samples in a timely fashion.

4.7 Overall conclusion

Our econometric analysis is sufficiently clear to say with confidence that improvements in the measures covered by our CCI lead to a significant increase in observed trade, and that approximately half of this specific increase is facilitated by international express delivery services.

The measures covered by the GEA’s database relate to measures which facilitate shipments requiring immediate release. These are measures that are, unsurprisingly, important to the international express industry. We consider that there are significant benefits from creating an environment in general in which all forms of trade can flourish, regardless of the means by which goods are transported. In this context our evidence shows that the specific border improvements covered by the capabilities shown in **Figure 17** promote trade,

**Relationship between customs capabilities, trade
and international express delivery**

with a large proportion of the trade impact facilitated by international express delivery services.

We acknowledge that some improvements to customs capabilities may have resource implications for the countries in question. However, the scale of the potential benefits available from improvement clearly indicates that there is significant value in improving customs capabilities.

5 The changing role of international express delivery in the context of e-commerce

The previous sections have provided an estimate of the economic footprint of the international express delivery industry and described its role in facilitating trade. Both sections consider the current state of the industry. In contrast, this section explores to what extent the role of international express delivery in facilitating economic value may change in the future, particularly in the context of e-commerce.

5.1 Global e-commerce is expected to be a major driver of economic growth

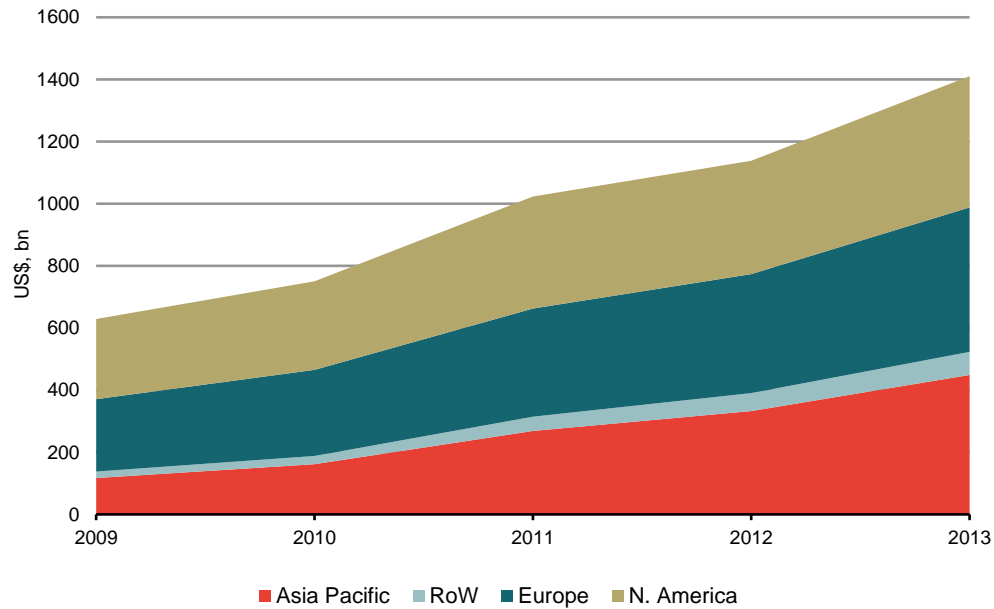
Customers shopping habits have changed tremendously over the last decade with the wide take-up of the internet. In Europe, for example, the proportion of consumers engaging in e-commerce has grown significantly in recent years from 20% in 2004 to 45% in 2012.²³ Going forward, e-commerce is expected to:

- continue to grow substantially in the future, with double-digit growth expected to be the norm; and
- become increasingly global with regions outside of Europe and North America growing faster than the average.

B2C e-commerce

Figure 20 shows that total global business to consumers (B2C) e-commerce turnover reached US\$1.4 trillion. Europe and North America have been the largest B2C e-commerce markets. But B2C e-commerce in the Asia Pacific region has grown the fastest in the recent past and consumers in the region now spend more on e-commerce purchases than those in North America.

23 Consumer Conditions Scoreboard, Consumers at home in the single market, Ninth Edition, July 2013, Available: http://ec.europa.eu/consumers/consumer_research/editions/docs/9th_edition_scoreboard_en.pdf

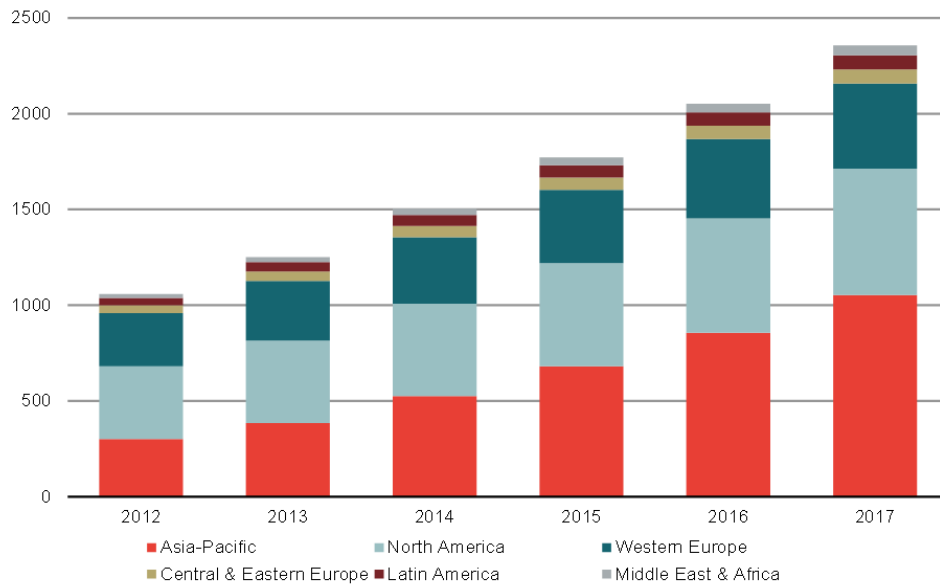
Figure 20. B2C e-commerce turnover by region, 2009-2013, US\$ bn

Source: emota e-commerce conference 2013 (converted in US\$)

It is expected that the trend for B2C e-commerce will continue. B2C e-commerce is expected to reach \$2.3 trillion of sales by 2017 or grow by nearly 20% per annum on average as illustrated in **Figure 21**. In terms of regional growth, e-commerce in Asia is projected to continue to grow faster than North America and Europe. By 2017 the Asian e-commerce market is projected to be 60% larger than in North America and 137% larger than European markets. The smallest e-commerce markets at present in Latin America, the Middle East, and Africa, are also projected to grow at a faster rate than in North America and Europe.

The changing role of international express delivery in the context of e-commerce

Figure 21. Forecasts of B2C e-commerce sales worldwide, by region, billions \$

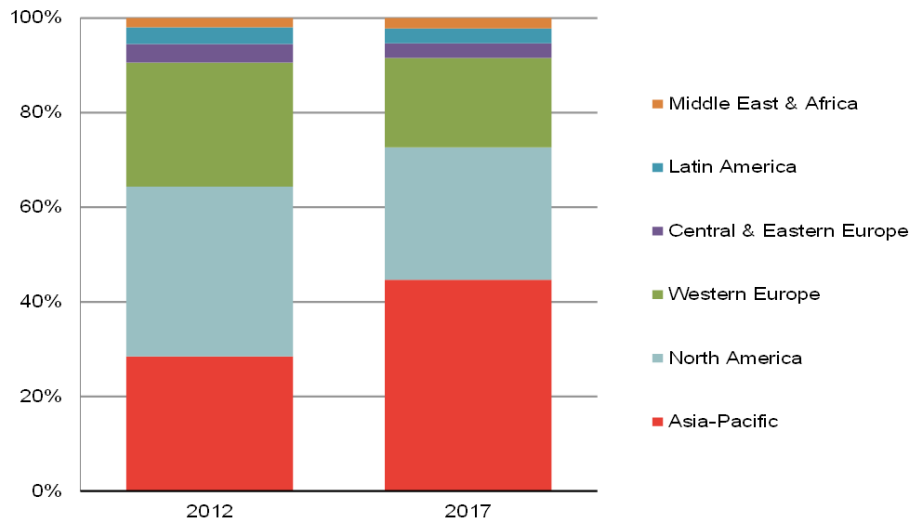


Source: eMarketer, Jan 2014

Notes: Includes products and services ordered and leisure and unmanaged business travel sales booked using the internet via any device, regardless of the method of payment or fulfilment

eMarketer projects that more than 40% of B2C e-commerce will take place in the Asia-Pacific region as illustrated in **Figure 22**.

The changing role of international express delivery in the context of e-commerce

Figure 22. Region Share of B2C e-commerce sales worldwide, 2012 and 2017, %

Source: eMarketer

Notes: Includes products and services ordered and leisure and unmanaged business travel sales booked using the internet via any device, regardless of the method of payment or fulfilment

New technological trends and consumer attitudes will support this growth. Retailers are getting new opportunities, such as promoting and selling their brands electronically through social-media and mobiles. Many brick and mortar organisations are establishing an online e-commerce channel in addition to their traditional shops. Consumers are also getting more confident in the security of online payments and more are willing to buy online. Both demand and supply side factors thus support further growth in e-commerce in the coming years.

B2B e-commerce

B2B e-commerce is also expected to continue to grow. Many firms are driven toward greater adoption of e-commerce by pressure to compete at a global level. e-commerce is a growing trend for businesses as they expand and reach new customers.²⁴ Research by Oracle finds that businesses see moving more customers' online key to their B2B commerce success.²⁵ A recent study

²⁴ Available: <http://www.tandfonline.com/doi/abs/10.1080/01972240309472#preview>

²⁵ Available: <http://www.oracle.com/us/products/applications/atg/2013-b2b-commerce-trends-1939002.pdf>

conducted by Forrester Research shows that 89 percent of B2B providers said adding e-commerce to their business increased annual revenue by 55 percent²⁶.

Increasing relevance of cross-border e-commerce

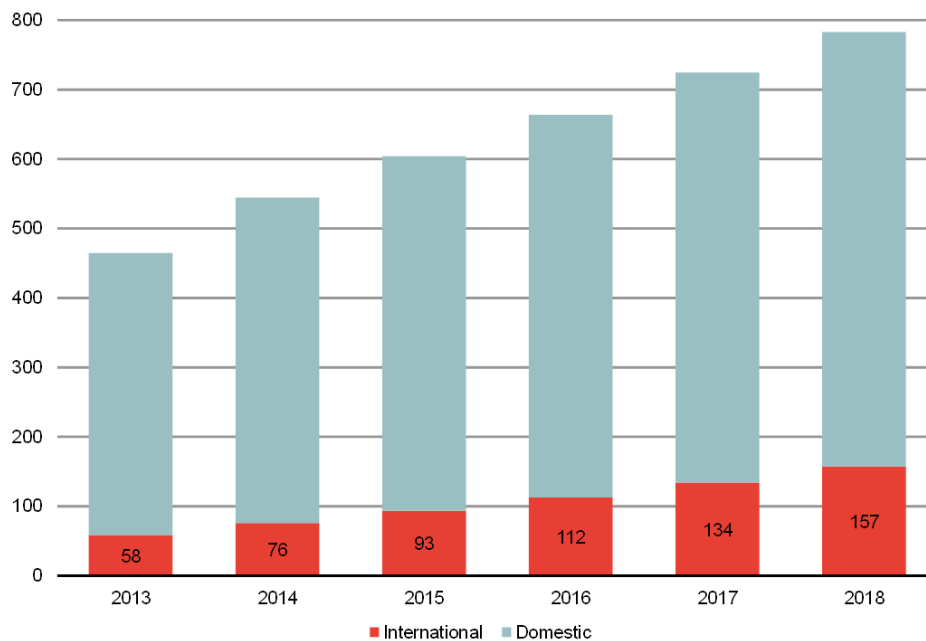
Perhaps the largest change expected is a significant increase in cross border e-commerce.²⁷ Today, cross-border ecommerce is relatively small. According to some estimates cross-border B2C ecommerce sales reached \$300 billion, while global B2C online sales volume is estimated to have exceeded \$1 trillion in 2013.²⁸ Experts now predict that e-commerce will become more international (cross border) than ever. **Figure 23** shows that cross-border e-commerce by European e-shoppers is expected to grow faster than domestic e-commerce and so its share is to increase from 13% in 2013 to 20% in 2018. In China, a recent report by MasterCard found that annual volumes of China's cross-border online shopping have reached \$2.92 billion in 2012 and by 2015 this segment is projected to surpass \$8.11 billion.²⁹

²⁶ Available: <http://blogs.sap.com/innovation/industries/4-big-trends-changing-b2b-e-commerce-01257425>

²⁷ Available: <http://www.crossborder-ecommerce.com/international-expansion/>

²⁸ Available: <http://www.payvission.com/cross-border-ecommerce-report-survey-2013>

²⁹ Available: <http://www.crossborder-ecommerce.com/shanghai-cross-border-e-commerce-conference-may-22-23/>

Figure 23. Domestic and international e-commerce sales in Europe 2013-2018, \$bn

Source: OCC, June 2013

Notes. Excludes grocery, 2-man and click and collect orders

Overall, e-commerce is expected to account for a larger share of trade. For example, “Global E-Tailing 2025”³⁰ found that the e-commerce share of overall trade volumes of developed countries could reach up to 40% by 2025 and up to 30% in emerging markets.

e-commerce is considered among the main drivers of economic and social change, having significant domestic and international impact on supply and demand. In the case of international e-commerce, it increases the market sizes available to firms; it promotes sales and thus consumption. e-commerce can be expected to increase productivity thanks to economies of scale and scope and increased competition between domestic and international companies. These new market dynamics can be expected to also lead to more innovation and thus economic growth.

³⁰ Available : https://www.dpdhl.com/content/dam/global_etailing_2025/pdf/dpdhl-study-global-e-tailing-2025.pdf

5.2 The role of international express delivery in facilitating the potential of global e-commerce

The expected increase in international e-commerce is dependent on well-functioning express delivery services. With their global reach, international express delivery services can facilitate the global diffusion of e-commerce and support retailers and businesses develop successful e-commerce channels. The express delivery services have become a key input to online retailers who want to be able to offer both international and express deliveries as options to their wider customer base.

Delivery operators are building on the feedback from e-shopper and e-retailers to continue to enhance the delivery of their online shopping. They expand the choice of the locations of deliveries available to e-shoppers and so facilitate e-retailers to succeed and grow their e-commerce. International express delivery services will be more than ever a key input in the supply chain of global online retailers and firms. It will facilitate global e-commerce to succeed.

In particular, (SME) will depend on the availability of well-functioning express delivery services as their initial volumes may be small so they are unlikely to set up their own supply chains. As internationalisation of SMEs requires fast, secure transport links, the international express delivery companies provide a crucial service.

5.3 Better customs capabilities are of increasing importance in the context of global e-commerce

As economies increasingly engage in international e-commerce, governments and individuals are examining their policies and positions on international trade. For instance, at the 2013 Bali ministerial meeting, WTO member countries agreed to further the work program on the interaction between e-commerce and trade.³¹

As discussed in section 4, a number of studies have shown the importance of good access to foreign markets and how trade facilitation impacts on trade and the prospects of global e-commerce.

However, there are signs that there may be a return to some form of protectionism. In 2012, two highly regarded institutions highlighted the increasing growth of protectionism in the global economy.

³¹ Available:
<http://www.brookings.edu/~media/research/files/papers/2014/02/internet%20international%20trade%20meltzer/02%20international%20trade%20version%202.pdf>

- In 2012, the European Commission identified about 150 new trade restrictions introduced in 2012, whereas only 18 existing measures have been dismantled among the trading partners of the Europe Union.³²
- In 2014, Global Trade Alert, an independent body monitoring policies that affect trade, reported that since 2008 G20 countries have introduced more than 1,500 new non-tariff trade restrictions³³.
- A recent report by the Brookings Institution also identified the barriers to internet-enabled trade. Among its proposed trade policy reform, it recommends a reform of customs procedures and a new commitment on *de minimis* levels.³⁴

The rise in protectionism or delays in reform could hinder the realisation of the e-commerce expansion, which is expected to be a key driver of economic growth. As e-commerce is likely to make up an increasing proportion of trade and customs capabilities are important for facilitating e-commerce, this suggests that the impact of improving CCI on trade could be increasing in the future.



³² Available: http://europa.eu/rapid/press-release_IP-13-807_en.htm

³³ Available: <http://www.globaltradealert.org/news/b20-report-cites-gta-numbers-protectionism>. GTA is coordinated by co-ordinated by the Centre for Economic Policy Research, an independent academic and policy research think-tank based in London, UK.

³⁴ Available: <http://www.brookings.edu/~media/research/files/papers/2014/02/internet%20international%20trade%20meltzer/02%20international%20trade%20version%202.pdf>

6 Summary of findings and policy implications

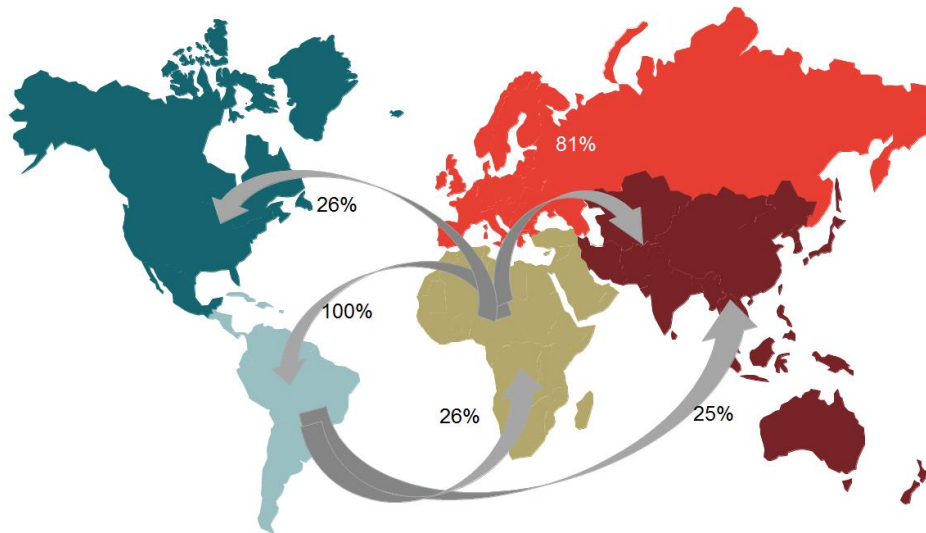
6.1 The express delivery industry to date

Express delivery operators provide a range of services to meet customer needs. The services include next-day and time-defined delivery services and deferred services (i.e. a slower delivery). Companies and individuals generally use express delivery services because they value five main attributes of the service: its global reach, reliability, transparency, speed and security.

The main users of express delivery services are businesses, with the engineering and manufacturing sector as the largest user, followed by transportation services, consumer goods and retail.

Despite the global financial crisis, international express delivery volumes have grown on average by 7% over the past five years. Considering a regional breakdown, volume growth has been strongest in regions outside of Europe and North America as shown in **Figure 24** below. Volume growth has generally been higher than the growth in trade.

Figure 24. The top inter-regional flows with fastest growth, 2011-2013



6.2 The express delivery has a substantial international economic footprint

In order to provide its core service, express delivery providers employ people and use goods and services in each of the countries in which they operate. This creates a ripple effect down the supply chain, which in turn creates indirect and induced jobs. Overall, international express providers facilitate employment of 2.9m people around the world with North America accounting for nearly half of the total employment.

Table 3 below shows the breakdown of our results in direct, indirect, and induced impact, both in terms of employment and proportion of GDP. The global express delivery industry provides almost 600,000 direct jobs³⁵ and supports over 1,800,000 indirect jobs and over 570,000 induced jobs.

Table 6. DII impact of express delivery industry

	Global employment	Global GDP Impact (%)
Direct impact	585,000	0.04%
Indirect impact	1,815,000	0.11%
Induced	571,000	0.04%
Total	2,971,000	0.19%

Source: Frontier Economics estimates based on data from GEA members and publicly available sources³⁶

Overall, we conclude that international express delivery providers have a substantial economic footprint accounting for around 0.2% of global GDP.

6.3 Better customs capabilities increase trade

The express delivery industry also enables its customers to create economic value by supporting their commercial activities. This impact – termed catalytic impact – measures the economic value created by the customers of the express industry.

With the growth in world trade and reductions in traditional forms of protectionism – such as tariffs and quotas – a body of research has developed

³⁵ We report jobs as full-time-equivalent (FTEs) to provide a comparable metric. In 2009, Oxford Economics reported the total number of direct jobs as 1.3million. That figure is based on head count (i.e. the number of people employed) rather than FTEs.

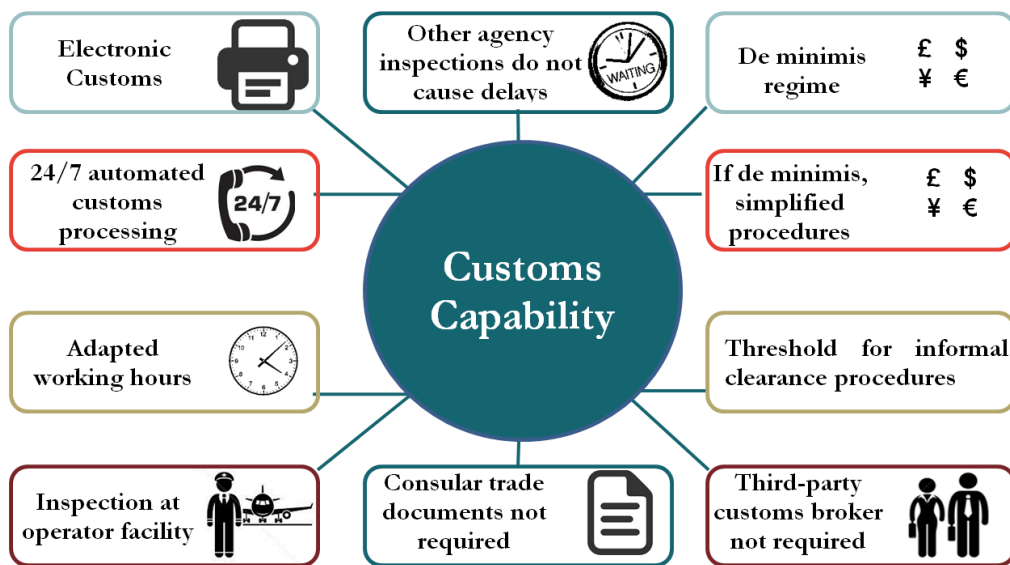
³⁶ We cannot provide the trend of DII economic impacts as we only have the relevant data for 2013.

Summary of findings and policy implications

that considers the importance of trade facilitation, in particular, the effects of administrative processes and institutions on the flow of goods.

To add to this body of evidence, we have performed our own detailed econometric analysis of the impact of customs capabilities on trade. For this analysis we used data from the Customs Capability Database which is collated by the Global Express Association.³⁷ Our analysis focussed on ten specific measures of customs capability from the GEA’s database. These are shown in **Figure 25**. We have constructed an index based on these measures that records how many of the measures have been implemented by each country.

Figure 25. Overview of customs capability measures



We found that even after controlling for a range of variables we find a robust and statistically significant relationship between the CCI and trade flows to and from any given country. Our results are based on a dataset with more than 10,000 country pair observations.

Specifically, we found that implementing any one additional measure from the 10 measures making up the CCI (e.g. 24/7 automated processing) increases trade *on average* by 4.4% for the country improving its customs capability.

Our robustness checks confirm that:

³⁷ The database can be accessed on the GEA’s website: <http://www.global-express.org/index.php?id=271>

Summary of findings and policy implications

- Statistical tests indicate that the impact of improvements in the CCI is linear, i.e. introducing two measures has twice the effect of introducing one. However, economic models of this type may not be very good as a means of predicting dramatic change so while a linear specification provides the best fit, this should be viewed with caution.
- Improvements in these customs capability measures are equally beneficial to high and low income countries.
- There are also no significant variations in the scale of this effect between regions.
- The most appropriate weighting of the components of the CCI index is to assign equal weights.

Overall, we conclude that improvements in customs capabilities for goods requiring immediate release provide substantial direct benefits to countries by increasing trade. Policy-makers around the world should therefore consider steps they could take to improve their score (provided in Annexe 3) so as to avoid losing out on economic value.

6.4 Express delivery is the channel for improvements in customs capabilities to affect trade

Our analysis clearly identifies the benefits that improvements in specific customs capabilities can have in terms of encouraging increased levels of trade between countries. A further, important question that we researched as a second step is: what role does the express delivery industry play in facilitating the additional trade that can be unlocked by improvements in these customs capabilities?

We find that international express delivery is a necessary condition to unlock the benefits that can accrue from improving these customs measures. Our analysis shows conclusively that international express delivery is one of the key channels that enable an improvement in the CCI to facilitate an increase in trade. Our results show that international express volumes play a significant role in facilitating trade promoted by improvements in the CCI and that up to two-thirds of this trade is directly facilitated by international express, with 50% as representing a reasonable mid estimate of the effect.

We therefore conclude that the benefits of improving customs capabilities depend strongly on the existence of international express delivery services. As a result, policy-makers should ensure that any improvements in customs capabilities are considered in the context of enabling international express delivery services.

Summary of findings and policy implications

6.5 Better customs capabilities are of increasing importance in the context of e-commerce

Customers shopping habits have changed tremendously over the last decade with the wide take-up of internet. Going forward, e-commerce is expected to:

- continue to grow substantially in the future, with double-digit growth expected to be the norm; and
- become increasingly global with regions outside of Europe and North America growing faster than the average.

These trends suggest that international express delivery services are likely to play an increasing role in facilitating internationalisation of businesses, particularly SMEs who are unlikely to set up their own supply chains.

However, in the context of the emergence of international e-commerce there are signs that there may be a return to some form of protectionism. The rise in protectionism or delays in reform could hinder the realisation of the e-commerce expansion, which is expected to be a key driver of economic growth. Policy-makers should therefore consider improvements in customs capabilities in the context of international e-commerce.

Annexe 1: Detailed methodology for direct, indirect and induced economic impact

This annexe provides the detailed methodology and the assumptions we have used to estimate the direct, indirect and induced economic impact. We first provide an overview of the data and methodology used for each of the three impacts, and then summarise the assumptions we applied throughout the analysis. We use full-time equivalents for all employment figures to provide a consistent metric.

How do we quantify direct impact

The direct impact is based on the number of employees that are on the pay-roll of GEA members or are subcontracted. We used data on direct and subcontracted employment provided by each of the GEA members – on a full-time equivalent basis – in 2013. Our results are based on GEA members' data only and should therefore be viewed as a conservative estimate of the overall footprint of the express delivery industry. We have not 'grossed up' the figures as the assumptions required to do this would reduce the reliability of our analysis.

How do we quantify indirect impact

In addition to the staff GEA members employ directly, they also make significant purchases of goods and services in the countries where they operate. The purchase of these inputs has a multiplier effect through the local economy. Expenditure on a large range of inputs such as energy, fuel or manufacture of uniforms and packaging creates demand in the supply chain for these industries.

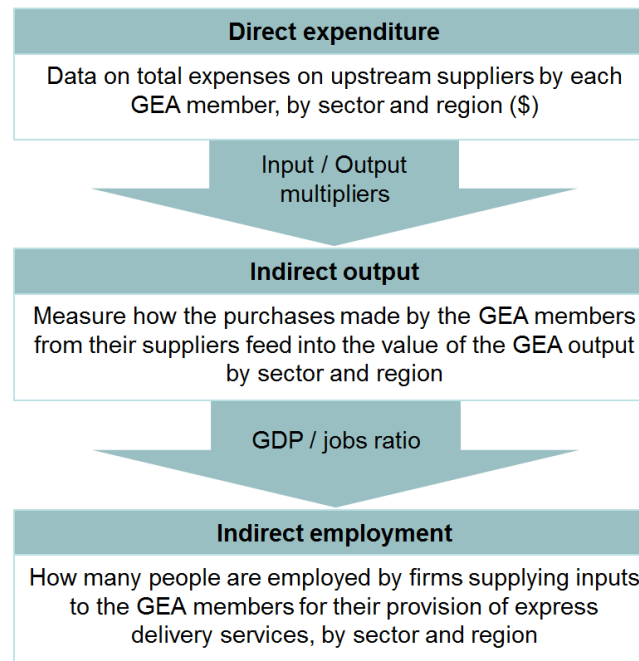
Figure 26 provides a simple illustration of our methodology in estimating indirect employment for the GEA members.

The baseline data we use for this analysis is total expenses on upstream suppliers by each GEA member, specified by sector and region. The sectors in which upstream expenditure was grouped are:

- Manufacturing;
- Energy;
- wholesale and retail;
- hotels and restaurants;
- transport, storage and communication;
- financial intermediation;
- real estate, renting and business services; and

- public sector, education, health and recreation.

Figure 26. Methodology behind indirect employment estimates



Source: Frontier analysis

In order to estimate the impact of this expenditure along the supply chain, we need to establish an appropriate multiplier. The OECD publishes Input-Output tables which show the flow of goods and services between different industries in the economy. From these tables, we can infer the Type I multiplier which describes the demand created down the supply chain for an industry as a result of one additional unit of demand for the output of that industry. While these multipliers are published at an industry level, consider the following simplified example. A Type I multiplier of 1.6 for a textbook implies that demanding the production of an additional textbook unit would lead to an increase of 0.6 units of demand down the supply chain.

We apply Input-Output multipliers for the sectors listed above to the direct expenditure data and obtain an indirect output measure.

We convert this into number of jobs by using GDP/jobs ratios. Following these steps we get indirect employment, indicating how many people are employed by firms supplying inputs to the GEA members for their provision of express delivery services. The analysis described above has been done at a regional level, allowing for any assumptions on Input-Output multipliers and GDP/jobs ratios to be region specific.

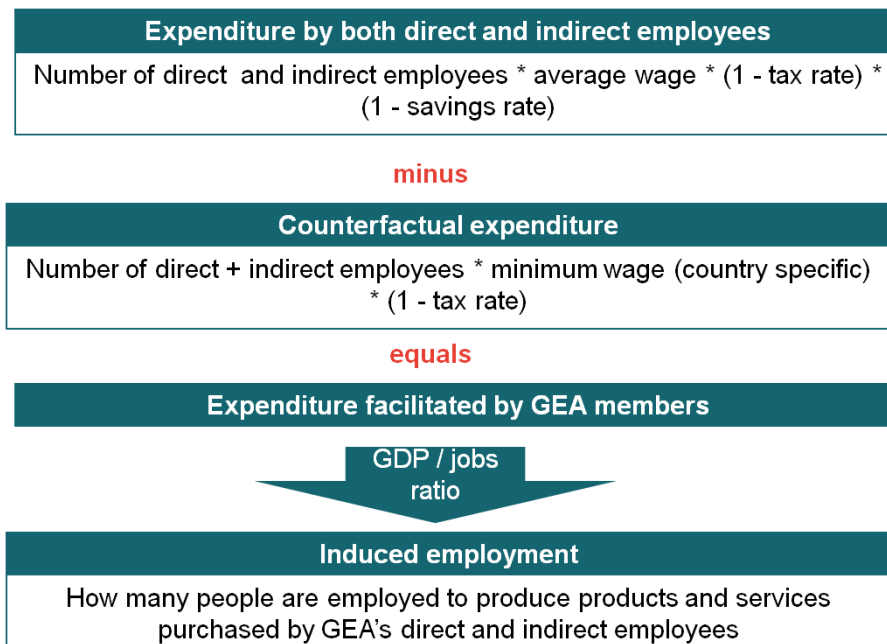
Annexe 1: Detailed methodology for direct, indirect and induced economic impact

How do we quantify induced impact?

Induced employment is based on considering the spending by employees working both directly or indirectly for GEA members and estimating the jobs created by this spending.

Figure 27 below is a simple illustration of the logic behind our methodology.

Figure 27. Methodology behind induced employment estimates



Source: Frontier analysis

We start by considering the spending incurred by direct and indirect employees in in each country. For this, we need to first estimate the disposable income available to direct and indirect employees after taxes and then, the proportion of this income that they would spend rather than save. Again this analysis was performed at regional level, allowing us to use region specific average wage, tax rates and savings rates

As a second step, we need to consider a counterfactual scenario. We assume that in the absence of global express services, direct and indirect employees would be on the minimum wage. In countries where a minimum wage does not exist, we used unemployment benefits as the income in the counterfactual. This is a more conservative and robust approach than assuming that in the absence of GEA members, direct and indirect employees would be earning no income at all.

The additional expenditure facilitated by GEA members' operations in the world is then derived by subtracting the spending in the counterfactual scenario from

Annexe 1: Detailed methodology for direct, indirect and induced economic impact

that in the spending in the scenario in which global express services exist. As with indirect employment, we convert this additional expenditure to an employment number using GDP/jobs ratios using region specific assumptions.

What assumptions did we use?

In order to perform the analysis detailed above, we have made a number of assumptions. **Table 7** below lists our assumptions and data sources.

Table 7. Assumptions used for DII analysis

Assumption	Source
Input-Output multipliers	OECD
GDP/jobs ratios	World Bank indicators
Average wages	International Labour Organisation
Tax rates	KPMG
Savings rates	World Bank indicators
Counterfactual income	Each country official website
GDP	World Bank indicators

Annexe 2: Detailed methodology for the “facilitating trade” analysis

This annexe provides a detailed description of our econometric analysis. We first discuss the data we used, and then explain our methodology and finally discuss our results. All of our results have been peer reviewed by **Prof Ron Smith** who is a **Professor of Applied Economics at Birkbeck College, London**.

What data did we use?

The three main variables in our analysis are the CCI, trade, and express delivery volumes. We also used a number of other variables to control for external factors. Below we discuss each of the data sources in detail.

Customs Capability Index

We used data from the Customs Capability database³⁸ to create the CCI. The Customs Capability database measures customs procedures in 139 countries around the world with more than 1,200 data points. It records countries’ performance with respect to transparency, efficiency and post-release processes. Based on the information on customs efficiency in the Customs Capability database, we have identified ten key measures of customs capabilities that we combined in the CCI. This index measures how many of the ten aspects of customs capabilities each country has in place. **Table 1** provides a detailed overview of the questions covered in the customs capability database that we included in the index. Note that a partial ‘yes’ answer was scored as a 0.5.

Table 1. Custom Capability Database Variables

Reference name	Corresponding question in Custom Capability Questionnaire	Scoring
Electronic customs / Pre-arrival processing	Does Customs accept and process electronically the data required for release of shipments in advance of their actual arrival so that they can be released either prior to or immediately after arrival?	1 = yes 0 = no
24/7 automated customs processing	Is full-time (24/7) automated processing for the customs ports at which you operate available?	1 = yes 0 = no

³⁸ Available on the Global Express Association website, at <http://www.global-express.org/index.php?id=271>

Adapted working hours customs personnel	Are the working hours of Customs personnel adapted to commercial needs?	1 = yes 0 = no
Inspection at operator facility or transfer?	For shipments arriving by air, does Customs inspect and release goods at the operator's facility or require their transfer to another facility?	1 = operator's facility 0 = transfer required
Other agency inspections cause delays	If there are inspections by agencies other than Customs, do those cause delays?	1 = no 0 = yes
<i>De minimis</i> regime present?	Does the customs administration apply a <i>de minimis</i> regime that allows goods the value of which does not exceed a certain amount to be exempted from duties and taxes?	1 = yes 0 = no
If <i>de minimis</i> , simplified procedures?	If yes, are those goods subject to simplified procedures e.g. consolidated release/clearance?	1 = yes 0 = no
Threshold for informal customs procedure	Does the customs administration apply a <i>de minimis</i> regime that allows dutiable goods the value of which does not exceed a certain amount to be exempted from formal declaration procedures	1 = yes 0 = no
Necessity to provide a consular trade document?	Does Customs or any other agency require in connection with importation of goods that the importer provide any of the following items: - a consular invoice - a consular visa for a commercial invoice - other trade document	1 = no 0 = yes
Third-party customs broker?	Does Customs or any other agency require clearance of import shipments by a third-party customs broker?	1 = no 0 = yes

Trade flows

We used data from the UN Comtrade database measuring imports to each reporter country. This variable, being a one-way flow, allowed us to model the direction of flows. The data relates to 2013 trade flows, covers over 200 countries, and is defined as the total value of imports in US\$ of the sum of all commodities classified in the “Harmonised Commodity Description and Coding System”.

Annexe 2: Detailed methodology for the “facilitating trade” analysis

Express delivery volumes

DHL, FedEx, TNT and UPS provided us with international express volume data at country pair level. Our data includes the number of items carried by directional flow. The dataset covers more than 200 countries and we therefore have more than 10,000 observations. The dataset covers several years which have been used as an input to the inter-regional flows discussed in Section 2 but our main analysis is based on the data for 2013.

Control variables

Table 8 provides the list of control variables we used and the relevant data source.

Table 8. Control variables used in econometric analysis

Variable	Observation level	Source
Population size	Country level	World Bank Indicators
GDP per capita	Country level	World Bank Indicators
Distance	Country pair level	Frontier analysis – great circle route distance between GPS coordinates of the main airport in each country
Colonial relationship	Country pair level	CEPII (Centre d'études prospectives et d'informations internationales) database
Common language	Country pair level	CEPII (Centre d'études prospectives et d'informations internationales) database
Contiguity	Country pair level	CEPII (Centre d'études prospectives et d'informations internationales) database
Openness	Country level	World Bank Indicators
Express delivery average price	Country pair level	Derived from data from GEA members on volumes and revenue for each country pair
Unemployment level	Country level	World Bank Indicators
Inflation rate	Country level	World Bank Indicators
Human Development Index	Country level	World Bank Indicators
OECD	Country level	OECD website indicating the list of countries

Annexe 2: Detailed methodology for the “facilitating trade” analysis

 members of the OECD

In addition to those variables described in the table, two measures are of particular interest as control variables:

- World Bank Ease of Doing Business Index; and
- World Bank Logistics Performance Index – Infrastructure component.

Use of these additional measures allows us to better isolate the impact of the GEA's specific Customs Capability measures, over and above any general effect of being a trade-friendly country.

Methodology and results

The two main results of our analysis are the following:

- implementing one additional CCI has a positive effect on trade; and
- international express delivery plays a crucial role in facilitating this increase in trade.

Below we explain the analysis underpinning both results.

Implementing one additional custom facilitation increases trade

The objective of our analysis is to estimate the effect of the CCI on trade. We use an econometric model that explains trade between two countries with CCI as one of the explanatory variables. This model is an enriched version of a classic gravity model. To identify whether CCI has a separate, significant impact on trade flows, we need to control for a number of variables that explain trade between two countries. We include:

- population of each country (to control for size);
- GDP per capita (to control for wealth); and
- distance between each country pair (to control of the cost of transport).

We expect that a large proportion of trade flows between country pairs would be explained by these three variables. This is because they capture the main drivers of trade but also because some of the variables are likely to be correlated with other factors that may explain trade such as the institutional frameworks. To test whether other control variables need to be reflected to explain variations in trade between country pairs in a given year we also include:

- A quadratic term for population and GDP per capita in order to allow for a non-linear relationship with trade. For example we might expect a positive, but diminishing, relationship between trade and GDP per capita;

Annexe 2: Detailed methodology for the “facilitating trade” analysis

- Colonial relationship – there is evidence to suggest that country pairs with historical colonial links trade more;
- Common language – there is evidence to suggest that country pairs sharing a language trade more;
- Contiguity – there is evidence to suggest that country pairs sharing a border trade more;
- Openness – measured as the sum of imports and exports as a percentage of GDP, which aims at further capturing any effect that high trade may in fact drive high CCI scores;
- Express delivery average price – this can be considered as a proxy for the quality of the goods that express delivery services carry;
- Unemployment – to account for the current state of the economy we have included the unemployment rate;
- Inflation – even though this is a flow variable, inflation during the year affects cost-competitiveness and therefore may have an impact on volumes;
- Human Development Index – which is a composite measure including life expectancy, education, and income indices. It is commonly used as a measure of the status of development of a country;
- OECD – as the trade flows between high income countries may differ from those between low income countries, we have included a dummy variable to test if within-OECD trade flows are different;
- Ease of Doing Business Index – which aims at capturing general pro-trade factors;
- Logistics Performance Index, Infrastructure component – which aims at controlling for pre-existent predisposition to trade and logistics.

The regressions estimated are of the following form:

$$\ln(\text{Trade})_{ij} = \beta_0 + \beta_1 * \text{Customs Capability Index}_i + \beta_2 * \text{Customs Capability Index}_j + B * \text{Control variables} + \varepsilon$$

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where each trade flow observation is for a country pair and i and j represent the origin and destination country. We use the logarithmic transformation of trade to allow an easier interpretation of the results.³⁹

We tested the relevance of each of the control variables in a number of regressions and then narrowed the regression specifications down to three models which include all variables listed in **Table 8** and:

- the Ease of Doing Business Index;
- the Logistics Performance Index (LPI), Infrastructure component; and
- both the Ease of Doing Business and LPI indices.

We report all three regression results as it is important that our coefficient for the CCI captures an effect that is separate to the Ease of Doing Business and LPI indices. A common criticism of this type of analysis is that the explanatory variable of interest is indeed correlated with other institutional quality variables. To be transparent, we report the results for each of the three regressions separately. **Figure 28** provides our results.

- **The regressions explain a large proportion of the variation in trade flows** – as the R square is between 0.743 and 0.747 this suggests that the explanatory variables can explain over 74% of the variation in trade between country pairs.
- **The coefficients have the expected signs** – for example, distance has a negative sign so the further the distance between two countries, the lower the trade flows whereas population and GDP per capita have positive signs which implies that larger and wealthier countries trade more.
- **Most of the coefficients are significant at the 95% or 99% confidence level** – this reinforces the validity of including control variables, such as the presence of a colonial relationship, or the measure of openness to trade.
- **The size of the coefficients is plausible** – for example, the coefficients of the $\ln(\text{distance})$ and $\ln(\text{distance})^2$ variables tells us that, holding everything else constant, a 1% increase in the distance between two countries is associated with a decreasing negative impact on trade of just below 3%.

The coefficient we are most interested in is the one of the customs capability index. Similarly to some control variables, given the CCI is a variable defined at country level, we inserted two variables in the regression, one indicating the level

³⁹ Given the multiplicative nature of the gravity equation, the standard procedure for estimating it is simply to take the natural logarithms of all variables and obtain a log-linear equation that can be estimated by ordinary least squares regression.

of CCI in the origin country, and one for the destination country. The coefficients are positive so a higher CCI score implies an increase in trade flows. The coefficients are significant at the 95% confidence level. This implies that even after controlling for all the other variables, the CCI can explain some of the differences in trade between country pairs. This is an important result, as the control variables already capture a large proportion of the factors that explain variations in trade. We would like to emphasise that nothing in our dataset or approach pre-supposed this result.

In terms of the magnitude, **Table 9** below summarises the effects we find.

Table 9. Average impact of improving CCI score by 1 on exports, imports and trade

Institutions-related control variable:	World Bank Ease of Business	World Bank LPI Infrastructure	Both
CCI Export - origin	4.8%	6.0%	5.0%
CCI Import - destination	4.5%	4.6%	3.7%
Average Impact on Trade	4.7%	5.3%	4.4%

Source: Frontier analysis

As we are modelling one way flows, the individual parameters can be interpreted as the average impact of an increase in CCI score by 1 on either exports and imports respectively, while the average on trade overall is the average of the two parameters.⁴⁰

The regressions show that improving its CCI score by 1 can increase a country's trade by between 4.4% and 5.3%. The models also show that the impact of improving CCI is consistently stronger for exports than for imports, with the arrange being 4.8% to 6.0%. This indicates that introducing a new CCI measure, other things being equal, can be expected to improve trade and, on balance, strengthen the balance of payments of the country in question.

Testing different specifications

We have undertaken several tests to analyse whether

⁴⁰ If a specific country has a significant trade imbalance then the correct overall trade parameter for that country should be weighted by the share of exports and imports in its total trade. The simple average of the export and import parameters is the correct average across all countries.

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- the relationship between CCI and trade is linear;
- the relationship between CCI and trade differs by region or income level;
- the relationship between CCI and trade is influenced by how we treat missing observations; and
- the relationship between CCI and trade is influenced by different weightings of the components of the CCI.

Linearity

After running several tests, we concluded that the linear specification leads to the best fit of the data. We therefore conclude that each additional CCI unit has the same effect on trade *on average*. Non-linear specifications would imply that introducing one additional CCI measure has a different effect on trade depending on the starting point. Improving the CCI by one unit has a different effect in the case where the CCI goes from four to five to one in which it goes from eight to nine. Non-linear relationships could be characterised by diminishing returns to scale (the effect of CCI on trade decreases with higher levels of CCI) or be characterised by an S-shape (the effect is smaller at relatively low and high levels of CCI but stronger at CCI levels in between).

For a non-linear specification to be preferred, two requirements would have to be met:

- the alternative non-linear specification has to fit our data better – displayed by a higher R^2 ; and
- the alternative non-linear specification has to make economic sense.

We tested a number of different non-linear specifications and found that none of them fulfilled the criteria above. For example, the s-shape specification allows for the effect to be smaller for lower levels of the index, higher for central levels and then decrease again at high levels. In practice this would mean that if a country does not have any of the customs facilitations in place, introducing one would have small effect, whilst going from five to six would have a bigger effect. And finally, if a country already has nine out of ten of the customs facilitations in place, introducing the last one would not have a big impact. In order to run this test we applied the Sigmoid transformation to the variables CCI_i and CCI_j , obtained two new variables named $Origin_I$ and $Destination_I$ and re-run the regression with the exact same specification but substituting the ‘CCI’ variables with the ‘I’ ones.

Although this alternative specification could theoretically make economic sense, it does not pass the first requirement since it has a lower R^2 than the linear specification. The full results are presented in **Figure 29**.

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The conclusion from these tests is that, insofar as it is possible to establish, the impact of improving CCI is linear, as found before. So, improving a score from 6 to 7 or from 2 to 3 can both be expected to raise trade for the relevant country, on average by around 4.4%.

However, caution needs to be applied when presenting the results in the context of large changes as econometric models of this nature are likely to perform best when considering relatively small changes.

Regional homogeneity

We have checked the stability of the impact when restricting our sample to specific regions. We have found no significant variation. This is likely to be partly explained by heterogeneity of countries within each region. For example, Asia Pacific would include countries such as Bangladesh as well as China.

In addition to regional variations, we have therefore tested the models by segmenting flows into OECD and non-OECD blocks. These tests suggest that the strength of the effect on trade between non-OECD countries is on average the same as for the sample as a whole. This might suggest there is little variation in the effect between high income/more developed countries and lower income/less developed ones.

However, this segmentation fails to find a significant effect of CCI on trade when at least one or the trading countries is in the OECD. This result is driven to large extent by the small sample size of OECD countries and the relatively small variation in CCI measures between them. However, it does indicate that the role of non-OECD to non-OECD trade is significant in our overall result and provides some evidence that the power of improving border procedures may be greater for non-OECD countries. **Figure 30** shows the full results.

Robustness to sample size

We have tested for the effect of omitting country observations because their CCI score is based on incomplete data.

As explained earlier, the CCI is calculated by counting how many customs capabilities a country has, out of 10. Out of the 139 countries in the customs capability database, 15 of them have more than 2 (out of 10) missing values. In our analysis we have assumed that a missing value equates to not having such customs capability. If this assumption were wrong, our results would be biased. A closer look to such countries, by and large small countries not very open to trade, makes us more confident of the validity of our assumption, and therefore of the unbiasedness of our results.

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Robustness to different CCI definitions

To construct the CCI we check how many custom capability measures each country has in place. For example, if country A only has electronic customs and no requirement for a consular trade letter, country A is assigned a CCI score of two. Implicitly, this method assumes each custom capability has the same weight in the index – one tenth. The rationale is that there is no a priori reason to suggest that one of the measures should have a higher weight than the others. This does not mean that in practice in some countries one measure will not be more important than the others but on average it is difficult to tell which measure is would have a stronger impact on trade. This is partly due to the interaction effects between the measures so the next most important measure may depend on the ones that have already been implemented. Discussions with the Custom Capability experts from the GEA confirmed this approach.

As an additional check, we have tested the data to see whether we could infer any specific weighting that should be applied. We have done so through two main types of tests.

We have tried running the same regression specification but instead of using the origin and destination CCI variables, we included each CCI component separately. This effectively allows the components to select their own weights, i.e. the data could suggest that one measure is more important than another. However, this test suggested that equal weights are indeed appropriate as:

- the fit of the regression did not increase significantly, suggesting that our preferred model is appropriate; and
- the interpretation of each coefficient is influenced by the sample size of each coefficient and the interactions between coefficients.

As a second step, we constructed a number of variants of the original CCI by assigning different weights to each component and run our regression specification on them. Again, this test did not suggest that the equal weighting assumption might not be valid as the fit of the regression did not improve. Overall, we therefore conclude that the equal weighting is a valid approach.

Express delivery is a an important factor to unlock the benefits to trade brought by improvements in the CCI

The analysis described in the previous section focuses on the impact of CCI on trade. We can consider various ways in which CCI could impact on trade. We are interested in finding out to what extent express delivery plays a role in facilitating the impact of CCI on trade. We have tested for this by including in the regression an additional variable measuring express delivery volume flows between each country pair in our dataset.

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Once the variable measuring express delivery volumes is introduced, the coefficients of CCI_i and CCI_j either lose significance or strongly reduce their magnitude. The interpretation of these results is that express delivery is a crucial channel through which customs capabilities affect trade.

Depending on which model we use, the parameter on the CCI is reduced by between 33% and 66%, with a reduction of 50% for the preferred model. What this implies is that GEA plays a very significant role in facilitating trade promoted by improvements in the CCI and that up to two-thirds of this trade is directly facilitated by international express, with 50% representing a reasonable mid estimate of the effect.

Figure 28. CCI effect on trade – regression results

	reg 1		reg 2		reg 3	
	Regression with Ease of doing business Index		Regression with LPI - infrastructure component		Regression with both	
	coefficient	(S.E.)	coefficient	(S.E.)	coefficient	(S.E.)
orig_CCI	0.0481***	(0.0145)	0.0604***	(0.0150)	0.0505***	(0.0152)
dest_CCI	0.0451***	(0.0152)	0.0463***	(0.0147)	0.0371**	(0.0154)
ln_orig_pop	1.311***	(0.196)	1.395***	(0.227)	1.369***	(0.225)
ln_orig_pop2	0.00152	(0.00577)	-0.00598	(0.00649)	-0.00481	(0.00647)
ln_dest_pop	0.931***	(0.197)	1.010***	(0.249)	0.991***	(0.248)
ln_dest_pop2	0.00637	(0.00578)	0.00118	(0.00719)	0.00213	(0.00719)
ln_orig_gdppercapita	2.225***	(0.227)	3.174***	(0.244)	3.093***	(0.249)
ln_orig_gdppercapita2	-0.0604***	(0.0124)	-0.125***	(0.0137)	-0.122***	(0.0138)
ln_dest_gdppercapita	1.939***	(0.249)	2.566***	(0.274)	2.476***	(0.276)
ln_dest_gdppercapita2	-0.0569***	(0.0136)	-0.100***	(0.0154)	-0.0962***	(0.0154)
Indist	-3.301***	(0.434)	-2.905***	(0.421)	-2.975***	(0.418)
Indist2	0.142***	(0.0279)	0.123***	(0.0272)	0.127***	(0.0271)
colony	0.537***	(0.121)	0.384***	(0.132)	0.397***	(0.131)
comlang_off	0.858***	(0.0791)	0.912***	(0.0832)	0.915***	(0.0837)
contig	0.171	(0.163)	0.445***	(0.161)	0.404**	(0.162)
orig_unemp	0.0244***	(0.00390)	0.00793**	(0.00400)	0.0110***	(0.00400)
dest_unemp	-0.00551	(0.00464)	-0.00837*	(0.00480)	-0.00565	(0.00488)
orig_ifl	-0.0386***	(0.00688)	-0.0323***	(0.00691)	-0.0287***	(0.00694)
dest_infl	0.00617	(0.00842)	0.00872	(0.00854)	0.00867	(0.00854)
orig_hdi	-0.160	(0.152)	-0.482***	(0.151)	-0.455***	(0.153)
dest_hdi	-0.126	(0.165)	-0.160	(0.167)	-0.153	(0.167)
oecd	0.0791	(0.0845)	-0.00891	(0.101)	0.00939	(0.100)
oecdrest	0.259***	(0.0565)	0.255***	(0.0560)	0.267***	(0.0566)
lnprice	0.930**	(0.391)	1.127***	(0.414)	1.098***	(0.409)
lnprice2	-0.147***	(0.0487)	-0.173***	(0.0521)	-0.169***	(0.0515)
orig_easeofdoingbusiness	-0.00605***	(0.000965)			-0.00237**	(0.00102)
dest_easeofdoingbusiness	-0.00370***	(0.000917)			-0.00193**	(0.000952)
orig_openess	0.00564***	(0.000389)	0.00387***	(0.000416)	0.00389***	(0.000416)
dest_openess	0.00340***	(0.000528)	0.00266***	(0.000557)	0.00274***	(0.000555)
origInfrastructure			1.004***	(0.0924)	0.911***	(0.0955)
destInfrastructure			0.640***	(0.0870)	0.585***	(0.0902)
Constant	-35.17***	(3.640)	-47.02***	(3.768)	-44.79***	(3.837)
Observations	7,046		6,125		6,125	
R-squared	0.743		0.746		0.747	

Source: Frontier analysis of data from GEA members and publicly available sources. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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Figure 29. Linearity tests

	Regression with Ease of doing business Index		Regression with LPI - infrastructure component		Regression with both	
	coefficient	(S.E.)	coefficient	(S.E.)	coefficient	(S.E.)
ln_orig_pop	1.281***	(0.202)	1.446***	(0.231)	1.469***	(0.232)
ln_orig_pop2	0.00297	(0.00595)	-0.00653	(0.00662)	-0.00756	(0.00663)
ln_dest_pop	0.914***	(0.201)	0.983***	(0.254)	1.000***	(0.255)
ln_dest_pop2	0.00724	(0.00590)	0.00271	(0.00736)	0.00181	(0.00735)
ln_orig_gdppercapita	2.218***	(0.230)	3.069***	(0.253)	3.136***	(0.248)
ln_orig_gdppercapita2	-0.0601***	(0.0126)	-0.121***	(0.0140)	-0.124***	(0.0139)
ln_dest_gdppercapita	1.887***	(0.251)	2.434***	(0.280)	2.518***	(0.279)
ln_dest_gdppercapita2	-0.0538***	(0.0137)	-0.0940***	(0.0156)	-0.0977***	(0.0156)
Indist	-3.366***	(0.450)	-3.017***	(0.435)	-2.950***	(0.437)
Indist2	0.143***	(0.0291)	0.127***	(0.0282)	0.123***	(0.0284)
colony	0.745***	(0.144)	0.607***	(0.154)	0.590***	(0.154)
comlang_off	0.880***	(0.0833)	0.915***	(0.0878)	0.909***	(0.0872)
contig	0.0615	0	0.297*	0	0.336**	0
orig_unemp	0.0240***	(0.00403)	0.0101**	(0.00411)	0.00748*	(0.00412)
dest_unemp	-0.00564	(0.00479)	-0.00599	(0.00501)	-0.00861*	(0.00494)
orig_ifl	-0.0413***	(0.00709)	-0.0305***	(0.00718)	-0.0336***	(0.00714)
dest_infl	0.00382	(0.00877)	0.00668	(0.00890)	0.00666	(0.00890)
orig_hdi	-0.0929	(0.156)	-0.365**	(0.158)	-0.385**	(0.156)
dest_hdi	-0.112	(0.169)	-0.131	(0.171)	-0.137	(0.171)
oecd	0.0475	(0.0888)	-0.0465	(0.106)	-0.0625	(0.106)
oecdrest	0.274***	(0.0591)	0.275***	(0.0591)	0.265***	(0.0586)
lnprice	0.866**	(0.391)	1.015**	(0.410)	1.040**	(0.414)
lnprice2	-0.139***	(0.0487)	-0.159***	(0.0517)	-0.162***	(0.0522)
orig_easeofdoingbusiness	-0.00586***	(0.000989)	-0.00204*	(0.00104)		
dest_easeofdoingbusiness	-0.00371***	(0.000935)	-0.00191*	(0.000974)		
orig_openess	0.00594***	(0.000408)	0.00418***	(0.000435)	0.00416***	(0.000434)
dest_openess	0.00348***	(0.000553)	0.00281***	(0.000580)	0.00272***	(0.000582)
origInfrastructure			0.956***	(0.0977)	1.037***	(0.0941)
destInfrastructure			0.602***	(0.0920)	0.656***	(0.0886)
orig_l	0.0993***	(0.0294)	0.0962***	(0.0307)	0.112***	(0.0305)
dest_l	0.0883***	(0.0307)	0.0738**	(0.0313)	0.0906***	(0.0302)
Constant	-33.83***	(3.755)	-44.57***	(3.987)	-46.51***	(3.915)
Observations	6,695		5,805		5,805	
R-squared	0.739		0.743		0.743	

Source: Frontier analysis of data from GEA members and publicly available sources. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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Figure 30. Regional homogeneity tests

	All countries to all countries - same as reg 3 in fig 1		OECD to OECD		OECD to non-OECD and viceversa		non-OECD to non-OECD	
	coefficient	(S.E.)	coefficient	(S.E.)	coefficient	(S.E.)	coefficient	(S.E.)
orig_CCI	0.0505***	(0.0152)	0.253	(0.219)	0.0103	(0.0367)	0.0422**	(0.0179)
dest_CCI	0.0371**	(0.0154)	0.0437	(0.0536)	0.0288	(0.0220)	0.0428**	(0.0207)
ln_orig_pop	1.369***	(0.225)	-9.998	(9.271)	1.139***	(0.269)	2.086***	(0.636)
ln_orig_pop2	-0.00481	(0.00647)	0.306	(0.253)	0.000963	(0.00747)	-0.0252	(0.0190)
ln_dest_pop	0.991***	(0.248)	0.573	(0.770)	1.148***	(0.388)	1.064***	(0.342)
ln_dest_pop2	0.00213	(0.00719)	0.0109	(0.0242)	-0.00358	(0.0112)	0.000941	(0.00989)
ln_orig_gdppercapita	3.093***	(0.249)	-4.089	(19.56)	3.649***	(0.510)	2.354***	(0.297)
ln_orig_gdppercapita2	-0.122***	(0.0138)	0.149	(0.908)	-0.156***	(0.0282)	-0.0790***	(0.0165)
ln_dest_gdppercapita	2.476***	(0.276)	0.781	(1.997)	3.397***	(0.391)	1.895***	(0.378)
ln_dest_gdppercapita2	-0.0962***	(0.0154)	0.00215	(0.104)	-0.147***	(0.0221)	-0.0644***	(0.0211)
Indist	-2.975***	(0.418)	-0.545	(1.035)	-0.348	(0.662)	-4.638***	(0.538)
Indist2	0.127***	(0.0271)	-0.0265	(0.0686)	-0.0450	(0.0427)	0.235***	(0.0348)
colony	0.397***	(0.131)	0.620	(0.423)	0.803***	(0.205)	0.0223	(0.179)
comlang_off	0.915***	(0.0837)	0.173	(0.194)	0.761***	(0.147)	1.159***	(0.105)
contig	0.404**	(0.162)	0.238	(0.296)	0.152	(0.217)	0.812***	(0.226)
orig_unemp	0.0110***	(0.00400)	-0.0490	(0.0641)	0.0314***	(0.00991)	0.00184	(0.00487)
dest_unemp	-0.00565	(0.00488)	-0.0212	(0.0143)	-0.0131**	(0.00659)	-0.00203	(0.00664)
orig_ifl	-0.0287***	(0.00694)	-0.128**	(0.0580)	-0.0209*	(0.0112)	-0.0288***	(0.00949)
dest_infl	0.00867	(0.00854)	-0.0106	(0.0278)	0.00785	(0.0129)	0.00429	(0.0115)
orig_hdi	-0.455***	(0.153)	1.283	(1.979)	-0.979***	(0.217)	0.0155	(0.224)
dest_hdi	-0.153	(0.167)	0.132	(0.521)	-0.0531	(0.237)	-0.270	(0.234)
oecd	0.00939	(0.100)						
oecdrest	0.267***	(0.0566)						
lnprice	1.098***	(0.409)	2.708	(1.715)	1.119**	(0.485)	1.379**	(0.623)
lnprice2	-0.169***	(0.0515)	-0.364	(0.224)	-0.146**	(0.0593)	-0.211***	(0.0786)
orig_easeofdoingbusiness	-0.00237**	(0.00102)	0.00816	(0.0321)	0.00119	(0.00187)	-0.00464***	(0.00130)
dest_easeofdoingbusiness	-0.00193**	(0.000952)	-0.00553*	(0.00299)	-0.000936	(0.00128)	-0.00195	(0.00131)
orig_openess	0.00389***	(0.000416)	-0.0227	(0.0285)	0.00557***	(0.000714)	0.00275***	(0.000592)
dest_openess	0.00274***	(0.000555)	-0.00266	(0.00172)	0.00235***	(0.000850)	0.00338***	(0.000752)
origInfrastructure	0.911***	(0.0955)	-0.159	(0.573)	1.096***	(0.172)	0.990***	(0.120)
destInfrastructure	0.585***	(0.0902)	-0.214	(0.338)	0.607***	(0.134)	0.627***	(0.121)
Constant	-44.79***	(3.837)	109.9	(181.1)	-60.46***	(5.834)	-40.64***	(6.791)
Observations	6,125		184		2,159		3,782	
R-squared	0.747		0.907		0.798		0.709	

Source: Frontier analysis of data from GEA members and publicly available sources. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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Annexe 3: CCI score by country

Figure 31. Overview of CCI scores by country

Country Name	CCI	Country Name	CCI	Country Name	CCI
Albania	6	Dominican Republic	6	Myanmar	1
Algeria	6	Ecuador	5	Nepal	1
Andorra	6	Egypt	2.5	Netherlands	9.5
Angola	2.5	El Salvador	2	New Zealand	10
Antigua and Barbuda	1	Eritrea	2.5	Nicaragua	3
Argentina	5	Estonia	6.5	Nigeria	4.5
Armenia	5	Ethiopia	5	Norway	7
Australia	7	Fiji	6	Oman	5
Austria	8	Finland	9	Pakistan	5
Azerbaijan	6.5	France	6.5	Panama	4
Bahamas	4	Gabon	4.5	Paraguay	3
Bahrain	7	Gambia	6.5	Peru	7
Bangladesh	2.5	Georgia	9	Philippines	7
Barbados	1.5	Germany	8	Poland	5.5
Belarus	3.5	Ghana	9.5	Portugal	5.5
Belgium	6.5	Greece	5.5	Qatar	3
Belize	3	Guatemala	4	Romania	8.5
Benin	4	Honduras	5.5	Russian Federation	5.5
Bermuda	5	Hong Kong SAR, China	7	Rwanda	4
Bhutan	4	Hungary	1	Saint Lucia	6
Bolivia	3	Iceland	5	Saint Vincent and the Grenadines	2.5
Bosnia and Herzegovina	4.5	India	4.5	Saudi Arabia	7.5
Brazil	1	Indonesia	6	Serbia	5
Brunei Darussalam	4	Ireland	5	Sierra Leone	5
Bulgaria	6	Israel	7.5	Singapore	9
Burkina Faso	4.5	Italy	6	Slovak Republic	7
Burundi	4	Jamaica	5	Slovenia	8.5
Cambodia	8	Japan	9	South Africa	6
Cameroon	5	Jordan	5	Spain	9
Canada	8	Kazakhstan	1.5	Sri Lanka	1.5
Central African Republic	3.5	Kenya	5.5	Suriname	1
Chile	7	Kiribati	1	Sweden	8
China	6	Republic of Korea	10	Switzerland	7
Taiwan, province of china	9.5	Kuwait	5	Thailand	9.5
Colombia	7	Kyrgyzstan	7	Togo	5.5
Comoros	1	Latvia	7	Trinidad and Tobago	2
Democratic Republic of the Congo	4	Lebanon	4	Turkey	8
Congo	5	Liberia	6	Uganda	5.5
Cook Islands	1	Lithuania	5	Ukraine	3.5
Costa Rica	8.5	Luxembourg	6.5	United Arab Emirates	6
Cote d'Ivoire	5	The former Yugoslav Republic of Macedonia	1	United Kingdom	10
Croatia	4.5	Madagascar	6.5	United States	7
Cyprus	5.5	Malaysia	6	Uruguay	3
Czech Republic	6	Malta	6.5	Venezuela	5.5
Denmark	8	Mexico	2	Vietnam	6
Djibouti	2.5	Montenegro	4.5		
Dominica	2	Morocco	7		

Source: Frontier analysis

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