Global input-output tables have significantly transformed our ability to interpret global production. However, because they value transactions at basic, and not market, prices, many of the related analyses are, in part, revealing only some of the story. At the heart of the debate, and indeed confusion, is that input-output tables in basic prices are in essence a mechanism to provide a view of production and because they remove significant distribution margins at the end of the chain, they are less well equipped to provide a perspective from the consumption point of view. This paper explores the development of a complementary accounting framework in ‘market’ prices and tries to illustrate the insights that can be gained through such an approach.
A new look at Trade in Value-Added and Global value chains: A view from the consumption perspective

1. What the accounting framework doesn’t tell you

Abstract

1. The proliferation and development of global input-output tables in recent years has significantly transformed our ability to interpret global production. However, because inter-country input-output tables value transactions at basic, and not market, prices, many of these analyses are, in part, revealing only some of the story. What is often not fully understood in the use of tables valued in basic prices is that they exclude the value that is added at the end of the chain by distribution sectors (in particular retail and wholesale, which, often include value associated with marketing activities and brands). At the heart of the debate, and indeed confusion, is that input-output tables in basic prices are in essence a mechanism to provide a view of production and because they remove significant distribution margins at the end of the chain, they are less well equipped to provide a perspective from the consumption point of view. This has a direct impact on smiley-curve type analyses that describe where sectors are in value chains and how far they are from final demand. Moreover, although the basic price concept provides, conceptually, for a correct view of, for example, the domestic value-added or services content of a country’s total exports, it provides an arguably distortionary view (seen from a consumption, or free on board perspective) of those same measures for a given good, because it excludes, often significant, distribution margins related to the transportation of any given good from the factory gate to the customs frontier (which may also reflect significant contributions from activities related to brand, R&D, design, marketing). For example the US domestic value-added content of its exports of textiles and clothing, in F.O.B prices was around 20% in 2016 compared to 3% using the pure basic prices approach.

2. The basic price approach also limits the scope to reveal additional dependencies related to globalisation, for example jobs sustained in retailers through sales of imports. This paper explores the development of a complementary accounting framework in ‘market’ prices and tries to illustrate the insights that can be gained through such an approach. In the United States the sale of imports in the United States generated an additional 840 million USD of US value-added in 2016, supporting 9.0 million jobs.
1 Introduction

3. Measures of Trade in Value-Added terms have greatly transformed the ability to interpret and analyse trade in a world dominated by global value chains. The ability to generate these estimates in recent years is, in large part, the outcome of significant efforts by official statistics agencies to generate more regular and more up-to-date national supply-use and national input-output tables. But what is often lacking in this debate, and often the source of some confusion, is a full understanding of how national input-output tables are constructed and the implications on TiVA type analyses.

4. Central to the debate here, and indeed to any type of input-output analysis, is the fact that input-output tables require a consistency between the prices charged by producers and the prices paid by consumers. In the System of National Accounts (the international accounting framework that governs the compilation of national Supply-Use and Input-Output tables) the recommended price basis for producers, and so, de facto in input-output tables, consumers, is the concept of Basic Price\(^1\). In very simple terms this is equivalent to the factory gate price, and so excludes any distribution margin not subsumed in the original invoice price of the producer, and that are included in the price paid by the final consumer. Also excluded are any taxes paid or subsidies received on the product sold.

5. Although superficially benign, the distinction between basic and purchasers prices matters, especially for GVC analysis. Export prices for example are measured on a full on board (F.O.B) basis and include any distribution services related to delivery from the factory gate to the port, and organised by the producer, but for input-output tables in basic prices (when these margins are separately invoiced by the producer to the consumer or provided by an intermediary that purchases and then exports the goods) they are removed from the F.O.B price and are instead re-allocated as separate exports of distribution services (typically recorded as output of transportation services and/or output of the retail/wholesale sector). On average these margins can be significant\(^2\), ranging at around 10 and 15% across countries, and over 30% in Greece, with significant differences by specific product, for example 140% and 216% for textiles and clothing in the United Kingdom and Sweden respectively and 310% for pharmaceuticals in Greece (Figures 1A and 1B below).

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1 See the 2008 System of National Accounts

2 Note that some care is needed in interpreting the margin values presented here. The varying degree, across countries, of implementation of the 2008 SNA guidance on merchanting transactions may affect cross country comparability and may also explain the very high estimates of margins in some countries. For example in countries with significant merchanting activities (typically recorded as a distribution margin) there will be a positive entry for the margin (merchanting service) exported, including under goods transactions, but there will not be a corresponding value of the exports of the goods being merchanted (unless the periods when the merchanter acquires and sells the goods differ, in which case margin ratios in the period when the goods are acquired will be bias upwards as the acquired goods will appear as a negative export).
Figure 1: Factory gate to exporting country’s customs frontier, recorded distribution margins: % of basic price of recorded exports

1A: By product

1B: By country


Source: OECD Supply-Use Table database

Moreover, with respect to international input-output tables, a focus on the distribution margin provided in delivering a good from the factory gate to the customs frontier understates the size of the problem related to the use of the basic price concept, as global input-output tables will also reallocate (to the distribution sector/product) the distribution margin related to the transportation of the good from one frontier to another, and in turn the final distribution margin related to delivery from the frontier to the final consumer.
7. Typically, the further away the destination the higher the distribution costs\(^3\). For most countries and products international distribution margins make up between 5 and 10 per cent of total import costs (see Figure 2), which, when combined with the distribution margin from the factory gate to the exporting country’s frontier, means that the value of distribution services from the factory gate of the exporting country to the frontier of the importing country (which are removed from the value of the imported good in TiVA type measures constructed in basic prices), contributes around 15 to 25\% of the overall C.I.F value.

8. In effect input-output tables at basic prices treat distribution services as if they reflected the acquisition of a separate product: with the rationale being that this creates an equivalence with prices paid by consumers when they independently organise the distribution service (and which, by definition, are excluded from the F.O.B price of the exported product, and indeed the C.I.F price of an imported product). But this convention is by no means a panacea.

Figure 2: International transportation margins on US imports

![International transportation margins on US imports](image)

Source: OECD International Transport and Insurance Costs of Merchandise Trade

9. Larger enterprises within affiliated supply chains for example are more likely (than independent smaller enterprises say) to include the costs of distribution in the basic price they charge (whether these are produced using in-house services or purchased from third parties), and so, in these circumstances, no adjustments will be made to arrive at a basic price estimate, which will be equivalent to the F.O.B price. So, as can be seen, sometimes the distribution services are included in basic price measures and sometimes they’re not, depending on how the original producer chose to invoice them.

10. But this is not the biggest issue here: the removal of the margin generates an alternative perspective of the value of what is being traded (and Figure 1 reveals that this can be significant) both from the exporting country’s perspective and the importing

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\(^3\) This also means that decompositions of the basic price value of imported goods purchased by final consumers into their origin of value-added (country and industry) will, typically, more greatly underestimate (compared to purchasers price concepts), the actual distribution services involved in transporting goods from long-distance countries. For example, all other things being equal, a basic price system will not be able to reveal that the transportation costs of importing an orange into the UK for final consumption differed from those in Spain as both oranges are recorded at basic prices.
country’s (exacerbating complications raised by the fact that import prices typically also include international distribution margins).

11. For any given export of a good therefore, because the domestic content of distribution services is typically high, the share of domestic content of exports for a given good will be lower when measured on a basic price basis than compared to estimates on a F.O.B basis (although, in theory, for exports of total, whole economy, goods and services, the ratios should align). Similarly looking at imports of a particular good into an economy, a basic price measure will show a significantly smaller (often implausibly low) contribution from the distribution and transportation sector, compared to C.I.F measures. Basic price concepts also complicate and hamper analyses of the multiplicative impact of tariffs, as, in a basic price format the rates, which are usually applicable to a C.I.F price, will instead be applied to a lower basic price; therefore underestimating the overall impact of tariffs.

12. Figure 3 below reveals the impact that different price bases can have in interpreting the decomposition of value in GVCs by looking at the domestic services content of textiles exports. In the United Kingdom and Sweden for example the domestic services content jumps to around 70% compared to around 20% using the basic price concept. On average, across countries the domestic services content of exports increases by around 15 percentage points.

![Figure 3: Domestic services value-added content of textiles exports (basic versus F.O.B prices)](image)

Figure 3: Domestic services value-added content of textiles exports (basic versus F.O.B prices)


Source: OECD Supply-Use table database and OECD-WTO TiVA.

Source: calculations based on OECD-WTO TiVA and OECD Supply-Use Table database

Note that in industry by industry output tables distribution margins provided directly by the exporting industry are included in the output and the value added of the industry. Figure 3 assumes that the additional margins are provided only by the domestic distribution industry and so will present marginally upward biased estimates of the additional contribution made by the sector; typically the contribution made by the distribution sector represents nearly all of the domestically produced distribution activity, for example in the United States the wholesale and retail sector provided 96% of all output in 2016 in the corresponding product.
13. Of particular interest in this respect concerns the contribution made by the distribution sector (transport, retail and wholesale) in the overall production of a given product, which is noticeably lower using the Basic Price concept (with well over half of the increase in domestic services value-added content reflecting distribution services in most countries).

14. The upshot is that by decoupling the distribution costs involved in transporting a good from the factory gate to the customs frontier from the production costs of the good, the Basic Price concept creates an, arguably, downward biased estimate of the overall contribution of exports of that good to the local economy. Exacerbating this downward bias is the fact that the Basic Price of the exported good will include all upstream distribution costs incurred in the production of that good, including cross-border distribution costs on intermediate imports used in production. So, in other words, distribution costs incurred in producing a good for export will be reflected in the Basic Price of that good when they relate to intermediate parts shipped within the country or imported into the country but, typically, not when they relate to transportation of the goods to the customs frontier.

15. In addition, the concept proves problematic for notions of international competitiveness as the Basic Price concept de facto gives the impression that countries are engaged in significant direct exports of these distribution activities, as any distribution costs related to the transport of a good from the factory gate to the customs frontier will be treated as if they were direct exports of separate distribution services. A country with restrictions on the provision of these services by foreign operators for example, and with high relative prices, that are, for example, absorbed only through the increased international competitiveness of goods producing sectors purchasing these distribution services, is more likely than not to reveal relatively higher measures of revealed comparative advantages (when measured on the conventional gross basis) in the distribution sector and relatively lower in the goods producing sector, when the complete opposite may be the more likely scenario.

16. But it is equally important to note that this is not only an issue for decompositions of exports into their sources of value-added. It affects all components of demand. For estimates of intermediate consumption (or rather the coefficients of the Leontief matrix) the effects are mitigated by the fact that the distribution costs will always be captured in the costs of production of a good, whether embodied in the price of any intermediate used in production or treated as a separate cost. This reflects the fact that intermediate consumption totals are always measured at market prices even if the components are recorded in basic prices.

17. In other words, Leontief coefficients provide a theoretically correct view of the upstream impact of the production of a given good but only when the application is to determine the full upstream impact of production as opposed to consumption. All current TiVA estimates align with this production view, but many of the applications are in fact looking at things from a consumption perspective. But in basic price Leontief systems, distribution margins provided by an intermediary (such as a retailer) or margins that are not part of an all-inclusive price charged directly by the producer, are stripped out of the

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5 However at the same time because of the decoupling, in practice, at least with current estimates of TiVA, there is an impact on the source of the distribution services, as, typically, the allocation (before balancing in a global input-output) to partner country sources of the imports are based on the partner shares observed for actual direct imports (and also, often, as part of the balancing process, exports) of these same services.
consumption (market) price. Not surprisingly, these charges can make a significant difference to the overall price of a good (see Figure 4).

18. For products, taking an average across countries margins adds (a low of) 31% to Basic Price of printing products and (a high of) 113% for textile and chemical products (and 560% for Basic metal products in Denmark). For countries, looking at total consumption of goods in Basic Prices, margins add a further 41% in Slovakia to 92% in Denmark.

Figure 4: Margins on Household Final Consumption, % of Basic Price

4A: By product

4B: By country

Source: OECD Supply-Use table database.

19. None of that is to say that basic price approaches are without merit. Far from it as they provide the conceptually correct view of the decomposition of costs from a production perspective, moreover, as described below, they are also significantly easier to calculate.
from current national accounting systems than decompositions based on market price concepts.

20. But it is clear that some care is needed in interpretation. As shown above, for analyses of global value chains, taking a perspective from a purchasers’ prices rather than a basic price perspective, can present a significantly different picture of GVCs, for example concerning the contribution to the domestic economy of exports of a given product. But the purchaser’s prices concept is perhaps also preferable in the derivation of other conventional analyses and metrics that rely on input-output based indicators. Perhaps chief in this respect concerns analyses of the now well-known Smiley Curve, which is looked at in the following section.

2 Looking anew at the Smiley Curve.

21. Although, at least in recent years, there has been an improved understanding of the limits of GVC analyses that look at fragmentation of production through the prism of Stan Shih’s Smiley Curve, even with these limits it remains an important looking glass.

22. A greater awareness that conventional statistics concerning fragmentation of production reflect the Basic Price rather than the Market Price concept can further help improve our understanding and limitations of Basic Price measures.

23. A simple way to illustrate shortcomings in current measures, and in particular the Basic Price concept, is to reconsider how they reflect single case studies, indeed case studies that have acted as motivators for much of the work, and new statistics on GVCs, that exists today.

24. Perhaps the most well-known of these is Dedrick et al’s seminal 2008⁶ work looking at the decomposition of value creation in an iPod (Table 1).

<table>
<thead>
<tr>
<th>Table1: Derivation of Apple’s Gross Margin on 30GB Video iPod</th>
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<tbody>
<tr>
<td><strong>Retail Price</strong></td>
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<tr>
<td><strong>Distributor Discount</strong></td>
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<tr>
<td><strong>Retailer Discount</strong></td>
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<tr>
<td><strong>Sub-total (estimated wholesale price)</strong></td>
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<tr>
<td><strong>Factory Cost</strong></td>
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<tr>
<td><strong>Estimated Apple gross profit</strong></td>
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</tbody>
</table>

Source: Dedrick et al, 2008

25. As noted in their study, the Factory Gate price (roughly equivalent to what would be recorded in trade statistics) was less than half the total retail price, and, indeed, Apple’s contribution (measured as its gross profit), and compensation for design, marketing and research and development, is completely absent from the factory gate price.

26. In this sense therefore any attempt to assess the full value chain, including Apple’s contribution, by decomposing only the factory gate price, will be severely compromised as the high-value activities, R&D and design (which are generally positioned at the beginning of the value chain, Figure 5) and marketing and distribution (at the end of the chain) are

completely absent from the decomposition. This is what is de facto done in decompositions of value using input-output tables at basic prices, because, as noted above, the contribution from distribution services, and very often R&D, marketing and design are shown as separate expenditure items also in basic prices.

Figure 5: Conceptual framework of the smile curve

27. An under-appreciation of this shortcoming in the Basic Price concept for GVC analyses of lengths and positions of activities in value chains is widespread in the literature. For example, Degain et al (2017)’s otherwise excellent paper ‘Recent trends in global trade and global value chains’ provides a decomposition of value-added, showing the contribution made by various industries and countries relative to their distance from the consumer and by their relative compensation per hour.

28. Intuitively, all of their charts plotting relationships for various products (see below Figure 8, the example for China’s electrical and optical equipment) show distribution activities (classified as industry 20 in the Figure) close to the consumer (with relatively high labour costs), where Degain et al explain: “Postfabrication service industries with higher labor compensation per hour - such as wholesale (20) and inland transportation (23) in the United States, Japan, Germany, and France – were the main beneficiaries in the postfabrication stage of this GVC. China’s ICT goods exported to the United States, Japan, and Germany had to be delivered to their domestic consumers mainly through those countries’ domestic wholesale and transportation service industries.

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Figure 6: Smile curve for China’s exports of electrical and optical equipment, 2009 (Basic Prices)

29. However, therein (the bolded text) lies the misunderstanding between the basic price and market price concept. Decompositions of the value of a good purchased as final domestic demand into source industries using input-output tables in basic prices do not capture the:

- final contribution made by domestic wholesale and transportation service providers delivering an import to final domestic consumers;
- international distribution costs involved in shipping the good into the country; nor indeed the
- shipping costs from the factory to the customs frontier of the exporting country.

30. This is why the results from Degain et al.’s analysis provides, perhaps counter-intuitive, results when comparing the contribution of the distribution activities in their results (generally no greater than 20%) with the significantly higher estimates shown above (around 40% when the decomposition is for an export, as in Figure 2, and significantly higher when the decomposition relates to the price paid by the final consumer, as in Figure 3).

31. To re-emphasise, what decompositions in Basic prices do capture (at least in theory) is the contribution of distribution activities related to transactions in intermediates, before the very last transaction recorded in input-output tables at basic prices. So, for example, they include any distribution activities related to the intermediate consumption of any firm (whether those intermediates were imported, in which case decompositions would include any related international distribution margin, or produced domestically). This is because the production function (input-output coefficients) of any given industry will always show total intermediate consumption at market prices, even if all the separate components are broken down into basic price components. However decompositions will not capture any distribution margins related to final demand transactions (whether household final consumption, general government final consumption – although in practice this is not
generally an issue as in most countries general government final consumption only records transactions in services – capital formation or, indeed, exports, including exports of intermediates).

32. This reveals another potential problem with analyses that present the position of these distribution activities within global value chains. In all of these studies distribution activities find themselves positioned very close to the final consumer. This is, of course, an accurate reflection of their overall positions when seen as a whole (i.e. in market prices), as an overall view would include the distribution services provided to final domestic demand (household and government consumption, consumption of non-profit institutions serving households, and capital formation) but this is not an accurate reflection of the position of these activities when they refer to the provision of distribution services used to service intermediate flows – in other words it is not an accurate representation of the position of distribution services when decomposing basic prices.

33. Indeed it stands to reason that for very fragmented chains, distribution services would be needed throughout the production process and, so, would be further away from the consumer than retail distribution services (which are almost entirely related to the provision of services to final demand consumers). It is only because, in practice, estimates of the position of distribution services (i.e. distance to consumer) are calculated for the sector as a whole that results in distribution services appearing close to consumers; reflecting the fact that distribution services provided to final consumers make up the majority of overall distribution services, and, so, swamp results for the overall position of the sector. This somewhat intuitive result appears to have created the misconception that has led many to conclude that the distribution service component in decompositions of basic prices reflects the final distribution service at the end of the chain – but this is not the case.

3 Marketing, Design and R&D services

34. What the above discussion clearly reveals is that an aggregated view of the position of the distribution sector in global value chains is unlikely to accurately reflect the position of the activity as an intermediate service in a given production process when input-output tables used decompositions in basic prices. But, because the remuneration for marketing, design and R&D services, are also often bundled within the final distribution margin, the discussion also reveals that our understanding of the contribution of other underlying activities – recorded as distribution activities - may be similarly affected, i.e. their position in global value chains, estimated using input-output tables, may not necessarily align with where they appear in the physical production process.8

35. This is particularly relevant for the position of high-value tasks such as research and development and design; which should of course appear at the beginning of the production process but where they appear in input-output based estimates depends greatly on a number of factors. Chiefly these relate to whether these activities are conducted by separate production entities or whether they are conducted within the firm. Further

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8 For example if an Apple store pays explicit cross-border royalties for the use of intellectual property (such as design, software) to an Apple subsidiary abroad every time an iPhone is sold, the position of the intellectual property will appear close to the end of the value chain using standard input-output estimation methods, despite the fact that the design and software are fundamentally at the beginning of the value chain.
complicating matters is the industrial classification of the firm itself, discussed in more detail below.

36. If the R&D and design activities are conducted by separate units classified to these specific activities in input-output tables then input-output based approaches will be able to capture their appropriate position and indeed value-contribution within GVCs. However, often these activities are conducted in-house for which there is no observable transaction, and in these cases their contribution is included within the value-added of the main activity of the firm, for example a retailer may outsource production of clothing but the value generated through brand, design, R&D may instead (and often) appear as distribution margin. Input-output based measures will therefore record (but not separately) the positions of the underlying R&D and design activities in the same position as the firm’s main activity (distribution); which will not typically be at the beginning of the value chain. This of course is not an issue unique to these types of tasks; any in-house activity not separately identifiable in input-output tables is treated in this way (and indeed secondary activities that are separately identifiable when input-output tables are constructed on an industry by industry as opposed to product by product basis).

37. But whilst this is a more generic problem with input-output tables it is perhaps most pertinent when it comes to R&D, design and marketing activities, where in-house production remains significant (certainly when considering the very high distribution margins on exports seen in Figures 1A and 1B). Further exacerbating this is the increasing importance within global value chains of factory-less producers, who outsource physical production whether at home or abroad, but control the overall production process (focusing control on activities such as specification, design, R&D, marketing), which to some extent is a reflection of the upgrading process underpinning GVCs.

38. Current international standards for the classification of firms (ISIC Rev 4) classify factory-less firms that own no material intermediate inputs in the production process to the distribution sector. As such the value added by these factory-less firms will materialise in input-output tables as distribution margins, and, so, are allocated to a separate activity to the good being produced when input-output tables are recorded in basic prices. In other words the value of the goods (whose production and sales are controlled by these firms) will reflect the (contractor’s) factory-gate price but these prices will not include the intellectual property, design, brand etc. owned by the factory-less firm, which will instead materialise in the wholesale prices the firm charges to other intermediaries or indeed the final retail price if the factory-less firm sells the products through its own chain of retailers.

39. Further complicating matters, factory-less firms that own some material intermediate inputs (even if they have no actual role in the physical transformation of those inputs) are classified to the activity of the good being produced. In these circumstances input-output tables should record transactions between the factoryless firm and its contractors following the recommendations for the treatment of goods for processing transactions in the System of National Accounts. But in practice this may not be the case, especially if the value of the material intermediate inputs purchased by the principal is marginal, in which case national accountants may instead choose to record the output of the principal as if it were a distribution service, (i.e. excludes the factory gate price of the good) even if the industry of the principal remains classified to manufacturing.

40. Following the example of the iPod above therefore, input-output tables that decompose the Basic Price value of the iPod will not record the contribution from Apple’s
R&D, design, brand etc. to the good itself if Apple is classified as a distributor (e.g. as a factory-less firm, in which case the contribution will be shown separately under consumption of distribution margins) and may not do so in practice even if Apple is classified as a manufacturer. Whatever the classification, any retail margins incurred by final demand consumers, whether charged by independent retailers or Apple stores, will never be included in the decomposition of the Basic Price. In other words decompositions of goods in basic prices (and in particular hi-tech goods) may, in practice, typically **significantly** underestimate the contribution of R&D, marketing, design etc. to the production process, (as they will instead be recorded as a separate transaction of ‘direct’ purchases of distribution services).

4 A new perspective on the role of imports

41. Another area, among many, where a purchaser’s price perspective can provide an important complementary view to basic price concept concerns the role of imports. One highly sensitive indicator produced in TiVA type analysis is the domestic content of a country’s imports, (typically used to highlight the potentially counter-productive impact of tariffs as they may impact on upstream domestic exporters). In the United States, on average, the US content of its total goods imports amounts to, on average, 6% in recent years (Figure 7). But bringing the imports into the country, in turn, generates distribution services, whether the imports are for intermediate consumption, final domestic consumption, or indeed for direct re-exports.

42. Rather than viewing these services as an ancillary activity detached from the import itself, and instead as integral services (or intermediate inputs) required to transfer imports from producers to consumers, reveals much higher US dependencies (or US ‘content’) on its imports. Indeed changing the price basis, and decomposing the purchasers price value of an imported good reveals that the US content of its total goods imports (*or rather the US value-added generated by consumption of imports*) amounted to 30% of the overall price of those imports (excluding any consumption taxes). **For imports of textiles, the US content was as high as 50% for consumption by US households and 20% for exports, compared to the 3% shown in TiVA.**

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9 Of interest with respect to the treatment of re-exports is the considerable margin associated with the distribution services (e.g. handling, transportation etc.) for re-exports. In the United States, around 200 billion USD of its total 2.3 billion of imports in 2016 in C.I.F prices, reflected re-exports. The handling (transportation etc.) of these imports for re-export generated 33 billion USD of distribution margins. In basic price input-output systems that exclude re-exports and allocate bilateral flows on the basis of their final destination, it is not possible to separately differentiate this activity from other distribution services, masking the role of re-exports. Allocations of bilateral flows on the basis of country of consignment, with a separate distinction for re-exports, even if only in basic prices may be a better approach for the construction of global IO tables.

10 Indeed, this may be an underestimate as the calculations for percentages of ‘basic prices plus margins’ shown here do not account for international transport margins (which can also be provided by US transporters). TiVA estimates exclude these costs in the basic price of the imported good but the US Supply-Use tables used to generate the ‘market’ price equivalent estimates use imports at C.I.F prices.
Indeed, the total value of distribution margins provided by US domestic operators in taking imports from the customs frontier to their next destination (to industries, final consumers, or as re-exports), amounted to close to 900 billion USD dollars in 2016, equivalent to 5% of GDP. In value-added terms, as the distribution sector also requires imports for production, distribution activities added 840 USD billion to US GDP in 2016 on account of transportation and sales of imports, supporting 9 million jobs, including 6.3 million in the wholesale and retail sector, 1.0 million in the transportation sector, with significant contributions from upstream industries (0.2 million in manufacturing, and 1.6 million in all other activities), (Figure 8).

In many other countries the contribution of distribution services (as recorded in official supply-use statistics) to the domestic economy through sales of imports is significantly higher (Figure 7), with the contribution, not surprisingly, larger, the smaller the economy (and the higher the dependency on imports). In Lithuania for example, where gross imports were equivalent to 78% of GDP in 2014, and the value-added of the distribution and transportation sectors accounted for 28% of GDP, the domestic value-added generated through sales of imports in the economy accounted for 22% of GDP. Of particular interest is the contribution to GDP made via distribution services related to re-exports, accounting, for example, for over 3% of GDP in the Netherlands. Total persons
employed\textsuperscript{11} (providing distribution and upstream services) are generally higher than shares of GDP reflecting the lower labour productivity\textsuperscript{12} seen in the distribution sector compared to other activities in the economy.

Figure 9: Domestic value-added generated and persons employed through sales of imports, by source of demand

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure9.png}
\caption{Domestic value-added generated and persons employed through sales of imports, by source of demand}
\end{figure}


\textbf{Source:} Based on OECD Supply-Use table database and OECD-WTO TiVA and OECD National Accounts.

45. None of the above is to say of course that higher import prices, or lower imports, will necessarily reduce the domestic value (direct and upstream) generated by distribution activities nor the jobs supported, as consumers will be able to substitute production with domestically produced equivalents (where these exist). But if the higher import prices occur through, for example, tariff measures, this may reduce the overall purchasing power of consumers (in addition to the potential reduction in competitiveness of producers, including exporters) which is likely to have a volume effect, so, in turn, reducing value-added generated and jobs sustained through distribution activities related to the sale of imports.

5 \textbf{Developing Market-Price Input-output frameworks}

46. Despite all the commentary above, it’s important to reiterate that decompositions of basic price transactions into the origins of their value contribution are not wrong, nor are they without meaning but care is needed in their interpretation.

47. There are a number of areas where care is needed, but key is the fact that they do not provide a view from the purchaser’s perspective. In this respect therefore, they cannot provide a whole view of the value-chain (in particular the distribution, marketing, retail channel at the end of the chain), nor are they necessarily well-equipped to provide insights on the contribution of design, marketing and R&D (for example because they are bundled

\textsuperscript{11} Note that persons employed rather than jobs (as in Figure 8) are shown here as fewer countries provide estimates of jobs by activity

\textsuperscript{12} Labour productivity measures should preferably be calculated on an hours worked basis but for the purposes of this paper, persons employed and jobs are used to better reveal the dependencies of sales of imports on individuals.
with distribution services or because they are performed in-house by manufacturers) nor on the actual positions of various activities within value chains.

48. In addition they can also introduce asymmetric results for the decomposition of chains that are to all extent and purposes, identical. For example, if a Korean producer used a Japanese shipping company to ship parts to be assembled in China before being shipped and sold to US households, the decomposition of the import price recorded in input-output tables at Basic Prices in the United States would include all costs incurred up to the point that the goods left the factory gate in China—in other words they would exclude the costs incurred in shipping the goods across the Pacific, which would be treated as a separate import of distribution services by US households from Japan, and, typically, the distribution costs involved in shipping the good from the Chinese factory gate to the Chinese frontier (which would also be recorded as a direct import of distribution services by the US). However, if the same goods were assembled in Mexico, the Basic price for the imports into the US would include shipping costs across the Pacific and the distribution costs incurred in China (as, theoretically, these would be included in the intermediate consumption costs of the Mexican assembler). As such even if the assembly costs in Mexico and China were identical and the shipping route (i.e. Korea-China-Mexico-US) and costs were also identical, the Japanese content of the US imports would be higher for goods assembled in Mexico compared to the same goods assembled in China.

49. Perhaps the main shortcoming with the basic price concept however is that it breaks the link between the good being sold and the final distribution services that are reliant on it. This means that any upstream domestic distribution services involved in shipping a good across borders before it is eventually consumed back in that same country for final consumption will be (at least in theory) recorded in the home-country’s content of its imports, but the same distribution services used to ship the product to the country’s frontier before it is finally consumed will not be (the difference between the CIF and Basic Price) any neither (generally) will any domestic distribution services engaged in shipping the good from its frontier to its final domestic consumer (the difference between the Purchasers price and the CIF price, ignoring taxes and subsidies). As such, there is a clear case to be made (as in Figure 6) for complementary insights based on the purchasers’ price.

50. The perspective necessarily needs to be complementary to, and not as a replacement for, the basic price concept, as a purchaser’s price perspective cannot meet all needs. For example, in looking at say the multiplicative impact of tariffs on imports, one still needs to have a view of the actual price of the imports and not the actual price paid by the ultimate consumer after distribution margins are included (although even here, although better, it has to be acknowledged that the basic price concept is also imperfect as tariffs are typically imposed on the CIF price and not the Basic price, and when they are not CIF prices they are typically the FOB price, which as shown in Figure 1 above can be significant).

51. The idea for a complementary view in this respect is a means of supporting a broader narrative, whether that be on the full upstream impact of exports, the domestic spillover from imports or the positions (and interpretation of positions) of industries within GVCs. Import-Export wholesalers for example depend exclusively on their ability to trade

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13 This would be the case whether the Mexican firm actually purchased the goods from the Korean producer or was merely a contractor, and so is unaffected by the changes in the 2008 SNA concerning goods sent abroad for processing.
internationally but you would not be able to identify this in a standard input-output table at basic prices; which would show they had no imports.

52. Developing such a complementary view in practice is, however, far from trivial. It would, in effect, require a very different presentation of the role of distributors in the accounting framework; either as providers of intermediate services that move the value of output by industries from basic prices to purchasers prices or as purchasers of the goods they sold, meaning that the accounts would need to record the value of their output inclusive of the value of the goods that they sell, and not just their margins. Both cases are complex, posing, in turn, difficulties for analyses and indeed in compilation.

5.1 With distributors treated as providers of intermediate consumption services

53. For the former, the first challenge is to determine the price basis. From the above discussion it’s clear that in considering exports of any given good, a F.O.B valuation (which includes distribution services from the factory to the exporting country’s frontier) is an important complement to basic price valuations. This would imply that for the exporter, its recorded output would rise in line with the difference between the FOB and basic price, as would its intermediate consumption. By extension, not least for consistency with sales on the domestic market, its output would also need to rise in line with the distribution margins on its domestic sales. But, the margins paid by consumers are often differential (as can be inferred from Figure 5), and indeed these are often significantly different across industries purchasing goods as intermediates.

54. As such theoretically such a system would require that columns for output of industries within input-output systems (and in supply-use tables) showed separate breakdowns depending on who the purchaser was: namely for each industry a separate category of final demand, and indeed purchasing industry, would be required. If there was also differential pricing on the basis of export markets further splits would be needed here too (although this is also strictly speaking necessary for input-output tables at basic prices).

55. One simplification in this respect would be not to provide separate breakdowns of sales of intermediates by purchasing industry, nor indeed for export destinations (in line with the approach used for basic price input-output tables) meaning that in effect, the split of a given industry would only require a breakdown into four categories: intermediate consumption, household final consumption, investment and exports. Concerning the column for production of intermediate goods for sale within domestic markets this would necessarily mean that the value of output remained at basic prices to avoid introducing distortions from not correctly amending for differential pricing in distribution margins. However the impact of doing this would be negligible as the intermediate consumption of any industry always records total intermediate consumption in market prices, so whether the distribution costs are shown separately or bundled in a purchasers price (theoretically)

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14 Note that basic prices input-output tables also suffer from differential pricing, for example, in a Leontieff system, 1000 households each paying 1000 dollars for 10 KW of electricity will generate the same upstream spillovers for their 10,000 KW of consumption as an industry purchasing 1000,000 KW for 1000,000 dollars.

15 In theory one could include government final consumption and non-profit institutions serving households but in practice entries in input-output typically recorded only record the consumption of their own services (e.g. public administration services) and, so, such a split is not necessary.
have no impact on the overall Leontief (or rather calculations looking at say upstream and downstream impacts of production).

56. For a single country input-output table this approach is relatively easy. However for a global input-output table, further complications arise as the purchase price paid by a final consumer includes international transport margins. For consistency in the treatment of prices across the global table, this would imply that a good produced in country A and sold to households in Country B would need to record in the output of the exporting industry in A, the distribution margins to its frontier, the distribution margins to the frontier of B, and the distribution margins from B’s frontier to the final consumer, which would mean that neither imports nor exports were recorded on a CIF or FOB basis. That is not to say there would be no merit in doing so (indeed there would certainly be merit in doing so for single country systems that could complement the results of global tables in basic prices) but it is to demonstrate that the applications would be limited to looking at transactions almost entirely through the consumers perspective, which would generate, in turn, very different (even if complementary) notions of imports and exports, (as they would necessarily impute exports of distribution services from, in the case above, country B to country A for services provided exclusively to residents).

5.2 With distributors as purchases of goods

57. An alternative presentation is to treat the intermediaries as purchasers of the goods they subsequently sell. For a domestic input-output table, following the logic above, such a distinction would not be necessary for purchases of intermediate goods used by industries but it would require that the distribution sector was split into the same number of categories as above (sales of intermediate goods to domestic industries, with output recorded as margin only, and households final consumption, investment and exports, where the output would need to record the output inclusive of the value of the goods sold, in addition to a separate category to include sales of direct distribution services and other ancillary activities that may be provided by the sector). However, further splits of the categories for households, investment and exports, would also be needed on the basis of the actual goods being sold. So, for example, if the national input-output table contained 40 industries which provided goods on which margins were typically added, each column of the distribution sector would necessarily need to show a separate column for each final demand category and each industry for which goods were sold.

58. One simplification that could be considered in this respect would be to merge the distribution sector into one single column (including wholesale, retail, transport, insurance) or to merge at least wholesale and retail (noting that most transactions of the wholesale sector in any case occur via sales to industries). A second simplifying modification would be to combine the sector showing sales of direct distribution services with that for the distribution of intermediates to domestic industries).

59. Constructing such a table would be relatively easy as the columns would only need to ensure that the difference between output and ‘intermediate consumption’ of the good being sold, as a percent of the value of goods sold was equivalent to the margin on that good, with other components of intermediate consumption being determined using fixed ratios of intermediate consumption to margin for the distribution industry as a whole, applied to the margin calculated for the sub-sector. A further modification could be to have additional columns for imports of each product but in most countries the margin calculated (or indeed charged) for products does not discriminate between domestic and imported goods that are sold and so arguably this modification may not be necessary in practice
(although in countries with large re-exports this would still be necessary at least for the export columns).

60. As in the previous approach, such an approach would provide an input-output table that recorded exports in FOB prices. But it could easily be adapted to record flows in CIF prices for global input-output tables, by the addition of CIF margins to the columns of output by the distribution sector for export markets (and intermediate consumption, if the CIF services are imported or purchased domestically from other transporters). To be fully comprehensive, as CIF margins via product and bilateral partners, the export columns would need to be further broken down on the basis of partner countries.

61. Unlike in the previous approach however, with this approach, it would not be necessary to change the entire price basis for all transactions to purchasers prices (which provide a distortionary view of international trade), as the approach would instead record purchases of imported goods for sale on domestic markets to final consumers (or subsequent exports) by either domestic intermediaries (distributors), adding their own domestic distribution margin in the production process, or by industries at the actual CIF price.

62. There is no doubt that such an approach would generate significantly large input-output tables. For example a national input-output table with 40 industries, 20 of which produced goods and 2 provide distribution services, would become a table with 100 industries (if imports were not treated separately) and 160 if they were. A national input-output table required for a global input-output table (with say 100 countries) would correspondingly have 2120 columns (showing exports of each product, by whether it was produced domestically or imported and where it was exported to).

63. Although on the surface onerous, computationally, such a system could be handled. Moreover, it’s important to note that the construction of the individual columns could be performed using algebraically simple approaches that require no further information than currently provided in the construction of standard national input-output or global input-output tables, and underlying assumptions that are completely consistent with those already used in constructing national Leontief tables.

64. Importantly such a system would be of significant benefit, as it would:

- more closely\(^{16}\) align with a relevant price concept used in international trade (CIF prices) – overcoming one of the most common criticisms of trade policy analysts with regards to basic price TiVA systems;
- provide a mechanism for a consistent treatment of bilateral trade flows that maintain, by design, a coherence between the good being exported/imported and the transportation services incurred in delivering that good (both domestic transportation services to the frontier of the exporting country and international services between frontiers) which is rarely achievable, in practice, in systems designed in basic prices;
- provide a more complete assessment of the position of activities in GVCs (for example the separate distribution activity dealing with sales of intermediates would be further upstream in the value chain than the sector selling goods to households);
- continue to provide a view of production of industries consistent with the basic price approach – that is, providing the current Leontief view of production for all industries, except those distribution activities that include the purchase of goods they subsequently

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\(^{16}\) For some countries and products the addition of any taxes on exports (which is generally not the case) or subsidies will be excluded from the corresponding CIF price.
sell but maintaining the same view as would be obtained from a basic price system for the sub-sector selling only intermediates and direct services – whilst also providing a view from the consumption (market price – excluding taxes) perspective.

6. Conclusion

Basic price approaches to the development of global input-output tables provide important insights on the nature of global value chains and have helped transform our understanding on international trade today. However they can be prone to significant misinterpretation, as shown in many of the studies that use them to infer positions of activities in global value chains. But, as shown above, this is not the only area where misinterpretation can occur; for example through their removal of the distribution margin on goods transported from the factory gate to the customs frontier, they provide a view of trade in goods that is significantly different to that seen by analysts of trade, which often hampers their take-up, and indeed can impact on analyses (for example in calculations of the impact of tariffs, whose price is typically CIF or FOB).

Perhaps chief in this respect is the application of basic price models to questions that require a consumption perspective (which is, to some extent, at the heart of many of the applications of standard Leontief analyses, which often look at the impact of an increase in final demand on production). But a significant part of the actual consumption price (be that a market price or a CIF price) on which taxes and tariffs are applied includes significant distribution margins, and pure basic price models that treat distributors as providing direct services to customers, break these links.

The approach described in this paper describes a framework that can satisfy both the production and consumption view, and in turn provide new important insights on globalisation, such as the results for example highlighting the ‘domestic’ content of imports. Further work over the course of 2019 will look to develop these various approaches, and report back to the 2020 WPTGS.