



THINKING IN A BOX: A 'MODE 5' APPROACH TO SERVICE TRADE

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Issue 1
March 2014

ABSTRACT

This paper draws the attention to the growing importance of services inputs in manufacturing sectors' exports in the EU and beyond. The GATS existing four modes of supply do not adequately cover this type of indirect services value-added trade. Hence, theoretically, the case for a new indirect mode of services supply - 'mode 5' - is made. On the basis of the TiVA database, our estimates of mode 5 services exports point to a substantial share of total merchandise trade.

The paper also finds that from a 'mode 5' perspective, services embodied into products are also subject to fairly complex trade rules. One such example illustrated in this paper is the area of customs valuation. Other issues (trade facilitation, rules of origin) could have an impact on the way 'mode 5' services are traded. The renewed impetus at the WTO on trade facilitation and the post-Bali agenda should provide a new opportunity for policy makers to forge trade rules that are well-suited for the ways in which goods and services interact along global supply chains.

Editor:
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**For further
information:**
ISSN 2034-9815

<http://ec.europa.eu/trade/analysis/chief-economist/>

* The opinions expressed in this paper are the authors' own and do not necessarily reflect the views and opinions of the European Commission. The authors would like to thank Ignacio Iruarrizaga Díez, Peter Kovacs, John Malone as well as their colleagues in the Chief Economist and Trade Analysis Unit of DG TRADE for their comments and fruitful discussions.



1. INTRODUCTION

The first decades of the 21st century mark a moment in time where international trade and investment patterns are changing rapidly, revealing that a new landscape of global production and labour division has emerged. Increasing fragmentation of production activities and hereby international trade has intensified the role of trade policy in determining external competitiveness. The sharp decline in information and communication costs as well as the diffusion of new technologies has allowed for unbundling of production processes and spared the need for various production activities to be performed in proximity. Global value chains emerged involving often the participation of multiple firms in multiple countries at various stages of the production process of a single good (Baldwin, 2014).

This development poses chances and risks as the fragmentation of production basically means that more and more production activities in various sectors open up for international competition. Securing participation in global value chains and moving up the value chain from low to high value added becomes critical for international competitiveness and hereby income and employment growth.

A growing share of manufacturing goods can no longer be simply referred to as 'goods' but should be regarded as a complex bundle of products and services interactions

Services play an increasingly important role in this process not only as a direct contributor to the value chain (financial services, telecommunication, IT, logistics) but often even more importantly in an indirect way - incorporated in manufacturing products. A growing share of manufacturing goods can no longer be simply referred to as 'goods' but should be regarded as a complex bundle of products and services interactions.

Moreover, manufacturers are buying, producing and selling more and more services in recent years a trend referred to as 'servicification' (Kommerskollegium 2012). A high services share in the value added of a manufacturing product may ensure competitive advantages for the manufacturer as services promote the uniqueness of a product and therefore its diversification from the competition. In addition, high value services often incorporating technological know-how are considered difficult to imitate and counterfeit. Furthermore, there is also evidence that service inputs affect firms' export capabilities positively and that buying-in more services is linked to higher export intensity for firms in some industries (Lodefalk 2014) as well as to total factor productivity growth especially in the high-skilled intensive industries (Wolfmayr 2008).



The trend of ‘servicification’ has started recently to attract attention not only in the academic circles but also in the policy debate hinting the idea that services and goods provisions in international trade agreements should be approached as mutually interdependent (Stephenson 2012, Kommerskollegium 2010a and 2010b).

The importance of this trend for the international trade agenda is stressed in this paper. It aims at drawing the attention to the fact that a significant share of services embodied into manufacturing goods are traded according to GATT and not to GATS rules of international trade. In the same vein, often services embodied into goods pay duties. To illustrate these findings and to highlight the importance of these services for manufacturing sector exports the paper introduces the concept of a new indirect ‘mode 5’ of services supply.

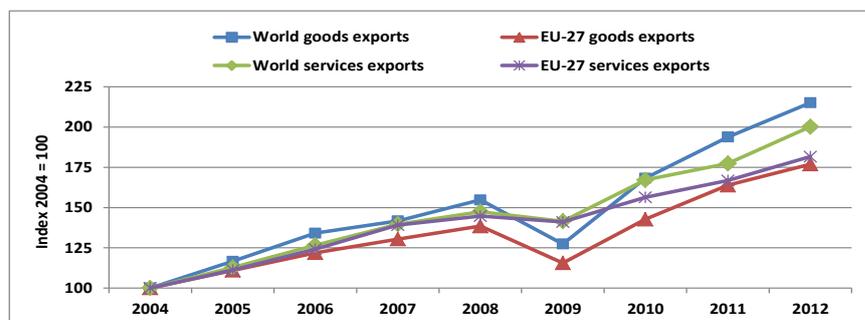
The rest of the paper is structured as follows: Section 2 draws the attention to the importance of trade statistics on a value-added basis. Section 3 depicts the treatment of services under GATS i.e. the four modes of supply. Section 4 introduces a new theoretical ‘mode 5’ of services supply whereas Section 5 discusses the treatment of ‘mode 5’ services in customs valuation. Section 6 concludes and provides policy implications.

2. DEVELOPMENTS IN GOODS AND SERVICES TRADE

In 2012 world services exports stood at €2.6 trillion and goods exports at €11.5 trillion. In recent years, trade in goods and services has grown at a similar pace although merchandise trade grew slightly faster. In the period 2004-2012 world exports of goods increased by 115% and world export of commercial services doubled (figure 1). Extra EU-27 services exports increased however stronger than extra-EU-27 merchandise exports signalling the EU’s comparative advantages in services trade.

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Figure 1: Growth in trade in goods and commercial services 2004-2012



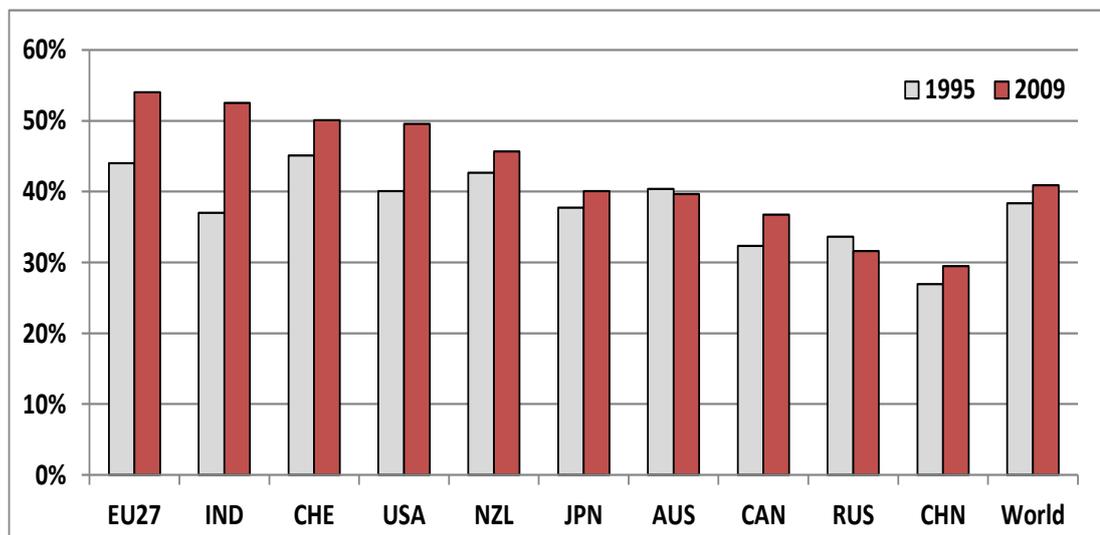
Source: EUROSTAT, own calculations



These statistics however significantly underestimate services trade because they do not cover all modes of supply.¹ Indeed services trade through factor movements mode 3 (capital) and mode 4 (labour) are not part of these statistics. In addition, services trade is underestimated also because trade is often double-counted by crossing the border once as a component and once as a finished product (WTO 2013, OECD – WTO 2012).

To alleviate this statistical drawback, the joint OECD – WTO Trade in Value-Added (TiVA) database addresses this issue by accounting for the value added by each country in the production of goods and services that are purchased worldwide. The TiVA database essentially links inter-sectoral cross-country information from the world input-output database (WIOD) with official trade statistics.

Figure 2: Services content of gross exports in selected countries



Source: TiVA, own calculations, data extracted on 15 January 2014.

According to official trade statistics which measures the gross value rather than value-added at various stages of production, the share of service exports in total world trade was about 20% in 2009. In value-added terms however the services share nearly doubles (figure 2). The value added services content of total exports in the EU27 for example is significantly larger and amounted to 54% in 2009. Compared to 1995 this share increased by 10 percentage points reflecting a growth of 23% in the EU27. The services share of total exports has augmented in the majority of the

¹ Mode 1 and mode 2 are measured based on the balance of payment (BOP) statistics. Note that according to WTO (2006) a part of constructions services registered in the BOP might in fact be supplied through mode 3 (commercial presence). However the share of construction services in total commercial services is only 3% in the EU-27 in 2012.



countries covered by the TiVA database in the period 1995-2009. The largest increase of 42% took place in India followed by the USA of 24%.

The considerable difference in the share of the service contribution to total exports as shown in figure 2 in comparison to the official trade statistics makes it obvious that in order to properly account for the services contribution, value-added data is indispensable.

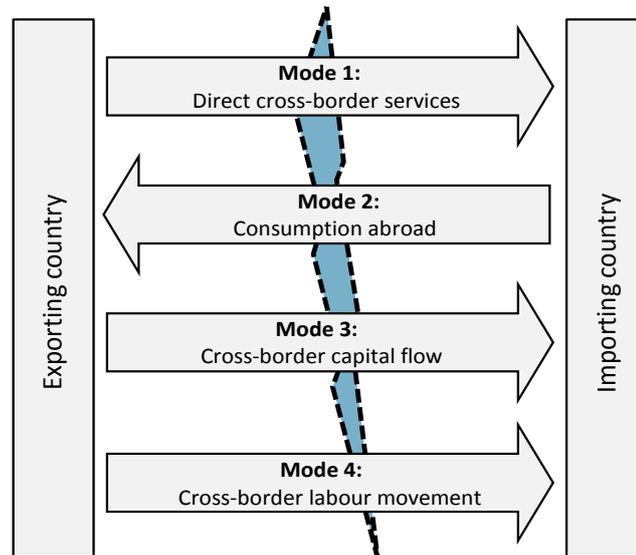
3. THE TREATMENT OF SERVICES UNDER GATS

The role of services and the way in which the global community promotes trade in services is reflected in the existing body of international trade rules (multilateral, plurilateral and bilateral) governing services trade. The legal platform for services trade at the multilateral level is found in the WTO GATS, with its well-known four modes of supply (see figure 3 for an illustrative description). Briefly described the intuition behind these modes of supply is the following:

- **Mode 1:** a service crosses the border (the blueprint of a new building is sent online, a software (ebook) is downloaded from abroad);
- **Mode 2:** an individual crosses the border as a tourist, to study, etc.;
- **Mode 3:** a company sets up commercial presence abroad to supply services (e.g. supermarkets, telecom companies, banks, etc.);
- **Mode 4:** a worker crosses a border to temporarily work for a company (a business consultant, an engineer repairing/installing machinery).

The importance of these four modes of services supply is essential as they determine the way and modalities in which multilateral services liberalisation efforts are negotiated. Due to many exceptions and limited coverage of GATS as well as the growing economic importance of the services sector, the Doha Round has envisaged further liberalisation of the services sectors. The failure of this attempt so far has led to substantial efforts to further liberalise services trade through bilateral and regional free trade agreements. At a multilateral level, in October 2012, the EU and several other countries have decided to negotiate a plurilateral Trade in Services Agreement (TiSA).

Figure 3: GATS’s four modes of supply



Source: own illustration

4. ‘MODE 5’: SERVICES INCORPORATED INTO PRODUCTS

The GATS four modes of services supply described above do not account for the fact that a substantial and increasing share of services is being embodied in products and traded around the globe. In fact as it will be presented further on in this section this share is substantial; in the EU27 alone it accounts for 34% of manufacturing and primary sectors exports.²

‘Mode 5’ services exports account for 34% of EU merchandise exports

Taking account of this phenomenon a hypothetical case for a new indirect mode of services supply is made. Staying in line with the already existing 4 modes of services supply the new mode is called ‘mode 5’.

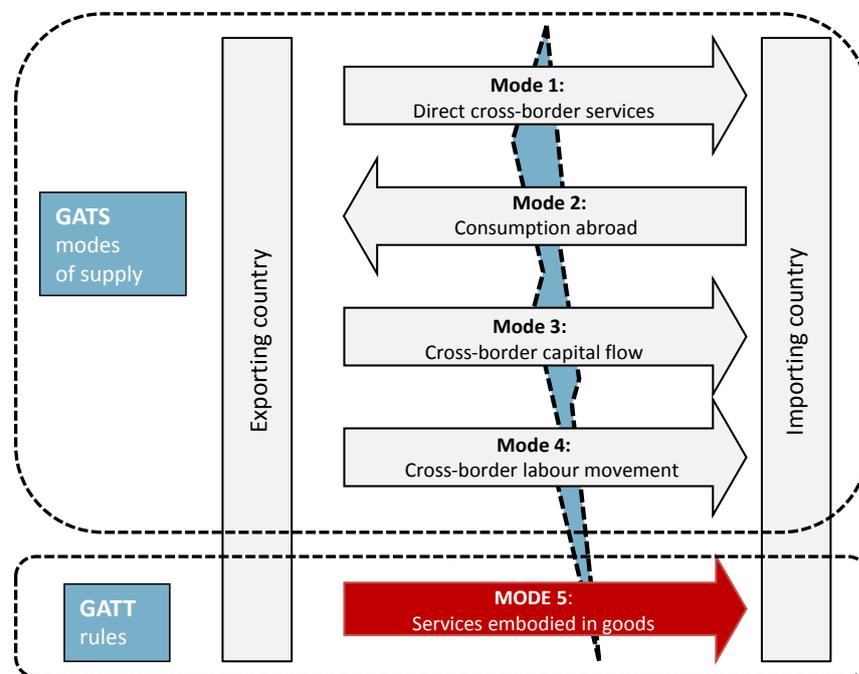
The idea behind this theoretical new mode of supply is illustrated in Figure 4. One characteristic of ‘Mode 5’ is that it simultaneously relates to goods and services as it focuses on the interrelation between merchandise and services trade. Many (high value) manufacturing products can no longer be defined as a ‘product’ in its

² For simplicity the following sectors which are split out explicitly in TiVA are called manufacturing and primary sectors: transport equipment, textiles and apparel, food products, wood and paper, electrical equipment, other manufacturers, basic metals, machinery, chemicals and minerals, agriculture and mining.

traditional sense but as complex bundles or hybrids of goods and services interactions.

At this place it is important to clarify the scope of ‘mode 5’ and how it relates to the term ‘servicification’. As mentioned already in the current paper ‘servicification’ refers to manufacturing firms purchasing, producing and selling more and more services to their customers (both domestically and abroad) at all stages along the value chain. Hence, ‘servicification’ encompasses service inputs, production and after sales services i.e. the whole life-cycle of a product.

Figure 4: The five modes of services supply



Source: own illustration

In a nutshell, ‘mode 5’ services exports are domestic intermediate services inputs that are incorporated in one country’s merchandise exports

The coverage of ‘mode 5’ introduced in this paper however reflects production services which are embodied i.e. an inseparable part of the production process of a manufacturing good. As an example in order to produce a car there is a need for engineering, consulting and design services as well as electricity and retail services in order to operate the factory and to purchase necessary inputs. Consequently services covered under ‘mode 5’ represent a subset of ‘servicification’ i.e. those services which form part of the value of the good before it is exported. In a nutshell, ‘mode 5’ services exports are domestic intermediate services inputs that are incorporated in one country’s merchandise



exports. This distinction is of importance as in trade terms after-sales services are supplied internationally through other modes (e.g. mode 1, 2, 3 and 4) and hereby clearly distinguishable from the ‘mode 5’ concept.

Several ‘mode 5’ services such as design, R&D, architectural and engineering services are high-value added and intrinsically linked to technology³. Their importance for securing competitive advantages in manufacturing trade and especially in the context of global production networks is indisputable. One indirect indicator regarding the role of ‘mode 5’ services in the EU comes from a recent joint report by the European Patent Office and Office for the Harmonization of Internal Market, which indicates that 90% of EU exports are IPR-intensive (EPO-OHIM 2013).

Measuring ‘mode 5’

Thanks to recent advances in global value added databases, such as TiVA and WIOD, it is possible to provide a first indication of the magnitude of ‘mode 5’

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services. In this respect figure 5 provides the share of domestic service input incorporated in domestic value added embodied in manufacturing and primary sector exports in key global players. This share is calculated by relating the ‘indirect domestic service content of gross exports’ (originating from

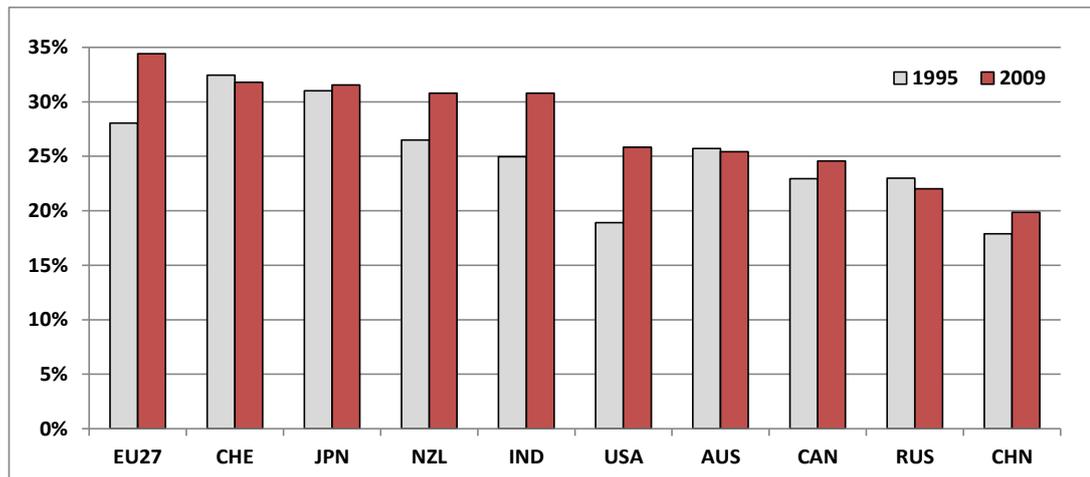
domestic intermediates) to the domestic value added of gross exports of the manufacturing and primary sectors. The domestic services content reflects the indirect contribution of domestic service suppliers made through domestic (upstream) value-added, for exports.⁴ More importantly this indicator depicts the export share and hereby the weight of domestic services in value-added terms which

³ A recent study reports the share of the so called ‘knowledge intensive business services’ KIBS (computer services, R&D, consulting and analysis, architectural and engineering services) to be 40% of the business services in the EU25 in 2007 (Stehrer et al. 2012). In the EU27 sectors ‘machinery’ and ‘electrical equipment’ for example business services account for 33% and 39% respectively. This implies that in these sectors KIBS account for 13% and 16% of total indirect services inputs (see also footnote 4).

⁴ In the TiVA database the term ‘domestic service suppliers’ refers to the gross exports contribution of the following sectors: utilities, construction, wholesale & retail, transport & telecoms, finance & insurance, business services and other services. The input of these service sectors to the manufacturing and primary industries varies but on average ‘business services’ and ‘wholesale & retail services’ have the highest shares. The share of ‘utilities’ and ‘construction services’ in the total services value added is only 6% and 2% of the ‘machinery’ and 4% and 2% of the electrical equipment sector.

are traded embodied into goods in relation to gross domestic exports of the primary and manufacturing sector.⁵

Figure 5: ‘Mode 5’ - domestic service content of gross domestic merchandise exports



Source: Own calculations based on TiVA, data extracted on 15 January 2014.

The EU indirect ‘mode 5’ service exports amounted to over €300 bn in 2009

According to figure 5 the weight of ‘mode 5’ exports is considerable. This share varies between 20% in China and 34% in the EU27. Translated in absolute values for 2009 (the latest year available in TiVA) this figure depicts for the EU indirect ‘mode 5’ service exports amounting to over 300 bn. In this respect even more important is the upward trend depicted in figure 5. Compared to 1995, the ‘mode 5’ export share increased by 23% in the EU27. The highest increase however took place in the US where this indicator rose by 37% in the same reference period. There are also three countries - Russia, Switzerland and Australia - which exhibited a minor decrease in the share of ‘mode 5’ exports indicating that there are probably regional differences in the level of service

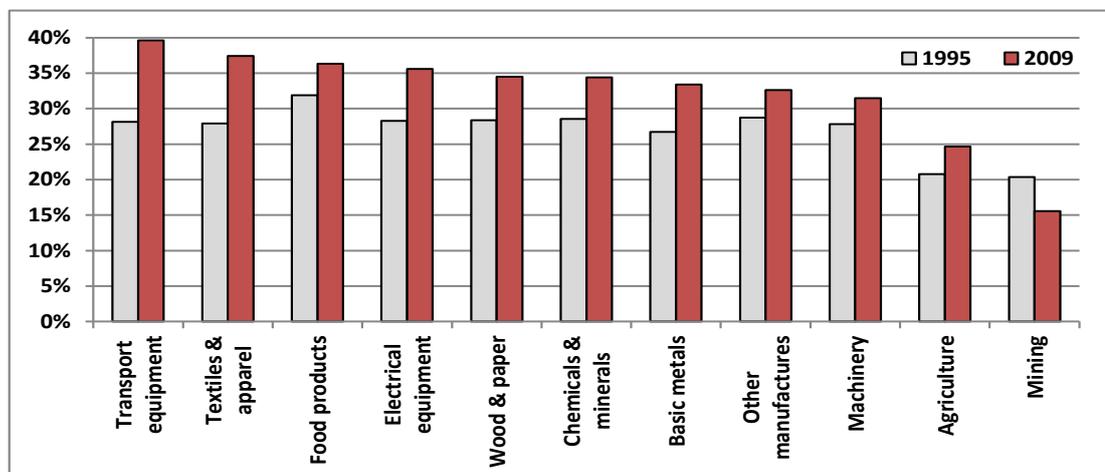
⁵ It has to be noted however that this indicator is an underestimation of the importance of services inputs for the domestic value added of merchandise exports as the data provided by TiVA as usually assumes that the exports of the manufacturing and primary sector are goods only. However a transaction recorded as goods export might be a bundle of a merchandise and accompanying services i.e. installation, maintenance, repair and trainings. The unbundling of the transaction into its goods and services part would be possible by case by case studies (Lodefalk 2014). In addition the ‘in-house’ production of services in manufacturing companies is captured as goods value added and this leads to an additional downward bias of the indicator. An indication in this respect provides a study which reports an increase in services employment share of the Austrian manufacturing sector of 5 percentage points in the period 1995-2003 (Wolfmayr 2008).

proliferation of manufacturing exports. This negligible decline is however also influenced by its compositional nature as the indicator shown in figure 5 has gross domestic merchandise exports in the denominator. In other words, in all these three countries ‘mode 5’ service exports increased in absolute levels but as total merchandise exports augmented even more the impact of this is visible as a relative decrease.⁶

The sectors with the highest ‘mode 5’ services share in total exports are transport equipment and textiles and apparel

Noticeable differences in the importance of ‘mode 5’ service value added for exports persist also among industries. Figure 6 depicts this distribution in the EU27. The sector with the highest ‘mode 5’ services share in the domestic gross exports of 40% is ‘transport equipment’ followed by ‘textiles and apparel’ (37%) and ‘food products’ (36%). At the same time the ‘mode 5’ share accounts for only 16% and 24% of the domestic value added exports of ‘mining’ and ‘agriculture’. Compared to 1995, ‘mode 5’ exports increased in all sectors but ‘mining’. The largest augmentation of this share (by more than 40%) is observed in ‘transport equipment’.

Figure 6: ‘Mode 5’ - domestic services content of gross exports in the EU27, by industry



Source: Own calculations based on TiVA, data extracted on 15 January 2014.

Apart from the quantification of ‘mode 5’ described above, the major purpose of the introduction of this hypothetical indirect mode of supply is to convey the message that the substantial and increasing share of services value-added contained in manufacturing sector exports calls for reflection on how to proceed with this

⁶ Measured in absolute values the domestic service content of primary and manufacturing sectors almost doubled in Australia and Russia and increased by 80% in Switzerland.



phenomenon at the international trade agenda. Moreover, as already mentioned, different regulatory regimes apply to goods as opposed to services trade. Merchandise trade is covered by GATT and services trade is internationally regulated under GATS. The WTO itself calls for rethinking of current trade policy so as to account for this development and states that barriers to merchandise trade (tariffs or non-tariff measures) hinder the delivery of a “package” by “servicified” manufacturing companies (WTO 2013).

Thinking in ‘mode 5’ mode implies paying attention to the fact that services are being traded indirectly under a merchandise trade regime. A relevant example is that of a software trade. If a software is sold cross-border separately (e.g. via mode 1) this transaction will appear as trade in services. However, if the software is installed in ICT equipment, the value of the software is counted as goods and not as services trade anymore. So, for services which are exported not directly but "in boxes", embodied in manufacturing goods, the regulatory regime is crucial since when services are "sold in boxes" they usually pay custom duties.

5. CUSTOMS VALUATION TREATMENT OF ‘MODE 5’ SERVICES

It is common understanding that cross-border services are not supposed to pay duties. Their trade is regulated according to the GATS and the four modes of supply

Mode 5 services traded ‘in a box’ and labelled as products are subject to GATT rules discussed previously in this paper. In reality however indirect ‘mode 5’ services exports are covered by GATT and do pay duties.

The reason for that is a general principle of the Customs Valuation Agreement (CVA) on Implementation of Article VII of the GATT that ‘the customs value of imported goods shall be the transaction value, that is the price actually paid or payable for the goods when sold for export to the country of importation ...’ (CVA, Article 1(1)). This implies that generally the customs value has to include all purchased inputs - services included.

This customs valuation principle has a considerable implication for ‘mode 5’ services as they are usually embodied inseparably in the product whose value they determine to a noticeable extent. In other words, when services are traded ‘in a box’, and labelled as products, they become subject to international trade rules governing merchandise trade, namely the GATT. In principle three types of ‘mode 5’ services are fully or partially subject to existing WTO customs regulation rules:



- Intellectual assists,
- IPR services,
- Software.

Intellectual assists

To further explore the treatment of intellectual assists under GATT, Article 8 of the Agreement on Implementation of Article VII of the General Agreement on Tariffs and Trade, which covers additions to the customs value of the imported goods, provides further insights. Article 8 allows for an essential distinction between ‘intellectual assists’ under 8(1)(b)iv and other kinds of inputs that are generally included for customs valuation purposes. Moreover, Article 8(1)(b)iv allows for duty free treatment of engineering, development, artwork and design services in determining the value on which duties should be paid, provided these ‘mode 5’ services are sourced in the country of importation.⁷ In other words, the WTO customs valuation rules allow for a duty-free preferential treatment of certain own ‘mode 5’ services exports when re-imported as part of foreign goods.

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In the European Union, ‘intellectual assists’ are covered by Article 32(1)(b)iv of the EU Customs Code. In line with WTO provisions, Article 32(1)(b)iv states that: In determining the customs value under Article 29 of the Customs Code defined in Council Regulation (EEC) No

2913/92, engineering, development, artwork, design work, and plans and sketches undertaken elsewhere than in the Community and necessary for the production of the imported goods shall be added to the price actually paid or payable for the imported goods. Therefore those ‘mode 5’ services listed in Article 29 that originate in the EU can be deducted from the customs value and do not pay duties.

IPR services

Intellectual property rights services such as patents, trademarks and copyrights that are part of ‘mode 5’ services inputs receive a special treatment across the board under various customs valuation rules and WTO Members have certain flexibility in the way they implement the rules, depending on the conditions of sale and other

⁷ On how these rules are applied in practice, see for instance the US Customs Valuation Encyclopedia, which contains a number of examples falling under Article 8(1)(b)iv.



contractual obligations. In the EU there is a similar legal basis⁸ which determines that any patented invention or protected design shall be considered as already included in the value of imported products and shall not be added to the customs value.

In the “Bosch” case the European Court of Justice decided that the customs value of a machine is supposed to include only the value of the incorporated material elements and not the value of incorporeal property such as processes, services or know-how (ECJ 1977). This case however shows that there are still uncertainties of how the Article 3(1)(a) of Regulation (EEC) No 803/68 of the Council is to be interpreted in practice.

Software

The treatment of software for customs valuation purposes can be also complex. When the software is imported on a carrier medium (e.g. compact disc), the GATT 1995 Decision on customs valuation for software allows flexibility among WTO members in choosing between (i) including the value of the software or (ii) considering only the value of the carrier (the disc) when determining the customs value of such a ‘mode 5’ import (WTO 1995).

However, this flexibility does not apply to other products that incorporate software components (the operating system in a computer, a GPS navigation system in car, etc.). In such cases ‘mode 5’ services imports, unlike those covered under WTO CVA Article 8(1)(b)(iv) and regardless of their origin, pay duties. In the same vein in the EU, Article 34 of the EU Customs Code allows for specific rules to be laid down in determining the customs value of carrier media for use in data processing equipment.

The case-law of the European Court of Justice on the treatment of software for customs valuation purposes, although complex, points rather towards the inclusion of software in the final price. In “Brown Boveri” for example the Court found that if a software is integrated into a product its value is an integral part of the imported product and should be included in the customs value on which duties are to be paid (ECJ 1991). In the ‘Compaq’ case the opinion of the Advocate general was as well that the value of a software which was pre-installed on a laptop should be added to the customs value (ECJ 2006).

⁸ See Article 3(1)(a) of Regulation (EEC) No 803/68 of the Council.



Let us take these issues further with a hypothetical example to illustrate how two 'mode 5' services will be most likely treated differently under current trade rules. If a car is imported from country B into country A and if the design of the car originates

Depending on the mode of supply – 'mode 5' versus mode 1 – the same service is covered by GATT or GATS and hereby subject to duties or duty free

in the importing country A, then the value of the design services the car company in country B bought from country A can in theory be deducted *pro rata* from the value of the car. However, if the same car company in country B also bought and installed all the necessary software needed to operate the car (for internal car controls, breaks, GPS navigation, parking, etc) from country A, the

value of such software will most likely have to be added to the value of the car on which duties are payable, despite the fact that both design and software originate in country A.⁹ In contrast, if the same company would import the car first and then install a software package like a GPS navigation programme the same service would be imported duty free under Mode 1.

The same example applies to the value of operating software installed on a laptop: if the software is downloaded after the importation of the laptop it does not pay duty. If the same software is installed before the importation it would be fully dutiable. So, depending on the mode of supply – 'mode 5' versus mode 1 – the same service is covered by GATT or GATS and hereby subject to duties or duty free.¹⁰

Overall, it should be noted that the example of customs valuation provides a clear case for the need to further reflect on the ways in which GATT and GATS rules operate when it comes to 'mode 5' services, an area at the interface between services and goods production of growing importance for the competitiveness of a technology-intensive and highly competitive manufacturing sector.

⁹ As an anecdote, the latest GM Volt electric car model contains 100 microchips and 10 million lines of software code (allegedly accounting for a double digit per cent of the total car value), being more IT-intensive than a Boeing or a sophisticated computer (for more information see <http://techcrunch.com/2010/11/01/the-chevy-volt-electric-gm-ib/>).

¹⁰ This example refers to what is called "normal trade" regime. If such a car would be produced and imported under the "outward processing trade" regime in Europe, the treatment of certain "mode 5" services might be different. See Cernat and Pajot (2012) for an assessment of the processing trade regime in Europe.



6. CONCLUSIONS AND POLICY IMPLICATIONS

The main aim of this paper was to depict the growing importance of domestic service intermediate inputs for manufacturing products and their international competitiveness in a globalised economy. The trend of ‘servicification’ has attracted increasing attention recently, particularly thanks to recent advances in global databases on trade in value added such as WIOD and TiVA. This in itself created a momentum for a more informed policy debate and has triggered a whole range of indicators and new policy research possibilities.

While acknowledging the relevance of ‘servicification’ as an important phenomenon impacting on international trade, this paper points out to a subset of this trend relating to the share of domestic service intermediates embodied into the domestic value added of manufacturing sector exports. The portion of these services is substantial and increasing; it reaches 34% of the EU manufacturing exports which as explained in this paper should be considered as a lower bound. From a trade policy perspective this implies that a substantial share of services are traded ‘in boxes’, disguised as products.

The authors of this paper argue that none of the existing four modes of supplies covers this type of services trade. Hence, theoretically, the case for a new mode of supply - ‘mode 5’ - is made. Several services supplied through ‘mode 5’ are technology intensive (such as innovation, design, engineering, product development, etc.) and essential for internationally competitive manufacturing. In this respect the ‘mode 5’ approach to international trade owes a great deal to the recent attention given to global supply chains, trade in tasks and value-added trade as services inputs are of growing importance for global production networks.

The ‘mode 5’ view to services trade allows for a range of preliminary conclusions, with possible future implications for international trade policy and beyond.

In the first place this paper points to the importance of trade rules affecting ‘mode 5’ services. Being at the intersection of rules governing direct service exports under the GATS four modes of supply on the one hand, and GATT rules for manufactured products on the other, ‘mode 5’ service exports have to comply with a combination of fairly complex trade rules. One such example illustrated in this paper is the area of customs valuation. As exemplified in the previous section a service supplied through ‘mode 5’ would pay duties whereas the same service supplied through mode 1 would not. Certainly, this induces an incentive for companies for changing the way services are supplied so as to avoid tariff charges. Customs valuation is only one area but clearly other sets of issues (trade facilitation, rules of origin) could have an impact on



the way 'mode 5' services are traded around the world. The various trade agreements under negotiations and the renewed impetus at the WTO on trade facilitation and the post-Bali agenda should provide a new opportunity for policy makers to forge trade rules that are well-suited for the ways in which goods and services are put together along global supply chains.

In a more general sense, given their nature and position in the supply chain, many 'mode 5' services are intrinsically linked to technology and innovation and therefore are essential ingredients that can strongly influence the export competitiveness of the products in which they are embodied. For the EU this is even more crucial as 90% of EU exports are IPR-intensive. Going one step further, the promotion of 'mode 5' services can also have a positive contribution towards the achievement of the EU 2020 Growth Strategy and its target on R&D and innovation.

Looking towards the more or less distant future, several 'mode 5' services may influence or be influenced by the development of "disruptive" new technologies that may further blur the difference between goods and services. Two recent examples that have been widely discussed in the business literature may provide for such a shift: 3D printing and "the internet of things". Recent advances in 3D printing, although not yet ripe for a large-scale deployment for mass production across all industrial sectors, may lead to a shift from trade in finished goods towards trade in "additive ingredients" and various manufacturing services. In parallel, the "internet of things" and the ability of various objects and products to contain a wide range of sensors that could be connected with each other across wireless sensors networks and become in turn intelligent will increase the technological intensity and R&D content of existing goods, and thus increase the share and importance of 'mode 5' in world trade.

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