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TRADE MODEL DEVELOPMENT AT THE OECD

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Abstract: In its capacity of providing trade policy advice to its 34 member countries, the OECD is often called upon to provide input with a relatively short turn-around or in answer to a specific set of trade-related policy concerns. Currently, we rely on 'off-the-shelf' models of trade which are not, by definition, tailored to suit our needs. Starting from our current and foreseeable future needs for trade modelling we identify design options in areas of particular concern to the OECD including: services trade and protection, global value chains and trade in value added, and the capacity to add specialized and detailed sectoral modules if and when required. Thus the OECD aims to develop a flexible framework within which technical developments can be more easily incorporated but not necessarily maintained, in anexisting model. Given that best practices in empirical trade modelling are still evolving, in particular those relating to firm-level trade, national origin of firms, value added trade, and trade in services, there is a need to maintain an open structure. This need for flexibility is further compounded by the uncertainties relating to the availability of the data required to accomplish these extensions. It is not obvious exactly which of the recent theoretical advances will be supported by data collection efforts and become standard features of the models of tomorrow.

1 Introduction

This paper outlines the proposed procedure for the development of new trade modelling capacity to underpin quantitative analysis in support of the OECD's trade policy agenda. Thus far we have relied on off-the-shelf models to provide inputs into analysis of trade policy options. This approach has worked well in providing broad and useful insights when needed on an *ad hoc* basis. However, as economic and policy developments in member countries and emerging economies become more complex and increasingly interact with developments outside traditional tariff regimes, there is a need for coordinated cross-discipline empirical approaches within the OECD. Thus, some level of in-house expertise and 'ownership' of empirical trade modelling is now required. There are several key drivers of the proposed OECD modelling work. These include the need to account for the geographical fragmentation of global supply chains (GVCs), the growing role of services in the world economy, and the continuing tendency to conclude bilateral and other free trade agreements. To better understand and empirically assess the trade consequences of these developments, model based analysis is the tool of choice. Models are the only way to conduct a proper assessment of a policy change by constructing a 'counterfactual', a comparison with and without the change in policies. And a model specifically adapted to the OECD is the best way to accurately reflect the policy environment of interest. [1]

The broad goal of an OECD trade model is to generate an empirical assessment of the trade policy questions that are important to OECD member economies and the global trading system more generally. This broad goal translates into three desired design characteristics:

1. Ensuring a model that is tractable, transparent and accessible to modellers as well as consumers of model outputs.

2. Implementing a modular approach to minimize complexity and enhance flexibility.

3. Building in structural architecture to take advantage of recent data developments at the OECD, namely trade measured in value added terms (TiVA), services trade restrictiveness, and export restrictions.

GVCs have become a dominant feature of world trade, creating a fragmented yet increasingly connected world economy. The recently released TiVA database tracks net trade values to their source, providing a more 'realistic' portrayal of flows over that of gross trade statistics. This information is crucial to improving the accuracy of measuring trade policy impacts on services versus goods; capital versus labour; and downstream versus upstream industries. Incorporating this data into the underlying structure of the OECD trade model ensures that our analysis remains rooted in real world economic trends.

A general equilibrium framework, with its explicit modelling of economy-wide interlinkages, is ideal for capturing the complementarities between trade in services and trade in goods. The expertise on services trade developed within the Trade and Agriculture Directorate of the OECD will be key to incorporating the latest developments into the model. As well, the export restrictions database highlights the potential role of policy in the mutual interdependencies of raw materials trade, and this too would be a unique insight available from this model.

[1] As part of the preparations for defining the scope of the modelling effort, a workshop with a group of leading modelling experts was organized in November 2012 to discuss the latest approaches to modelling trade policy issues. This was of great help to clarify realistic and feasible ways forward while keeping an eye on relevant theoretical developments.

This short paper will briefly outline the plans for the OECD trade model. Section 2 discusses outlines the reasoning for developing yet another CGE model, Section 3 discusses the proposed structure of the base model; Section 4 outlines areas of extension and describes next steps and potential future areas of expansion.

2. Why an in-house model?

Applied (or computable) general equilibrium models (CGE), as their name implies, require a complete specification of all economic activity and an explicit recognition of inter-linkages. This, in turn, allows for a detailed tracing of shocks and policy changes throughout the economy. This approach is ideal for examining the whole of economy impact of a policy or other change. It is also more important than ever when modelling trade policy areas. The issues facing policymakers today are as much about domestic regulation and standards as they are about tariffs and more traditional NTMs. A recent Business Dialogue organised by the OECD identified regulation as the #1 obstacle to international commerce (OECD 2013). As changes in trade-related domestic regulation can have profound structural impacts on the economy, a general equilibrium framework is the natural choice to be able to measure the interaction between various domestic regulatory structures and international trade.

One drawback of using CGE models is the level of aggregation of the data. We know from the literature that the level of detail (i.e. sectors and individuals) can impact the results of empirical analysis (McCleery 2013). CGE models rely on input-output tables which are, relatively speaking, highly aggregated. Also, these models take as a starting point the currently observed structure of the economy, and this structure will only change marginally in simulation experiments. While this feature is prevalent in essentially all applied economic models this may not be appropriate over longer run scenarios where for example the relative weight of services in the economy can be expected to increase.[2]

There are numerous existing multi-country CGE models currently used to provide analysis of trade policy. These models are generally housed within research institutions and work in support of particular policy advice is completed on a contract basis. Traditionally, the OECD has relied on these high-quality sources of modelling expertise. However, the increasing frequency with which we are called to provide quick turn-around empirical analysis with multiple 'what-if' scenarios has created dissatisfaction with this approach. In addition, the expertise in areas of empirical development of most interest to our stakeholders resides in-house. Thus, to leverage this in-house expertise, reduce time lags and increase flexibility, the decision was made to develop modelling expertise within the Trade and Agriculture Directorate.

We propose proceeding under a dual approach with in-house emphasis on CGE modelling, while relying on econometrics to provide additional insights to the CGE analysis, as well as input to the parameterisation of the CGE model.

3. Basic Model

We will proceed by developing a general equilibrium model that takes the basic GTAP structure as its starting point.[3] We intend to keep this 'core' model as simple as possible to ensure its integrity and adaptability. This core model will be a standard multi-region CGE model with constant returns to scale in production, an import specification that allows for intra-industry trade and bilateral trade flows, a single household in each economy and a database that covers the world economy.

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2 However the GE modelling framework can accommodate scenarios with exogenously specified structural change. Ground breaking work in this area has been done by the MONASH modelling group in Australia.

3 For details of the GTAP modelling structure see Global Trade Analysis (1997), editor T. Hertel. Updates to the basic model can be found here https://www.gtap.agecon.purdue.edu/models/current.asp

We will focus on the following areas of extension/modifications to this basic model:

- Macroeconomic consistency – ensure baseline consistency with projections produced by the OECD Economics Department.
- Model specification to absorb TiVA data – by end-use category (intermediates, final consumption, investment)
- Monopolistic competition – to capture productivity impacts of trade.
- Labour markets – differentiating skill levels within scope for labour-skill splits in the data.
- Barriers to trade – model instruments for handling restrictions on raw material exports and services.

Our model will start with a well-specified baseline. This means an initial picture of the world economy focusing on macroeconomic aggregates and trade flows. This baseline will incorporate analysis and forecasts from the OECD Economics Directorate, anchoring our baseline assumptions regarding such aggregates as GDP and unemployment.[4] Thus we will work closely with both the Economics and Environment modelling groups. , who have developed a method to tally long term macro-economic projections with the ENV-LINKAGE model.

On the policy side, the model will offer the option to implement tariff reductions, export tax and subsidy reduction, trade quota expansion, input subsidies, output subsidies, and reductions in trade costs. This can be used to capture higher costs when producing for export markets, due to regulatory barriers or NTMs that do not generate rents (or where the rents are dissipated through rent-seeking).

3.1 TiVA – what does it mean for trade in intermediates?

The growth of production fragmentation, global value chains, global production networks and the myriad ways relating the basic trend in the international sourcing of inputs has had a tremendous impact on trade over the past 20 years. Intermediate inputs now account for the majority of trade flows in both goods (over 56%) and services (close to 73%) (Miroudot et al, 2009). With this growth in intermediate trade has come concern over the use of gross value trade measures. Namely, the question has arisen as to what extent these data accurately measure the potential impact of trade on the domestic economy, and importantly for our purposes, measurements of welfare and job growth?

There are two major concerns when using gross trade flows to analyse impacts from changes in trade policy. First, the fact that exports increasingly embody intermediate inputs sourced from abroad makes it difficult to identify the real contribution a given export may make to an economy. This has implications for measuring the impact of trade on labour or capital markets in the domestic economy. The factor content of exports of a country, for example, can appear to embody a level of capital or skilled labour which was, in fact, value added embodied in imports. Second is the implication for sectoral trade impacts. For example, gross trade flows imply that services make up about 20% of world trade. Based on value added figures, that number is likely to be closer to 40% (OECD 2013). Given the large role services play in many OECD economies, this factor is of significance in analysing employment impacts and growth opportunities.

[4] See Hervè et al. (2010) for an explanation of the Economics Directorate's forecasting model.

Finally, conventional trade statistics are not necessarily able to reveal those sectors of the economy where value-added originates. As more and more trade policy concerns itself with sector-level regulation, standards, and other 'behind the border' measures, understanding where an economy generates value is extremely important for effective policy development. For example, in developed economies a large share of the total value-added generated by manufactured exports originates in the service sector. Disentangling the domestic value chain into its sectoral components can shed new light on the sources of international competitiveness and the direct and indirect employment impacts of trade.[5]

The OECD in collaboration with the WTO has developed a new database, stating trade in terms of value added. This new database TiVA (Trade in Value Added) will provide the underpinning of developing a more detailed nesting structure for the trade flows in the new model.[6] This includes the Bilateral Trade Database by Industry and End-Use Category (BTDIxE) , 1988-2009, derived from OECD's International Trade by Commodities Statistics (ITCS) database and the United Nations Statistics Division (UNSD) UN COMTRADE database, where values and quantities of imports and exports are compiled according to product classifications and by partner country.[7] The database will provide the basis for a finer allocation of imports by exporting country to users (intermediate consumption, household final demand, and investment) and greatly improve the quality of inter-industry trade flows in the global input-output matrix and therefore the trade in value-added results.

We will incorporate the TiVA insights into our baseline model. This will ensure the development of an initial starting point that is well rooted in current economic thinking, incorporating the most recent understanding of how the world economy actually works. Measuring trade by the value generated by each country in the production of any good or service that is then exported, offers a fuller picture of commercial relations between nations. It also means that the income impact of any policy change will be attributed to the place where income generation actually occurs. An additional implication of using insights from the TiVA data relates to the traditional Armington-based assumptions. Most trade models assume that all countries produce and trade varieties of the same basic set of products, where each country's variety is a substitute, but not a perfect substitute, for varieties produced elsewhere. It has served as the basis for empirical trade modelling for decades. In the Armington framework, data at odds with the prevailing theory (Heckscher-Olin-Samuelson) could be explained and recreated in a modelling framework, namely two-way trade and greater stability of trade flows in the presence of large relative price swings.

Yet the Armington approach is seen as being an increasingly limiting and restricting factor in empirical trade models today. Existing estimates of Armington trade elasticity's are being attacked on both theoretical and empirical grounds (McCleery 2013). In a world increasingly dominated by global value chains and multinational corporations, it is ever more difficult to justify a model based on the assumption that Honda Accords produced in Marysville, Ohio are perfect substitutes with Fords produced in Dearborn, Michigan, but imperfect substitutes with Honda Accords imported from Saitama, Japan (McCleery 2013).

While the logic of replacing Armington may be sound, we must keep in mind that the project described in this paper is largely an empirical exercise and thus is constrained by the availability of data to populate any additional or varying assumptions outside the Armington framework. Even if this data are available, the ultimate impact such a change in modelling structure would have on the policy advice given would need to be credibly different from what the current framework provides. Arkolakis, et al (2012) reviewed the

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5 Much has been written about measuring trade in value added terms and its potential impact on trade policy. See for instance, Koopman, et al (2010, 2012), OECD-WTO (2010).

6 More information on the TiVA database and project can be found here: http://www.oecd.org/trade/valueadded .

7 Further information can be found here:http://www.oecd.org/industry/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm.

implications of the various alternatives to the Armington assumption (namely Krugman and Melitz) to derive differences in the welfare outcomes of each approach. Their answer, in a nutshell was 'not much'. They conclude the paper by saying, 'Although it may be tempting to think that new and richer quantitative trade models necessarily entail larger gains from trade, our analysis demonstrated that this is not the case.' (page 118). However, they go on to say that 'Within the class of trade models considered in this paper the number of sources of the gains from trade varies but conditional on observed trade data, the total size of the gains from trade does not.'(p. 118). Therefore, the devil does appear to be in the details.

As stated above, our analysis will live in a world where sectoral allocation, and it implications for labour market outcomes for instance, does matter. As both Balistreri et al (2009) and Arkolakis, et al (2012) show, in a multisector environment the supply of labour in each sector is no longer inelastic and foreign shocks to trade may lead to changes in sector-level employment and the measure of goods that will be produced. The equivalence of outcomes across the perfectly competitive and monopolistically competitive trade models relied on the fact that there was no change in the measure of goods produced in each country. When this assumption is dropped, equivalence no longer holds. However, again this does not necessarily imply that estimates of overall welfare gains will diverge because while gains from trade will be larger in those sectors expanding, they will also be smaller in those in which it contracts. The net outcome may be a wash.

However, as noted above, this differential in intersectoral outcomes is an important area of interest in our policy analysis. Thus, the added 'complication' of departing from the Armington assumption, required. The TiVA data allows us to insert a level of substitution, in connection with the monopolistically competitive framework, to avoid some of the pitfalls of the implementation structure of the Armington approach. Because TiVA data traces imports for intermediate use versus final demand, trade will be driven by substitution at both the source and final use stages.

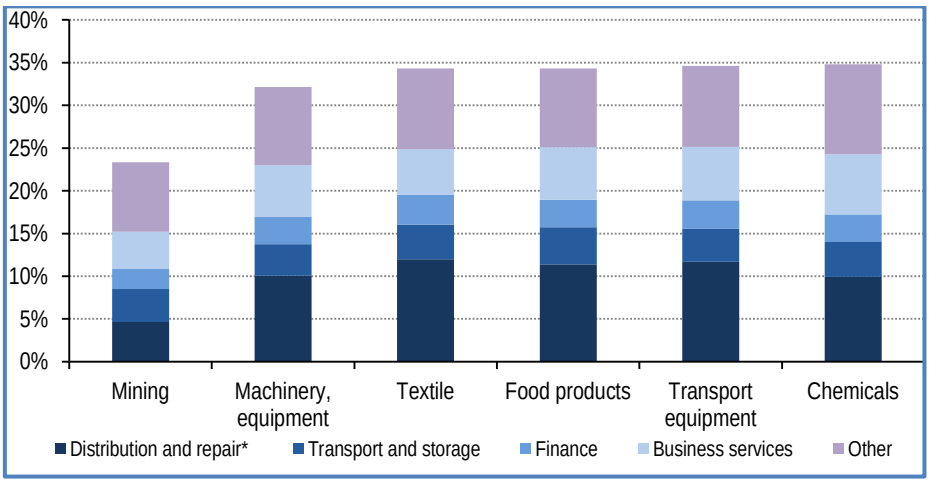
Thus we anticipate modelling businesses as monopolistically competitive, where relevant, so that an examination of both intensive and extensive margin changes can be made (Dee et al., 2011). Monopolistic competition involves scale economies that are internal to each firm, depending on its own production level. An important property of the monopolistic competition model is that increased specialisation at intermediate stages of production yields returns due to this specialisation, where the sector as a whole becomes more productive with a broader range of specialised inputs. These gains spill over through trade in specialised intermediate goods. Thus, this framework allows for improved modelling of GVCs, taking advantage of the TiVA data insights. With these spillovers, trade liberalisation can lead to global scale effects related to specialisation, similar gains following from consumer good specialisation.

3.2 Adding services trade – and it's restrictions

Traditionally, services have not been well captured in empirical models – both CGE and econometric. This has largely been due to the poor state of statistics on services. However, as more information becomes available, we are able to improve our understanding of the trade implications of services, and their interaction with goods trade. The TiVA work has already gone some way in highlighting the important role services play in international trade, not just in their own right, but in support of manufacturing trade. Figure 2 demonstrates the large share of services value added embodied in various manufacturing processes. As shown, these shares can be as large as 35%.

An important improvement in the policy side of this analysis is the OECD services trade restrictiveness index (STRI). This index is supported by an underlying database can be used to complement what is known about services trade, to improve the trade policy analysis of both goods and services trade.

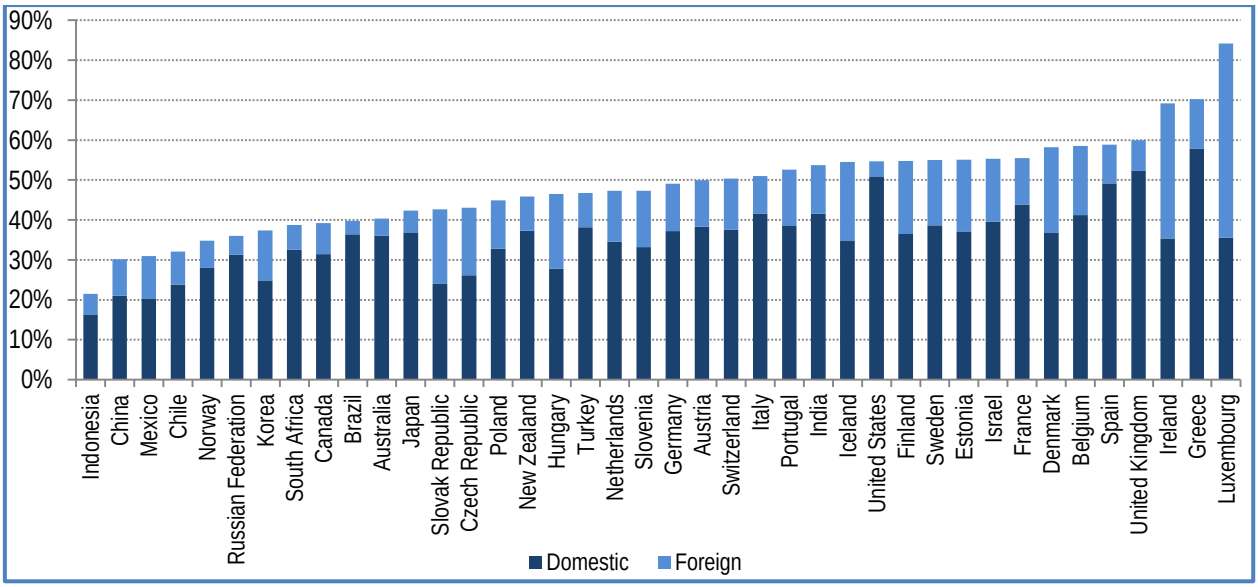
Figure 2: Services share of value added in manufacturing, 2009



Source: OECD (2013). The share of distribution does not include distribution services for final goods.

Figure 3 further illustrates the importance of services in trade by highlighting the value added share in total exports for OECD economies. Domestic services play a relatively large role in the value added of exports in the US, Brazil, Australia, and Japan, for instance. The foreign content of services is important in the economies of Luxembourg, Ireland and the Slovak Republic. The ability to reflect these relationships in empirical trade modelling is important for sending the right message to policy makers. It demonstrates the importance of a well functioning, liberalised service sector for a well functioning and growing export sector.

Figure 3: Share of services value added in total exports, 2009 (Percentage)



Source: OECD (2013).

There are two challenges to modelling services in the OECD model. The first is to accurately reflect services trade in the structure of the model, both services trade itself and its input to goods trade. The second is to accurately reflect the restrictions on the current international flow of services.

Expanding on the services trade already in the GTAP model is complicated by a number of issues. First, services trade itself is quite complex. We must account for the various modes of supply, the relationship between the different modes (as complements or substitutes) and their related costs. The definition of many services is blurred, making tracking and quantifying difficult. Also, the fact that there are often no national tax or tariff issues (such as with goods) means governments are not providing statistics for this trade. This means that information on trade in services is sparse and inconsistent (Francois and Hoekman 2010). Even for the services where some information is available, incorporating them into a model can be challenging. Different services play different roles in the economy, have different market structures and, as noted above, different modes of supply. These modes of supply have implications for the outcomes of resource flows such as capital (namely FDI) and labour (in the movement of national persons). CGE models are, by definition, perfectly suitable to track this international factor mobility and service provisions as long as the underlying data are available. Incorporating a consistent framework for the international flow of goods, services, and factor trade is thus a longer-term goal of the OECD trade model.

3.2.1 Restrictions on Services trade

Quantifying restrictions on services trade already available will be aided by the development of the OECD's service trade restrictiveness index or STRI. This index is being developed for OECD member countries and emerging economies that are significant services traders in the global economy. STRI currently covers computer services, telecommunications, construction and professional services (engineering, architecture, legal, accounting) in 40 countries. Ultimately, all economically important services sectors will be incorporated.

The conceptual work in the development of the STRI has partly been sector-specific, aiming at understanding the driving forces and barriers to trade by mode in each sector, and partly horizontal aiming at developing the methodology for calculating the STRIs. Specific sector studies were produced for each of the covered sectors. These were presented to expert meetings with invited speakers and participants from the sector concerned, academia, other international organisations (notably the WTO and the World Bank) and participants from OECD members, who were encouraged to send sector experts. The expert meetings provided important input to the STRI project by ranking and scoring the inventory of measures included in the OECD's Product Market Regulation (PMR) survey according to their judgement of relative trade restrictiveness.

The STRI project has two distinct but complementary instruments: a services trade regulatory database and a services trade restrictiveness index.[8] The current database's measures are organised under five policy areas:

1. *Restrictions on foreign ownership and other market entry conditions.* The measures included under this heading relate to restrictions on entry which can take the form of limitations on foreign ownership and screening requirements. The measures correspond to a large extent to restrictions on market access in the GATS. However, restrictions on board of directors are also included under this heading as it is envisaged that a board of directors will be appointed upon entry and restrictions on the composition of the board will affect both the cost of entry and the decision whether or not to enter the market. Measures under this policy area are similar in all sectors, although there are some sector-specific nuances.

[8] More information on the STRI can be found here: http://www.oecd.org/trade/services-trade/towardsaservicestraderestrictivenessindexstri.htm.

2. *Restrictions on the movement of people.* The measures included under this heading relate to restrictions under mode 4 as defined in the GATS. The measures distinguish between intra-corporate transferees, contractual services suppliers and independent services suppliers.

3. *Other discriminatory measures and international standards.* Under this heading are found measures related to national treatment, discrimination in government procurement; and the lack of adoption of international standards when such standards exist and are found to reduce technical barriers to trade.

4. *Barriers to competition.* Barriers to competition that are considered trade restrictive fall under two broad categories. First, there are discriminatory measures where foreign suppliers' rights under the competition law are inferior to that of local companies. These also concern to what extent state-owned enterprises have privileges that may put foreign enterprises at a competitive disadvantage. The second category relates to inherently uncompetitive markets. In such markets lack of regulation is trade restrictive in the event that local incumbents may prevent competitors from entering the market. One particularly relevant competition policy instrument are price controls. In markets that are inherently uncompetitive, price controls in the form of e.g. price caps, cost-plus regulation or other measures are imposed in order to prevent incumbents from abusing market power. Price regulation can also stifle competition and restrict trade. Regulated minimum prices for example may prevent more cost-effective foreign suppliers from competing in the market.

5. *Regulatory transparency and administrative requirements* The measures found under this heading are related to regulatory efficiency and include information on costs in terms of time and money of obtaining necessary licenses or permits. The nature of the measures implies that information cannot be found directly in laws and regulations but are based on surveys such as OECD Indicators of Regulatory Management systems, the Product Market Regulation (PMR) survey, the World Bank's Doing Business Indicators as well as other relevant and reliable sources.

Figure 4

Examples of measures included in the regulatory database: Telecommunications

Policy Area	Measure*	Result	Source	Country
Foreign ownership & market entry restrictions	Joint ventures are required	Qualitative information	Link to regulation (law, administrative decision), etc.	Country confirms entry or provides correction
	Screening of investment			
Restrictions on temporary movement of people	Quotas			
	Labour market tests			
Other discriminatory measures	Foreign participation in government procurement			
Barriers to competition	Whether access to networks and interconnection is regulated			
Regulatory transparency	Information on spectrum regulations publically available			

*Measures shown are examples for illustrative purposes only

Some features of the STRI regulatory database:

- Based on regulations on the books, rather than the GATS or RTA commitments.
- Covers all trade-related domestic regulation.
- Documents the source (law, regulation, rule, administrative decision).
- Each measure is verified with the country, and "peer reviewed" by all other countries.
- Updates and maintains measures current, so that regulatory reforms are reflected.
- Provides explanations and definitions of each measure included in the database.

The index translates the qualitative information of the regulatory database into quantitative measures using an elaborate scoring and weighting mechanism. Providing a measurement tool for trade in services barriers, the indices capture the essence of restrictiveness at a glance, in order to help policy-makers identify areas of strengths and weaknesses. A first attempt has been made at estimating trade costs from trade data using the most recent insights from theoretical and empirical research on the gravity model. There are, however, gaps in the services trade data for some sectors and countries such that providing a complete set of trade cost estimations has hitherto not been possible. With release of trade data for 2008, however, we anticipate making further progress in this regard.

3.3 The role of export restrictions

Industrial production relies on trade in raw materials such as minerals, metals and rare earths. Prices and quantities of these materials are not only influenced by global demand, but by the policies in the countries that produce and export them. The OECD is often called upon to determine the impact such restrictions have no only on raw material trade, but all along the value chain.

Over the past few years, producer countries are making greater use of measures which raise export prices, limit export quantity or place other conditions on exports. Countries use these export restrictions as a way to increase revenue, decrease domestic prices, promote downstream processing industries or conserve natural resources. Materials affected by these restrictions in recent years include timber from Russia, chromite from India (used in chrome plating and in pigments) and rare earths from China (used to make computers and mobile phones). Food commodity exports have also been restricted; when food prices rose sharply in 2007-08 over 40 countries imposed various forms of export restrictions(Fliess and Mård 2012).

Export restrictions have negative consequences for international trading partners and producer countries. By diverting raw materials from export to domestic markets, these restrictions raise prices for foreign consumers and importers. At the same time, by reducing domestic prices in the producer countries and increasing global uncertainty about future prices, export restrictions discourage investment in extracting and producing raw materials - potentially reducing the overall supply of materials in the long term. Finally, the potential for retaliatory restrictions by other countries can lead to a downward spiral of trade distortions and price increases.

Businesses and policy makers alike are concerned by the increasingly restrictive and unpredictable environment of international trade in industrial raw materials. The open and competitive access to these resources is seen by many businesses as one of the most significant and important obstacle to trade (OECD 2013). Multilateral disciplines governing the use of export restrictions are weak. There are no rules for using export duties, while policies behind export restrictions often lack transparency. This creates uncertainty for industries that depend on supply of these materials and raises the risk for investment in both mining and processing facilities worldwide.

In order to better understand these restrictions, and quantify their potential impact on trade, the OECD

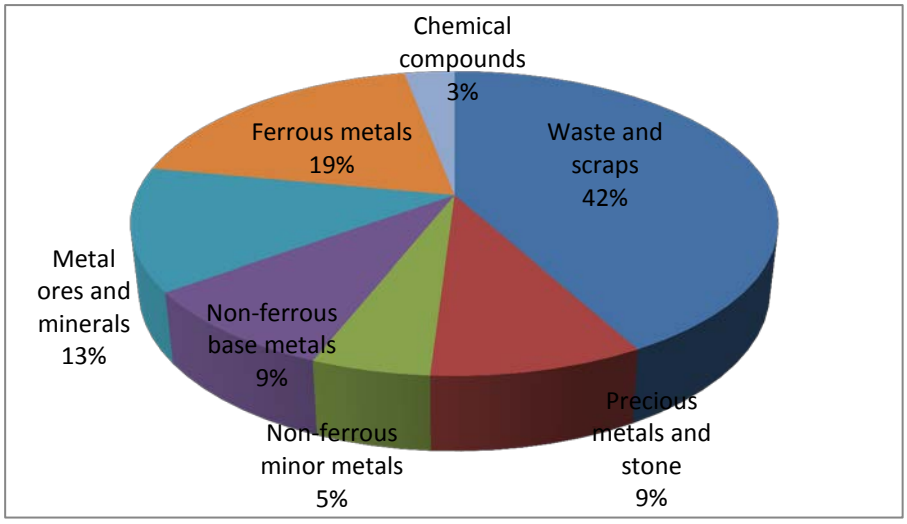
recently released inventory of export restrictions on raw materials. [9] This Inventory of Restrictions on Exports of Industrial Raw Materials is part of a larger effort undertaken by OECD to take stock of such measures in the raw materials sector. As most of the measures are not notified to the WTO under existing multilateral trade rules, a key aim of the Inventory is to improve the transparency of their use. It also offers a databank for empirical analysis advancing the understanding of the economic effects of export restrictions.

For each material official government data were collected for the five leading countries in terms of share of global production in 2009. The sources for production data are: USGS Mineral Commodity Summaries 2010, IEA for coke and coking coal, ITTO and UNECE for wood. Secondary sources such as WTO Trade Policy Reviews, Metal Bulletin, Global Trade Alert, EU trade barriers database were reviewed to identify additional minor producers reported to use restrictions for inclusion in the survey.

The database records export restrictions that governments have applied during the period of 2009-2010. Updates to more recent years are underway. The work involved two stages, data collection and data verification. During the first phase information on export restrictions was collected from the websites of the governments of the producer countries. The search targets included the different ministries in charge of economy, trade, industry, mining, forestry or foreign affairs as well as customs agencies. Sources of information on policies that restrict exports include legal acts, rules, regulations, public notices, circulars and notifications by ministries published on the websites. The data collected from the internet sites were then verified with the government officials for accuracy and completeness of export restrictions applied.

The research covers 100 countries that produce industrial commodities, including 28 OECD countries. The number of countries with at least one measure in force at the HS6 digit level in 2009 and 2010 is 55. Figure 5 provides a breakdown of sectors imposing export restrictions. Measures covered include various types of export taxes, VAT rebates, export quota and export licensing. As shown, waste and scrap metals make up the majority of restrictions in 2009. Also important are ferrous metals (such as copper, aluminum, lead and zinc) which make up almost 20% of all restrictions imposed (Fliess and Mård 2012).

Figure 5: Incidence of export measures by subsector of minerals and metals (2009)



Source: OECD Inventory as of 23 April 2012.

[9] More details on the export restrictions database, see: http://www.oecd.org/tad/benefitlib/exportrestrictionsonrawmaterials.htm.

The database will help provide an empirical basis for designing relevant scenarios to elicit the world market effects of export restrictions as well as tracing their direct and indirect effects through the supply chain – including effects on the economies of the countries that impose those measures.

Figure 6 outlines the top materials subject to export restrictions in 2009 and the countries applying these measures. As seen, iron and steel have many policies attached to their export. This has potentially a tremendous influence on the ability to produce basic products for both consumers and as inputs to business. One of the expansions of the OECD trade model will be to quantify these policies to get a better sense of how much these measures really are restricting trade.

Figure 6: Leading products subject to export taxes (2009)

Product	Count (HS6 lines)	(countries)	Countries applying the measure
Iron and steel	252	5	Argentina , China, India , Russia, Ukraine
Copper	61	4	Argentina ,China, Russia, Zambia,
Molybdenum	19	3	China, Russia, Vietnam
Diamonds	17	3	Namibia, Sierra Leone, South Africa
Aluminium	14	4	China, Guinea, Russia, Vietnam
Tungsten	11	3	China, Russia, Vietnam
Nickel	8	2	Russia, Vietnam
Cobalt	8	4	Argentina, China, Ukraine, Vietnam
Antimony	7	2	China, Vietnam
Borates	7	1	Argentina
Gold	7	2	Benin, Fiji
Tin	7	3	China, Russia, Vietnam
Pig iron	6	2	China, India

Note: Product coverage is all minerals and metals, excluding metal waste and scrap. Direction of change "elimination" is not counted. Other products are subject to export taxes but are are not shown here, The ranking criteria for the Table are the number of Inventory entry counts at the HS6 level, but a comparison of counts would be misleading as not all products have the same number of HS6 lines. For example, Iron and steel and Copper, which head the Table, consist of many more HS6 product lines than Zinc or Gold.
Source: OECD Inventory as of 23 April 2012.

3.4 Other data considerations

Another area of potential expansion for the OECD trade model is the relationship between trade and labour markets. The literature has shown that labour market outcomes with respect to changes in trade policy can differ dramatically depending on the type of labour examined and the relative scarcity of the labour in the respective markets. The standard GTAP database breaks labour into two categories: skilled and unskilled. However, we know that trade can affect medium skilled workers in unique ways, and these effects differ by sector. In the general equilibrium framework we can account for these differential impacts of these labour groups across sectors but have more limited information on skills. There is the possibility of using satellite data to examine employment outcomes beyond the binary approach of skilled versus unskilled. By adding frictions to the movement of labour between activities we more accurately reflect the current literature on labour market adjustment (e.g. Davidson and Matusz, 2000 and 2010).Thus, a CGE framework allows us to take account of the variation across different types of workers, in different economies with different labour market institutions.

We will start with the basic GTAP database which has a base year of 2007. As discussed above, we will supplement this information with the TiVA data from the OECD, as well as relying on information from the WIOD database. Both of these databases have information through 2009. Using information from these sources and others, our base year will be 2009, which is then updated and projected forward to tally the macro-economic projections from OECD. One consideration in using 2009 as a base year is the abnormal performance of trade during this period. Thus, if possible, we will work to update our data to develop a baseline for 2010.

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