4. New data technologies for trade policy

4.1 Focus of the use case

This use case discusses the potential of using new, innovative (big) data sources and analytical tools to facilitate and improve trade policymaking. It explores the possibilities of using new innovative data sources on the firm level for trade policy. The main innovation is using data from firms' global supply chain management, Global Trade Item numbers and sensor/GPS tracking on the level of firms. This would allow for the analysis of the impact of new trade agreements on a micro level.

Ideally, policymakers would have access to a database with all exports and imports on a firm level, allowing also for an analysis of trade in added value. Currently there is no such database, but there are various data sources collecting this information. Private data brokers increasingly use real-time tracking shipment data, companies use big data for their own supply chain management and GNITs (bar codes) allow identifying products in detail. These new data sources offer an untapped potential for policymakers. The main challenge is to bring all stakeholders on board, safeguarding sensitive firm data and consequently linking the data in a meaningful way. This linking should take into account on-going efforts to measure trade in added value from researchers at Eurostat, OECD and WHO.

The level of maturity of this use case is between 2 and 3 (Figure 10): the translation from policy questions in data needs is discussed and a few data sources are identified.

The concept of using big data in trade is not new for international companies optimising their value chain. International organisations such as the OECD and WTO have also made attempts to use more innovative data sources in their trade statistics. Finally, the chief economist of European Commissions Directorate-General Trade, Lucian Cernat wrote a note on 'trade policy 2.0', explaining how future trade policy can tap into firm level trade data using new big data sources. As discussed above, the main challenge is to link these new data sources in order to actually use them in policymaking.

Figure 10 Use case readiness level
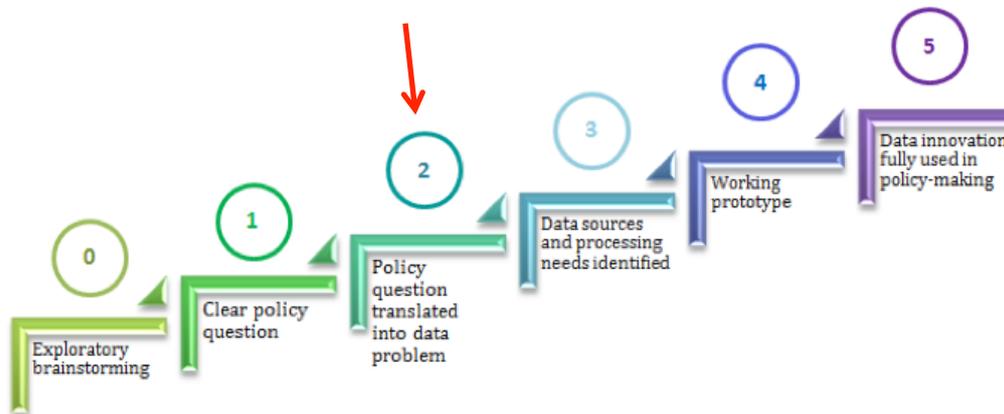
4.2 The rationale

The EU needs insight into current trade practices, trade flows and added value on a detailed level to develop its trade policy. Currently, data is based on customs records of exports and imports of physical goods that are aggregated at a national level. This may have been sufficient in the past, but globalisation and technological change have led to a more complex system of trade. Goods are not just exported in one country and imported in another; firms are optimising the production process by allocating various

stages of the production across different countries. These new global value chains are important to policymakers: importing intermediate goods can lead to economic growth by adding value and exporting them again. In addition, technological advancement in digital goods and services created a new international digital market where the monitoring of trade is not as far advanced in comparison to physical goods.

In order to negotiate new trade agreements, policymakers need insight into the impact of established and new agreements. Especially for negotiating minor changes in specific sectors and countries, predictive models on a detailed level are required. Current available aggregated data, although valuable at a macro level, are less useful at the micro level.

Indeed, policymakers would benefit from trade information on the firm level, as a basis for their assessment of the potential added value of new agreements. As global value chains are becoming a more dominant feature of trade, policymakers need more insight in the actual flows of goods and added value. Knowing what is imported and exported on a sectoral level is not sufficient anymore.

Trade barriers can block potentially valuable trade. Insight into abnormalities in trade flows can be indicative of a trade barrier. For example, knowing that firms successfully export goods to certain countries but not others is valuable information for trade policymakers that are negotiating free trade agreements.

More detailed information at the firm and product level would also support the ex-post assessment of trade agreements. For example, knowing which firms benefited from new agreements can feed into the analysis of job creation in that specific sector. Current aggregate data often are not suitable to conduct any casual analysis. Moreover, having this micro-level analysis of the results from trade agreements may help the Commission and national governments to explain the results from trade agreements in a more detailed, less abstract, manner.

There is high potential to move from aggregate data at country level to firm and product level data. New firm level trade data can feed into multiple stages of the policy cycle. Policymakers can set the agenda for future negotiations by detecting abnormalities in trade flows and consequently identify new opportunities. The data can feed into ex-ante and ex-post impact assessment of new trade agreements, especially of minor changes in trade policy that are not reflected by the current aggregate data. In addition, the monitoring of new trade agreements can benefit from receiving data faster, or even in real time. Finally, more insight into the effect of trade policy can improve the Commission's communication on these effects. It enables the Commission to better articulate the effects on a regional and/or sectorial level.

There are several ways in which firm level data can be analysed and useful for policymakers in an early stage of the policy cycle. First, descriptive statistics on flows of trade, volume, value, value added, type of sectors, company characteristics are useful to understand the current situation. To grasp the large amount of data, and to identify potential trade gaps, visualisation techniques can help, e.g. by actually mapping trade flows and volumes on geographical maps. The identification of these potential trade gaps can feed into policy agenda setting. Moreover, detailed data can improve ex-ante impact assessment models of new trade policy and thus inform negotiators.

More detailed trade data can also improve the monitoring and evaluation of new trade agreements. It can provide the data to potentially identify causal links between new trade agreements and specific outcomes such as employment in certain regions and/or sectors. Consequently, this would improve the Commission's communication on the effect of new trade agreements.

4.3 The policy context

The EU's responsibilities and tasks concerning trade policy are laid out in article 207 of the Treaty on the Functioning of the European Union (TFEU). It states that the EU

manages trade and investment relations with non-EU countries. The EU has exclusive power regarding trade policy, meaning that only the EU (and thus no individual Member State) can legislate on trade matters and make international trade agreements. Not only does the EU regulate the trade of goods and services, but also commercial aspects of intellectual property and foreign direct investment.

The role of the European Commission (Directorate-General Trade) is to negotiate new trade contracts on behalf of the EU. For this, the Commission works closely together with the Member States in the Council while keeping the European Parliament well informed. The Council and Parliament formally have to agree on new trade agreements. Moreover, DG Trade implements trade policy, promotes international trade and tackles unfair trade practices. It works closely together with international organisations such as the World Trade Organisation (WTO).

Having detailed insight in trade data is relevant for multiple priority areas of the Juncker Strategy. One of the most prominent areas relating to trade policy is the new Transatlantic Trade and Investment Partnership (TTIP) between the EU and the US. Insight into trade data feeds into the negotiation process and stakeholder consultation process needed for this new agreement, future negotiations with (other) trade partners and the continuous negotiations in the WTO. More broadly, insight into trade between EU countries and between de EU and other countries can generate insight in potential trade barriers that hinder the creation of new jobs, economic growth and investments. Also, more detailed trade data generates insight into the EU's role and added value in global value chains, and thus in the EU's competiveness. Finally, insight into digital traded goods helps policymakers monitor and stimulate the connected digital single market (e.g. online audio-visual media services).

4.4 The data process: from data collection to analysis and visualisation

Data sources

There are multiple new innovative data sources that can provide insight into trade on a firm and product level:

- Actual shipment data is increasingly publicly available, and some are also available in real-time through tracking technologies (e.g. GPS). There are private data brokers gathering and selling this data (e.g. ContainerStatistics[27]). In addition private companies are also analysing shipment data, for example to provide inter-modal routes (e.g. Intermodal Links[28]).

- Companies using Global Trade Item numbers (GTINs) can provide detailed information about the traded good. GTINs are very detailed international recognised product codes, embedded in a bar code, that give information on specific product attributes.

- Firms themselves increasingly use novel data to track their global value chains and to manage their inventories. However, firm data is often proprietary.

There are several initiatives that have tried to gather innovative trade data. The OECD and WTO have a joint initiative for measuring trade in value-added (TiVa). TiVA uses a new methodology, designed to reflect the complexity of value-added in international trade, foreign direct investment, component sourcing (domestic/external) and other features of the globalised economy; it covers 57 countries and is planning to expand its scope. Although the database offers a step forward, the data is still on an aggregate level. Furthermore Eurostat has worked between 2009 and 2013 on a Programme for the Modernisation of European Enterprise and Trade Statistics (MEETS).

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[27] https://www.containerstatistics.com
[28] https://intermodallinks.com

The new data sources on traded goods can potentially be linked to other data sources on companies' characteristics (e.g. size, employment, sector, level of concentration). This would permit analysis of the characteristics of importing and exporting firms (who are actually trading), and of the impact of trade on business activities and labour markets. Eurostat is attempting to combine these new data sources with established trade statistics.[29]

The data collection process

Different stakeholders are already collecting part of the data needed. The challenge is to get all stakeholders aboard, link the data and scale up. Although some data is publicly available, data brokers have already made considerable steps in linking the publicly available data (potentially with private data) and analysing it. They therefore play an important role in the data collection process. Moreover, also companies such as GS1[30] who manage product barcodes including the Global Trade Item numbers (GTINs), have a significant role to play. Also firms need to be willing to share data in an anonymised way. Finally, statistical offices and international organisations such as the WTO and OECD have to work together to link the data and use it optimally.

Firms and national governments are not keen to provide micro-level firm data. Dealing with confidentiality issues is of great importance; firms need be confident that data will solely be published on an anonymised aggregate level. The World Bank has experience in dealing with these issues in their Exporter Dynamics Database.[31] World Bank's legal department has developed internal procedures that are designed to ensure that researchers maintain data integrity and confidentiality.

Ideally a new trade database would cover all firms, sectors and products. However, it is advisable to start with a sector with very advanced data collection system and most willing to cooperate.

Data analytics and visualisation

The data generated from the above data sources and collection process can be analysed in multiple ways. First, descriptive statistics on flows of trade, volume, value, value added, type of sectors, company characteristics are useful to understand the current situation. To grasp the large amount of data, and to identify potential trade gaps, visualisation techniques can help, e.g. by actually mapping trade flows and volumes on geographical maps. Also trends over time can give insight into the effect of trade agreements.

More advanced trade models and predictive analytics are required to assess the impact of new trade policy and agreements ex-ante. Detailed firm level data allows for the use of new trade impact assessment models. Moreover, to understand ex-post impact the data could be used in causal modelling. Finally, the information can feed into scientific research on these trade models, using the data to construct and adjust models.

4.5 Reflections on challenges and next steps

There are some further issues and considerations worth mentioning:

There are **inclusion issues** to be taken into account. Different countries and sectors (and possibly firms of different size) differentiate in their ability to produce the necessary data, or in their willingness to share this data. Therefore, in the near future, these new data sources should mostly be used for specific policy questions. This allows for the analysis to take into account any inclusion issues.

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[29] see http://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_by_enterprise_characteristics#Further_Eurostat_information and http://ec.europa.eu/eurostat/statistics-explained/index.php/Services_trade_by_enterprise_characteristics_-_STEC

[30] http://www.gs1.org/about

[31] http://data.worldbank.org/data-catalog/exporter-dynamics-database

The trade policy issues discussed above mostly concern trade between the EU and other countries. However, the **EU single market** exhibits increasingly more trade flows. Better insight in these trade flows can benefit countries' and regions' competitiveness policy. The Smart Specialisation Inter-regional Trade and Competition Tool[32] already uses export and import statistics to map which region compete with other regions. This tool might benefit from more specific trade data on firm level.

So far, this case study explored the use of new data sources for physical trade. However, **digital goods and services** are increasingly being traded as well. As these goods and services are not physically crossing any border and customs, and in some case no monetary exchange is taking place, tracking these flows of goods, services and information is difficult. Currently, data from surveys or on foreign direct investment in the ICT industry are used to estimate digital trade. These measures only give a rough estimate of the trade and they lack detailed information; this calls for new innovative data sources. One of the options is, of course, collaboration between statisticians and providers of digital service platforms (in media, social media, gaming, software development, etc.). Another new, innovative, data source for estimating digital trade could be actual data flows between countries and even cities. The level of bandwidth provisioned between two points could estimate this.[33] Although data exchange does not necessarily include a monetary exchange, it can be of great economic significance. The possibilities of incorporating data exchange in traditional digital trade statistics should therefore be explored.

This case study has focussed on trade policy, but trade data may also be used in **other policy areas**. One of the application areas is economic policy. The complexity of trade flows can be correlated with economic indicators and thus provide insight into wealth and resilience. This feeds into our understanding of how trade impacts economies, and thus our policy for economic growth. In addition, data on the complexity of trade flows provides insight into the economic stability of countries in terms of supply of certain goods. For example, more detailed data on trade flows may reveal weak links that could lead to shortages of food or raw material. Another policy area where new trade data could improve policymaking is environmental policy. More insight into trade could detect inefficient trade flows (of waste) from an environmental perspective.

Further reading

GrowthCom project: http://www.growthcom.eu

Forecasting of Crises project: http://www.focproject.eu

L Cernat: Trade Policy 2.0.

http://trade.ec.europa.eu/doclib/docs/2014/november/tradoc_152918.pdf

C Hidalgo & R Hausman: The Building Blocks of Economic Complexity.

http://www.pnas.org/content/106/26/10570.full

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[32] http://s3platform.jrc.ec.europa.eu/s3-trade-tool

[33] Mandel, M. (April, 2014). Data, Trade and Growth. Progressive Policy Institute. Retrieved from: http://www.progressivepolicy.org/wp-content/uploads/2014/04/2014.04-Mandel_Data-Trade-and-Growth.pdf