Chapter 8 Improving the accounting frameworks for analyses of global value chains

CHAPTER 8

Improving the accounting frameworks for analyses of global value chains

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ABSTRACT

The use of global input-output tables, and the creation of Trade in Value-Added (TiVA) statistics, has greatly improved our understanding of the fragmentation of global production through value chains. However, their application requires a number of assumptions that, in practice, typically understate the degree of interconnectedness. TiVA estimates implicitly assume identical production functions across firms within an industry, when in reality production functions differ considerably. Typically, larger (and foreign-owned) firms tend to be more trade oriented than smaller (and domestically-owned) firms. As a result, TiVA statistics underestimate the import content of exports for the economy as a whole, a key indicator characterizing global production. Moreover, TiVA analyses are based on basic price concepts, which provide an appropriate view of production through value chains, but are less well equipped to analyse consumption, particularly as they exclude significant distribution margins (in particular retail and wholesale activities, often including marketing activities and brands), which add value at the end of the chain. This can distort analyses using "smile curves", which show the distance from final demand of different sectors within value chains, and in turn understate the scale of jobs supported by trade.

- Trade in Value-Added (TiVA) statistics have greatly improved our understanding of GVCs, but they use assumptions that generate typically downward biases in measures of GVC integration, and they give little information regarding the investment strand of GVCs.
- Efforts to mainstream key characteristics of different types of firms in the production of tomorrow's TiVA models, through extended supply-use tables, should be prioritized, to improve not only their relevance, but also their quality.
- Efforts to complement TiVA estimates currently based on basic prices with estimates based on market prices should also be initiated, not only to ease interpretability, but also to highlight the significant role played by distributors and to better understand the role played by intellectual property. Market-based approaches, for example, reveal that 9 million jobs are sustained in the United States through sales of imports.

1. Introduction

The proliferation and development of global input-output tables in recent years has significantly transformed our ability to interpret global production. But important though such initiatives have been, it is important to recall that they are analytical tools, requiring implicit and explicit assumptions on the detailed interactions of consumers and producers, and indeed, in their current form are silent on many drivers of globalization, such as the role of multinationals, and on impacts, for example with respect to "inclusive globalization".

Trade in Value-Added (TiVA) estimates, derived through the construction of a global input-output table, implicitly assume that all firms within a given sector have the same production function (input-output technical coefficients), import intensity and export intensity.

This of course has never been true. We know for example that larger firms will typically have different production functions to smaller firms, because of economies of scale, and also higher labor productivity. And these firms will also typically be more export- and, indeed, import-orientated than their smaller counterparts (reflecting in part the disproportionate costs of trade faced by smaller firms compared to larger firms). The same generalizations hold true for foreign-owned enterprises, or enterprises with affiliates abroad, compared to purely domestic firms; for example, the foreign content of exports by foreign-owned firms in the other transport equipment sector in the United States is twice that of domestically-owned firms.

That is not, of course, to say that the underlying conceptual basis for TiVA is incorrect. If, for example, global input-output tables were compiled at the firm level, with appropriate breakdowns to reflect the specific products and the (often differential) prices paid by consumers (as well as differences in transportation costs), then the corresponding results would accurately reflect the underlying reality they seek to measure. But, for many practical reasons[1], this is some way off what happens in practice. Further, the inability to capture this heterogeneity in current TiVA measures is increasingly compounded by additional complexities, notably the increased scope for multi-nationals (MNEs) to maximize global profits by recording intra-firm transactions in knowledge-based services in a way that is most advantageous to the firm. In practice this means that these types of intrafirm transactions can be recorded explicitly as cross-border trade or (and so outside of the TiVA system) as primary income flows.

But this is not the only area where there are challenges with the use of current TiVA statistics. Because inter-country input-output tables value transactions at *basic*, and not *market*, prices, many of the related TiVA analyses reveal only part of the story. For example the US domestic value-added content of its exports of textiles and clothing, in free-on-board (F.O.B.) prices, was around 20% in 2016 using market prices, compared to 3% using the pure basic prices approach. The basic price approach also limits the scope to reveal additional dependencies related to globalization, for example jobs sustained in retailers through sales of imports.

This chapter highlights the importance of developing extensions to current TiVA frameworks (Section 2) that are better able to capture firm heterogeneity, and, in turn, better highlight the importance of multinational enterprises (MNEs) within GVCs. It also 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 (Section 3). In the United States the sale of imports generated an additional 840 billion USD of US value-added in 2016, supporting 9.0 million jobs.

2. Accounting frameworks for global value chains: extended supply-use tables

2.1 Overview

The increasing international fragmentation of production that has occurred in recent decades driven by technological progress, reductions in trade costs, improved access to resources and markets, trade policy reforms, and indeed cost factors in emerging economies, has challenged our conventional wisdom on how we look at and interpret globalization. For example, traditional measures of trade record gross flows of goods and services each and every time they cross borders, leading to what many describe as a "multiple" counting of trade, which may lead to misguided policy measures in a wide range of policy areas. In response to this, the international statistics community has begun to develop new measures of trade on a value added basis, for example the OECD-WTO TiVA database, WIOD, APEC-TIVA and the European FIGARO initiative.

But important though such initiatives are, they are only able to respond to one aspect of the globalization debate. Significant attention, for example, is focused on the role of multinationals in this new landscape, and, on this, with the exception of recent exploratory initiatives[2], current available, and in particular official, statistics that follow the TiVA approach are silent. Of particular relevance in this context is the ability of multinationals to shift intellectual property products, such as software and R&D, from one economic territory to another, raising broader questions on the ability of GDP to accurately describe "meaningful" economic activity, with concomitant impacts on other macro-economic statistics, including TiVA. For example, TiVA measures purport to show how (in which industries) and where (in which territories) value is generated in the production of a good or service. The simple relocation of an intellectual property product from one economic territory to another[3] can radically alter that view.

In addition, the policy debate in recent years has increasingly focused on what has become referred to as "inclusive globalization", i.e. the growing realization that the benefits of globalization may not have accrued to all members of society equally, even if only as a process of transition. The challenges of inclusive globalization require that the impacts on people (in other words, workers) are also captured in our statistics. This requires information on skills, occupations, and compensation paid to these categories of workers.

2.2 Improved accounting frameworks for GVC analyses

More fundamentally, there is a growing appreciation that the statistical compilation tools and accounting frameworks designed and developed over the last 60 years in various manifestations of the System of National Accounts (SNA), despite their significant advances, may reflect a world that no longer exists.

In the early days of the SNA, the rest of the world was recorded as a separate institutional sector to and from which goods were sold and bought; and such a view was largely sufficient. But over the years as global production chains and interconnectedness grew, there was a growing realization that additional information was needed to properly navigate around the economic landscape, which resulted in the development of new areas of statistics, such as foreign direct investment measures and data collections focusing on inward and outward activities of foreign affiliates statistics (FATS). More recently new data collections, or rather compilations, have focused on linking trade and business registers to provide insights on which firms in which sectors engage in imports and exports (referred to as Trade by Enterprise Characteristics).

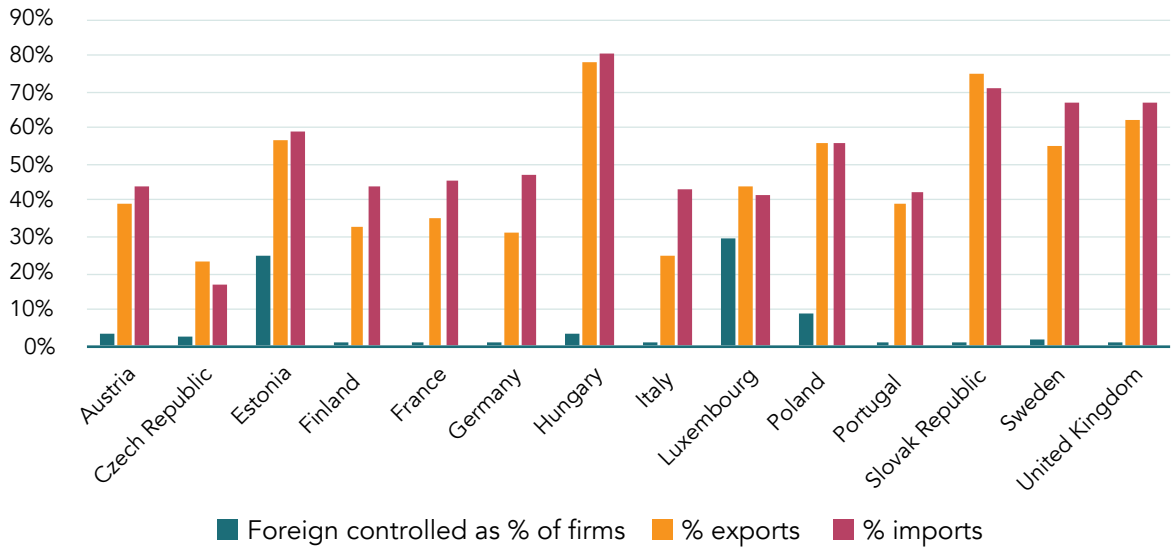
These more recent innovations have significantly improved our collective understanding of trade, and indeed investment, but they are still to a large extent only a partial solution to the statistical challenges presented by globalization.

The development of TiVA type statistics is certainly a step forward in this area, but these too suffer from the stove-pipe approach. TiVA estimates, derived through the construction of a global input-output table, implicitly assume that all firms within a given sector have the same production function (input-output technical coefficients), import intensity and export intensity. This of course has never been true. We know for example that larger firms will typically have different production functions than smaller firms (because of economies of scale) as well as higher labor productivity. And these firms will also typically be more export- and, indeed, import-orientated than their smaller counterparts (reflecting in part the disproportionate costs of trade faced by smaller firms compared to larger firms).

The same generalizations hold true for foreign-owned enterprises, or enterprises with affiliates abroad, compared to purely domestic firms; indeed in many countries MNEs account for the lion's share of overall trade (Figure 8.1). But TiVA estimates, relying as they do on national Supply-Use and Input-Output tables, cannot reflect these heterogeneities; meaning that key measures, such as the import content of exports are typically downward biased.

Moreover, the very process of globalization has increased the scale of these heterogeneities, driving coach and horses through the assumption of homogeneity within sectors. As firms within sectors increasingly specialize in specific tasks in the production process, they also suck in greater imports from the upstream part of the value chain and have greater export orientation. In addition globalization has itself led to an increased prevalence of (once rare) categories of firms such as *Factoryless Producers* and *Processers*, where recent changes in the accounting system further weaken the case for assumptions of homogeneity in technical coefficients. For example, all other things being equal, a processing firm in one sector will have significantly less (recorded) imports than a non-processing firm producing the same final product. Similarly, a Factoryless Producer will be allocated to the distribution sector (with limited intermediate consumption of

FIGURE 8.1 Foreign-owned firms across economies (2011)



Note: Foreign-owned firms are defined according to FATS/AMNE 50% thresholds.

Source: OECD Trade by Enterprise Characteristics.

goods) but the same firm that chooses to buy the material goods used by the processing firms will be allocated to the manufacturing sector (with significant intermediate consumption of goods).

The ability of national (and international) Supply-Use and Input-Output tables, based on industrial groupings alone, to describe how demand and supply relationships are related has therefore become more difficult. Typically, in confronting the problem of heterogeneity, the conventional approach has been to provide more detail by aggregating firms at lower levels of the industrial classification system, for example 3 or 4 digit groupings as opposed to two digit groupings, subject to confidentiality restrictions being preserved. But this approach may not be optimal, neither in terms of reducing heterogeneity within aggregations (and in a way that best responds to the policy drivers) nor necessarily in terms of processing burdens.

That is not to say that industrial classification systems are completely obsolete. It would serve little purpose for example to devise an optimal system that did not retain some means of classifying firms on the basis of their activity, (e.g. manufacturing versus services) if only because these remain the key prisms that users look through when analyzing production. But it does serve to highlight that other approaches to tackling heterogeneity can, and should, be considered.

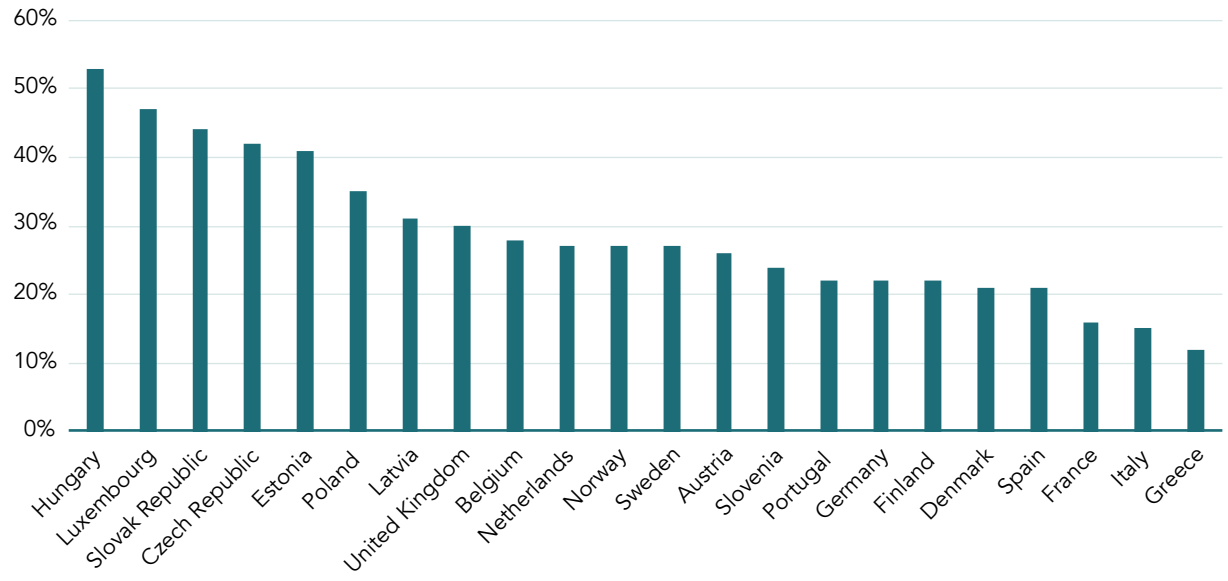
Arguably a more radical approach is needed. Such an approach requires that the role of foreign affiliates in the economic territory, which is significant in many economies, Figure 8.2, and affiliates abroad are captured explicitly (and visibly) in the core accounts and in the development of GVC-related (i.e. TiVA) indicators. It also requires improved information on the trade relationships of categories of firms (for example exporter and non-exporter). Equally important is the need to fully articulate income flows in and out of the economy and, in particular, from which category of firms (e.g. industrial sector) these arise.

In this sense it is important to note that value added essentially reflects two main components[4] – (i) operating surplus (including mixed income), or compensation for capital, and (ii) compensation for employment. While the latter component largely reflects the direct benefits that accrue and "stick" within the economy through production[5] the case is not so clear for the former, where foreign affiliates are concerned.

In perfect markets the operating surplus generated by foreign affiliates is equivalent to the return on produced "tangible" and "intangible" capital and also non-produced assets used in production[6]. While the National Accounts of countries attribute the ownership of this capital to the affiliated enterprise, the ultimate beneficiary of the operating surplus is not necessarily the affiliate but its parent. This has raised questions – often in emerging economies but also in developed economies – about the actual benefits of foreign MNEs to the host economy. Indeed, more recently it has begun to raise questions about the meaningfulness of GDP itself as a tool for macro-ecomomic policy making.

Particularly important in this regard are transactions in intangible assets: those recognised as produced in the SNA (such as research and development, software, etc.), non-produced (such as brands) and also other knowledge-based capital (such as organizational capital, e.g. management competencies). Often, in international trade in services statistics, payments for the use of these produced and non-produced assets are recorded as purchases (intermediate consumption) by one affiliated enterprise from another. But often they are not, and instead they are implicitly recorded under primary income payments (such as investment income, or reinvested earnings in the Balance of

FIGURE 8.2 Value Added at Factor Cost of Foreign Affiliates – share of national total, 2014 (ISIC B-N, ex K)



Source: OECD AMNE database.

Payments). In the former case, the value added of the affiliate using the assets is lower, as the value added generated through ownership of the asset appears on the accounts of the affiliate that owns it. In the latter case, however, the value added of the affiliate using the asset is higher (as there is no intermediate consumption) with the "ultimate" beneficiary (the owning affiliate) recording no value added but instead recieving primary income from the using affiliate. In both cases, however, the ultimate "income" generated by the asset ends up on the books of the owner (at least in theory, as even the very notion of the ultimate onwer is a complex issue).

Furthermore, the distinction between the two scenarios above is often clouded by (a) the ability of the statistical information system to record the flows and (b) transfer pricing and tax incentives of MNEs. Indeed, in some countries where foreign affiliates generate significant value added and repatriate significant profits back to parent companies the policy focus has switched from GDP to GNI, and indeed in some countries, such as Ireland, to new accounting concepts[7].

This is not however an issue singularly related to knowledge-based assets. Transfer pricing is also prevalent in transactions related to goods. Moreover, notwithstanding these issues, significant income flows generated by an affiliate can be repatriated to parents via other means, for example as interest payments.

The tool advocated in the SNA for ensuring coherence across various data sources to assure alignment of GDP estimates created by the income, expenditure and production approach is supply-use tables, the same underlying core statistical input required for TiVA estimates. As shown in this chapter, through (in principle) simple extensions to conventional supply-use tables, *Extended Supply-Use Tables* (ESUT) provide the ideal basis for bringing together these various domains into a single, integrated economic accounting framework that puts the measurement of the "global" at the heart of the "national".

2.3 National examples of extended supply-use tables

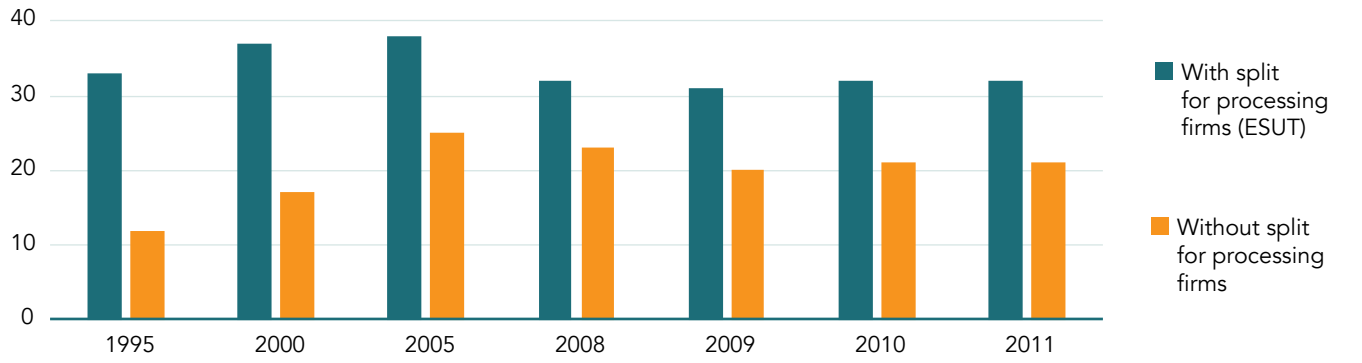
It is important to stress that the recognition that greater heterogeneity (disaggregation of firms) within national supply-use and input-output tables is not of course new. It stands to reason that more detailed tables will produce better results. Indeed Chapter 14 of the 2008 SNA provides a presentation of Supply-Use tables that differentiate production on the basis of market output, non-market output and production for own-final use. Historically and certainly prior to the explosion in GVCs, capturing heterogeneity was typically achieved through more detailed splits of industries. What has changed in recent years is the greater appreciation that a focus on the industries of firms is not necessarily best nor indeed optimal. Indeed, in 2011, even before the OECD-WTO released their first TiVA database in January 2013, it had become clear that a new approach to heterogeneity was needed, in particular one that focused on the role of MNEs.[8]

These earlier discussions, and indeed the first release of TiVA, highlighted the importance of looking anew at national statistics compilation systems, with the OECD moving, in 2014, to create a new expert group of countries that would begin to develop what have become known as ESUTs; in other words accounting tools for a coherent view of trade, investment, income and production (for a detailed exposition of the accounting framework of ESUTs see Ahmad 2018). What follows below are national examples[9] illustrating the potential (and indeed actual for China and Mexico, whose extended tables are already integrated into the OECD-WTO TiVA database) impact of improved heterogeneity on TiVA estimates.

Results for China

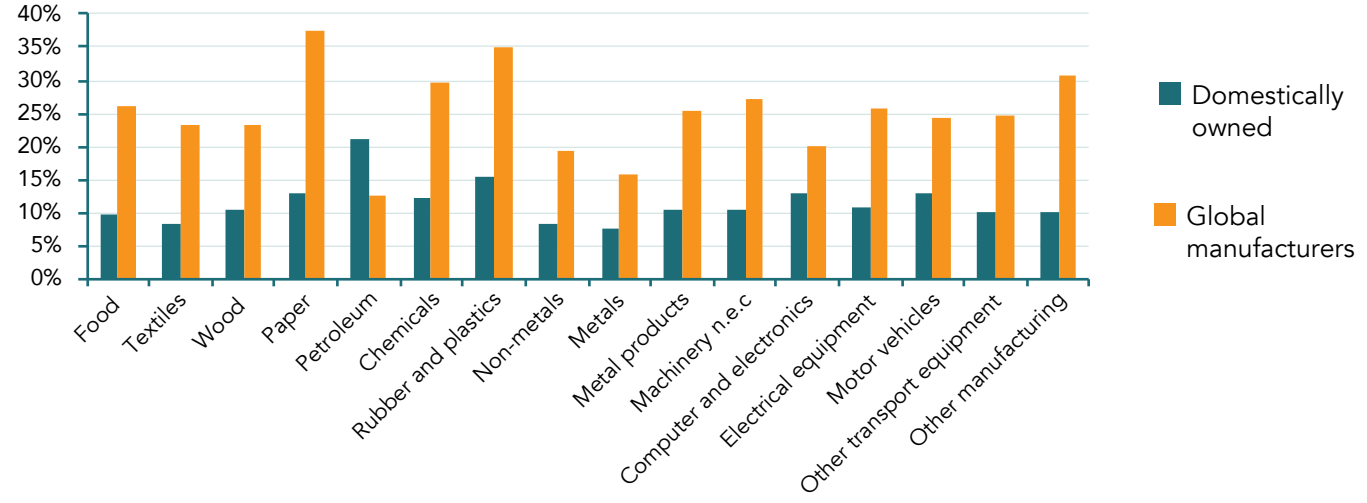
China has worked to develop extended supply-use tables that differentiate between three categories of firms – exporters operating within the Customs Processing regime, other exporters, and non-exporters. Figure 8.3 below reveals significantly different movements in the trend of the foreign content of China's

FIGURE 8.3 Foreign value-added content of China's exports



Source: OECD-WTO TiVA (May 2013 version).

FIGURE 8.4 US value added content of Mexico's exports % (2011)



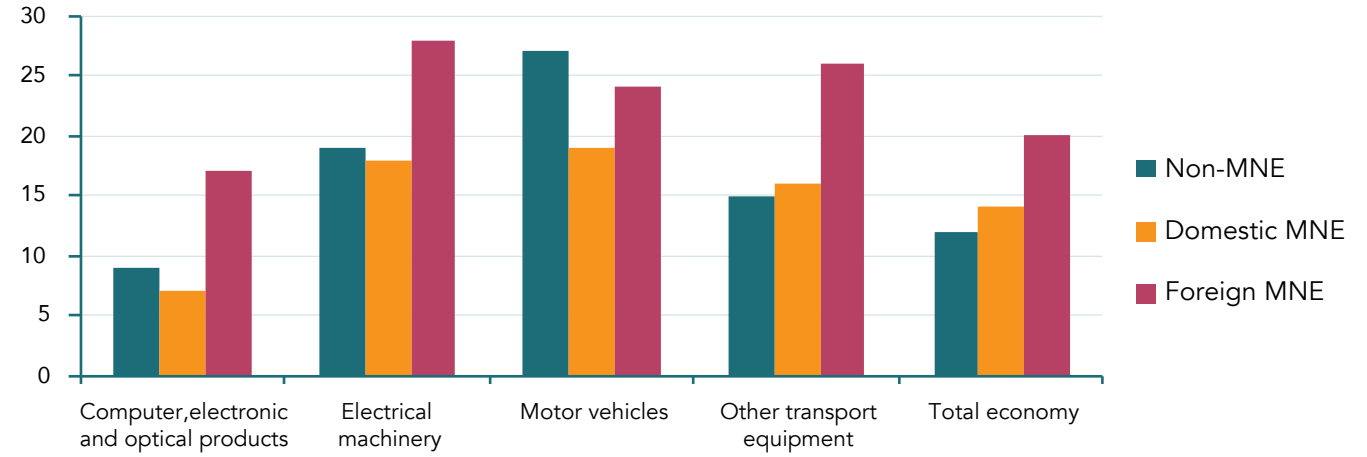
Source: Based on Mexico's Extended SUT.

exports over the last two decades when comparing estimates based on extended SUTs (referred to as ICIO) and pure national tables without a breakdown (referred to as national).

Results for Mexico

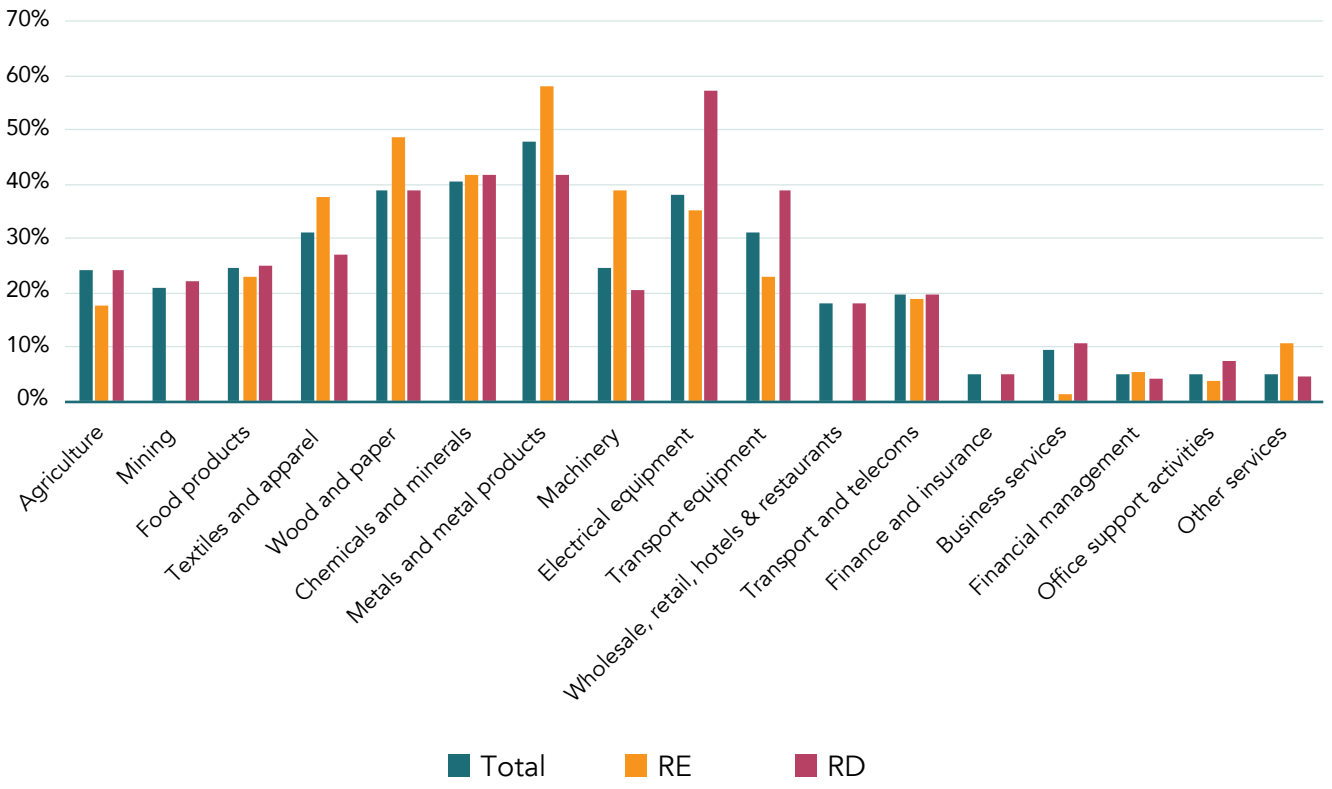
Mexico (Instituto Nacional de Estadística y Geografía – INEGI) have produced a categorization of firms referred to as global manufacturers[10] that: a) import the majority of their purchases (imports account for at least 2/3 of their export value); b) produce only for exports; and c) are controlled by a foreign owner. These global firms were responsible for 55% of total imported intermediate consumption and for 71% of gross exports of the Mexican manufacturing sector in 2008. Almost by definition the import content of Mexico's global manufacturing (GM) firms is significantly higher than comparable firms in the same sector. This can have a significant difference on highly policy relevant indicators, for example, on measures of the US content of Mexico's exports (Figure 8.4), where one-quarter of the exports by GM firms in the motor vehicle sector reflect upstream US contributions, compared to around half that amount for non-GM firms; this relationship is seen across most activities.

FIGURE 8.5 Foreign content of US exports, % (2011) (selected industries)



Source: Based on the US Extended SUT.

FIGURE 8.6 Foreign content of Costa Rica's exports, % (2012)



Source: Based on Mexico's Extended SUT.

Results for the United States

The United States (Bureau of Economic Analysis) has developed Extended SUTs with a three-way classification of firms reflecting ownership structures, that differentiate between foreign-owned affiliates operating in the US, domestically-owned MNEs, and domestically-owned firms with no affiliates abroad.[11] Results for the United States also reveal significant differences between the foreign content of exports across categories of firms defined by ownership structure. At the whole economy level the foreign content of US exports by foreign-owned firms is almost twice that of domestically-owned non-MNEs. This partly reflects compositional effects, but the foreign content is higher across nearly all activities (Figure 8.5)

Results for Costa Rica

A similar picture of strong heterogeneity emerges for Costa Rica, whose ESUT differentiates between firms operating from free trade zones (referred to as RE in Figure 8.6) and firms operating outside of foreign trade zones (FTZs) (referred to as RD). The results show that RE firms have a higher import content of exports than RD firms across a range of important export activities.

Results for Canada

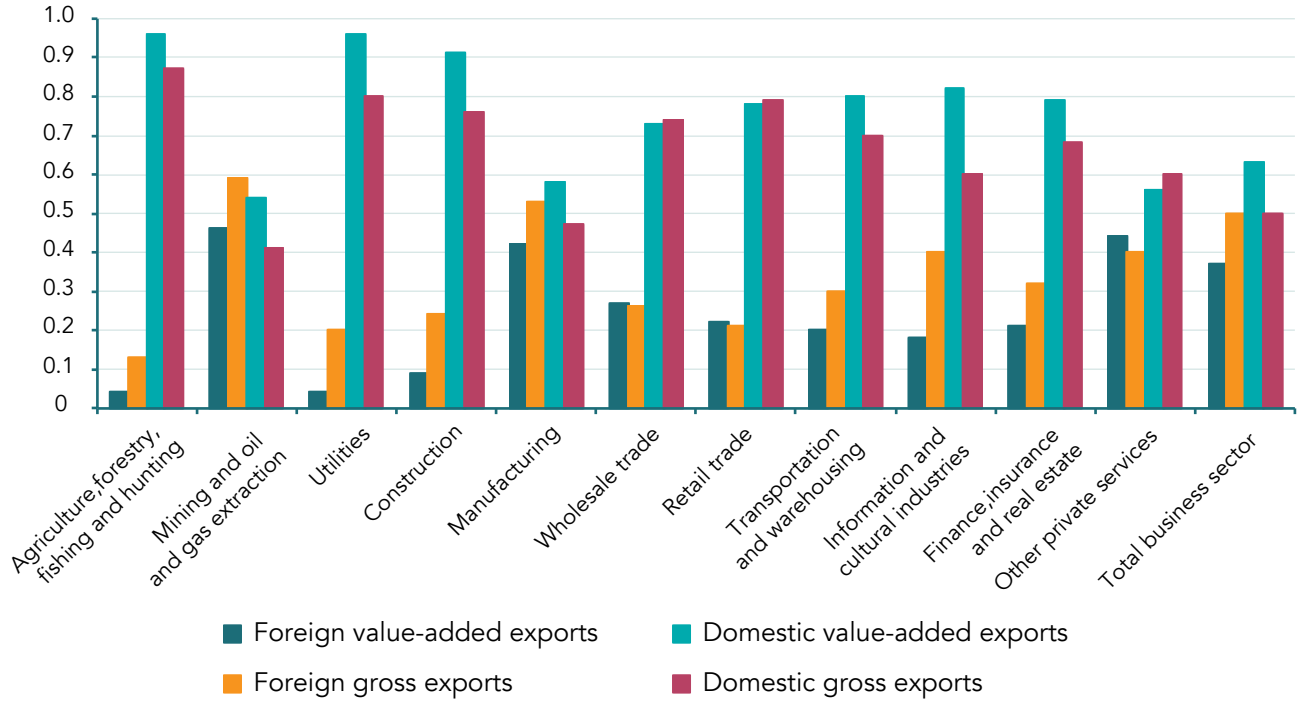
Results from a recent collaboration between the OECD and Statistics Canada reveal that the impact of compiling ESUT estimates for the business sector, accounting for either ownership or trading status, was an increase in the overall foreign value added content of Canada's exports of 4 percentage points. Figure 8.7, which shows that foreign-owned firms are responsible for a lower share of exports in value-added terms than in gross terms, highlights this higher propensity to import by foreign-owned firms, and, of course, the importance of capturing improved firm heterogeneity in national SUTs.

Results for Nordic countries

In a recent collaboration between 5 Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) and the OECD, the OECD developed extended SUTs with three variants of firm breakdown:

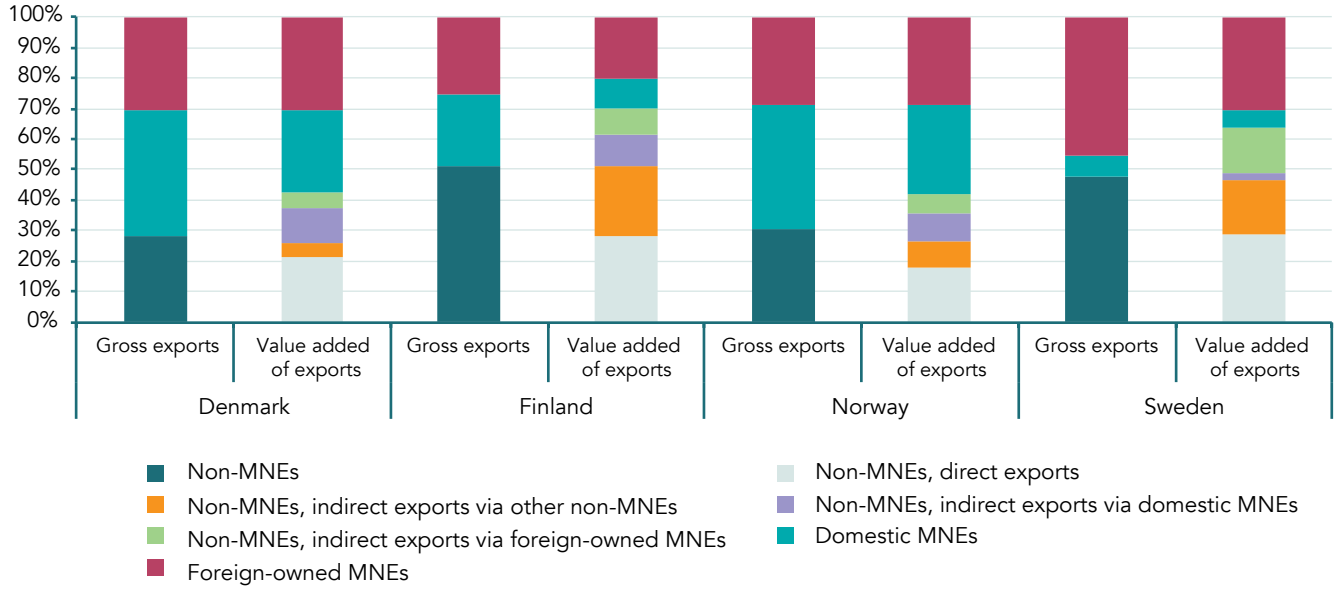
- By size class: micro, small, medium and large, further broken down by whether the micro, small and medium firms were independent or part of a larger enterprise group.
- By trading status: non-traders, two-way traders, importers and exporters

FIGURE 8.7 **Share of gross and value-added exports by ownership status, % (2010), Canada**



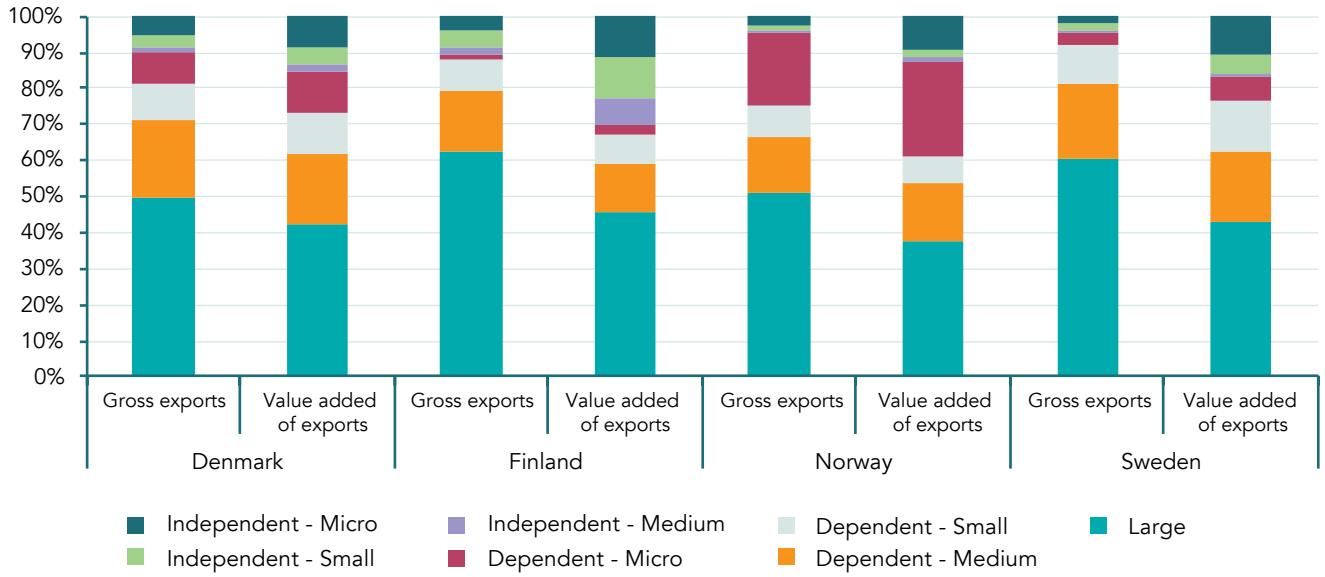
Source: OECD/Statistics Canada.

FIGURE 8.8 **Exports in gross and value-added terms, % (2013), by ownership structure**



Source: Nordic Countries in global value chains, 2017.

FIGURE 8.9 Exports in gross and value-added terms, % (2013), by size class

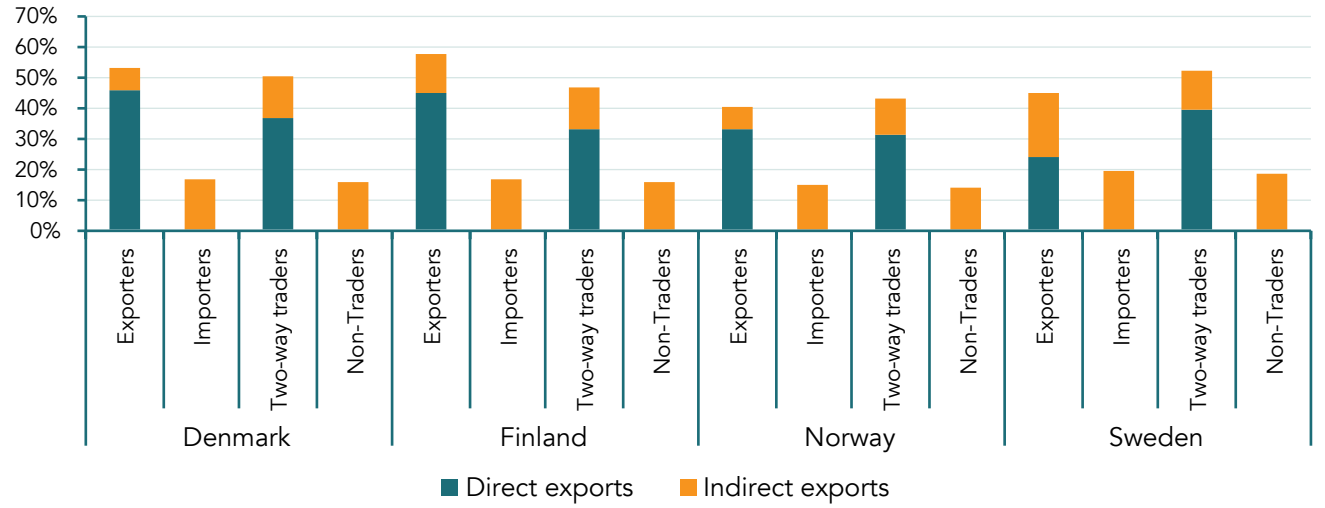


Source: Nordic Countries in global value chains, 2017.

- By ownership status: non-MNEs, domestic MNEs and foreign MNEs.

Highlights from this collaboration are presented below as Figures 8.8-10. Figure 8.8 reveals the significant upstream integration of non-MNEs across all countries, compared to integration seen looking purely at gross trade relationships. Of particular note is the fact that in all countries bar Sweden this integration is primarily channeled via domestic MNEs; in Sweden the main link is through foreign-owned MNEs, in large part reflecting scale. Figure 8.9 presents a similar picture showing the higher integration of smaller firms in GVCs when seen in value-added terms, through their upstream integration as suppliers to larger exporting firms. Figure 8.10 presents information on jobs sustained through integration in GVCs. A significant insight from this presentation is the fact that even within firms that have no direct exports, around one in six of all jobs in these firms are dependent on foreign markets.

FIGURE 8.10 Jobs embodied in exports, % of total (2013), by trading status



Source: Nordic Countries in global value chains, 2017.

2.4 Concluding comments

The statistical challenges of globalization are profound, and it has become increasingly clear in recent years that conventional approaches used to understand how economies work can no longer rely solely on national statistics. Increasingly, in order to understand how economies work and how to target and create industrial policies focusing on competitiveness, it is necessary to see the whole. National statistics build pictures based on interrelationships between producers and consumers and the rest of the world. But these relationships, particularly those with the rest of the world, have become increasingly more complex, and, as such, there is an increasing need to consider global production within a global accounting framework. This implies a departure from the traditional role of international organizations as compilers of internationally comparable national statistics, such as national input-output or supply-use tables. Instead, it requires that they bring together these national tables to create a global table.

Although TiVA estimates have been able to shed important light on our understanding of international trade and its relation to activity and competitiveness, in particular the importance of recognizing the importance of imports to exports, and, so, the hitherto hidden costs of protectionism as well as the benefits of trade liberalization, particularly in services, they do not reveal the full picture. With significant shares of exports being driven by foreign affiliates, TiVA estimates have also revealed the importance of going beyond just value added towards income, in order to capture flows outside of conventional international trade statistics, such as the repatriation of profits related to the use of non-produced knowledge-based assets (e.g. brands) and, indeed, the repatriation of profits related to the use of produced knowledge-based assets (e.g. software) that are (often incorrectly) not recorded as receipts from exports of services.

The emergence of global value chains therefore also raises arguably profound questions about the way national statistics are currently compiled. In the same way that international organizations increasingly need to think "national" in the way they present and compile their statistics, where "national" reflects the single economic territory comprising the "world" or large parts of it, national statistics institutions need to think global.

In other words, in the construction of national statistics greater emphasis is needed on the role of the rest of the world, both as a source of demand and supplier of demand but also with regards to the role of multinationals. This requires a rethink of the way that firms are currently aggregated within statistical information systems, to move beyond the classic aggregation based almost exclusively on industrial classification systems towards more meaningful aggregations that better reflect today's "global factory".

Such considerations are also essential not only to better understand the way that global production is today organized but also to better understand how investment drives global value chains, and in particular how that very same investment can lead to difficulties in interpreting trade flows as well as GDP.

Extended Supply-Use tables provide an effective tool to respond to these developments and growing needs. Increasing globalization of production raises challenging questions for national statistics. And fundamental and long-standing axioms regarding the nature of production and the way that statistics are necessarily compiled warrant a rethink. Certainly the evidence suggests that long-standing assumptions concerning homogeneity of firms within industry classifications should be reviewed. The evidence also suggests, particularly for those countries with FATS and TEC data, that an optimal level of aggregation may be achievable without any significant increase in compilation or reporting burden. But, of course, such reconsiderations need also take into account constraints such as burdens and confidentiality.

Supply-Use tables have become the conventional route with which coherent estimates of the national accounts, trade and production are now systematically compiled in many countries and lend themselves as being the ideal way in which to resolve these issues. Extended Supply-Use tables can play a similar role in responding to questions on globalization.

Three final comments, providing a broader perspective, are worth making in this respect. The first concerns the quality of national supply-use tables. In many (most) countries, such tables are derived using a series of assumptions at least in some years, reflecting in part the often different periodic nature of the large number of datasets needed to construct SUTs. Many of these assumptions are based on some underlying view of stability and homogeneity in production functions. As shown, globalization is increasingly undermining the strength of these assumptions. Looking again how the homogeneity is likely to manifest itself across firms and creating SUTs based around these categorizations of firms can greatly help to mitigate these effects and strengthen these assumptions, which will remain necessary, perhaps indefinitely, across most countries. As such, one important benefit of extended SUTs that should not be overlooked is their ability to improve the quality of the core accounts, and indeed GDP. In the same way they are also ideally placed to be able to significantly improve the interpretability of the accounts, in particular, when the accounts are affected by phenomena related to globalization, such as relocations.

The second comment concerns the potential momentum extended SUTs could provide to the development and improvement of statistical business surveys. The evidence shows that significant heterogeneity exists across all categories of firms, and that the conventional stratification variables used in survey sampling (typically activity and size) may be sub-optimal. It may for example be necessary to include additional, but readily available, stratification variables, pertaining for example to ownership (e.g. part of a foreign MNE, domestic MNE, an enterprise group, exporter, non-exporter) in designing tomorrow's surveys.

The third comes back to the issue of the statistical unit. The current 2008 SNA preference for the establishment should not be a barrier to developing extended SUTs. If for example these can only be developed using a different statistical unit, then countries are strongly encouraged to consider doing so. There is an increasing recognition that the arguments for the current SNA

preference for the establishment have been weakened because of the changing nature of production and indeed because of the changes made in the SNA itself regarding economic ownership. This is further recognized in the 2008 SNA Research Agenda, where explicit references are made for the need to reconsider the establishment preference, taking into account the "basic source information" and changes in the underlying accounting principles of "Input-Output" tables, whose emphasis has moved from a *physical* perspective to an *economic* perspective.

3. A new look at trade in value-added and global value chains: a view from the consumption perspective – what the accounting framework doesn't tell you

3.1 Overview

In the SNA the recommended price basis for producers, and so, de facto in input-output tables, consumers, is the concept of *Basic Price*[12]. 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.

Although superficially benign, the distinction between basic and purchasers prices matters, especially for GVC analysis. Export prices are measured on a free on board (F.O.B.) basis and include any distribution services related to delivery from the factory gate to the port, and organized 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[13], 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 8.11A and B).

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.

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

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 are not, depending on how the original producer chose to invoice them.

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 8.11A reveals that this can be significant) both from the exporting country's perspective and the importing country's (exacerbating complications raised by the fact that import prices typically also include international distribution margins).

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) (see, for example, Figure 8.12). 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; this underestimates the overall impact of tariffs.

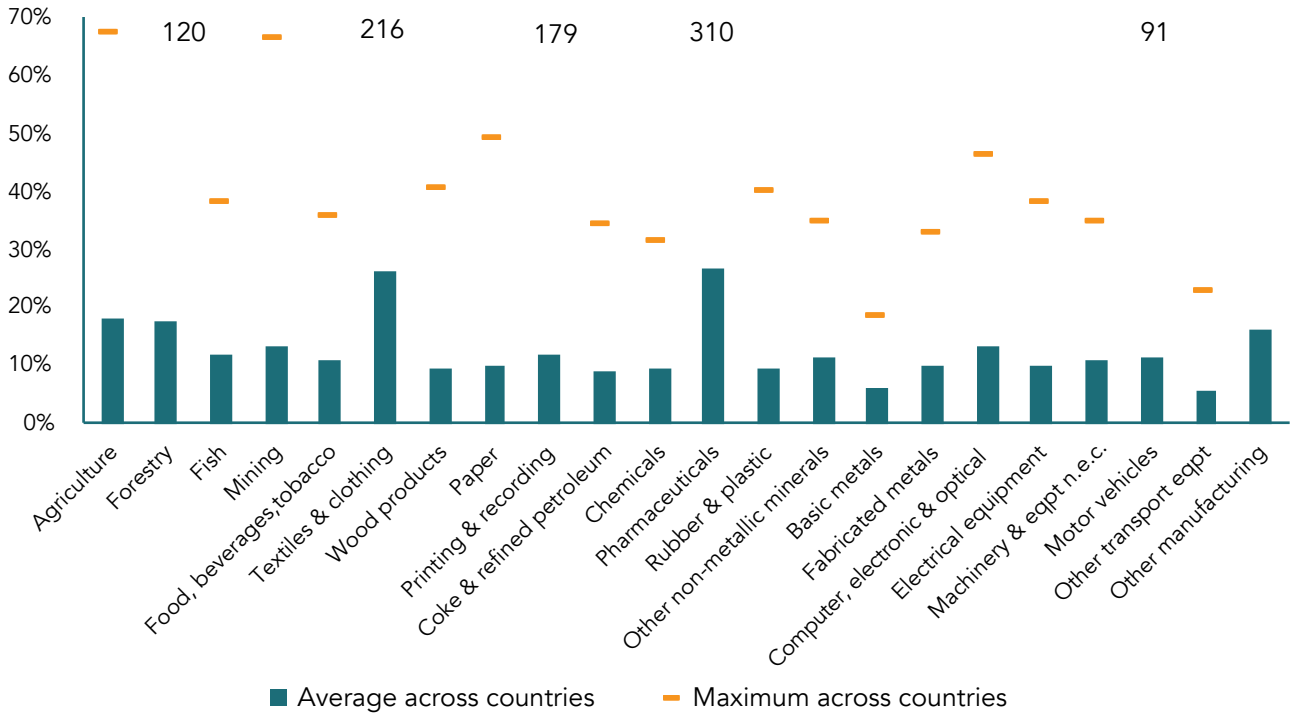
Figure 8.13[14] reveals the impact that different price bases can have in interpreting the decomposition of value in GVCs by looking at the domestic services content of textiles exports. In the United Kingdom and Sweden for example the domestic services content jumps to around 70% compared to around 20% using the basic price concept. On average, across countries the domestic services content of exports increases by around 15 percentage points.

Of particular interest in this respect is 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).

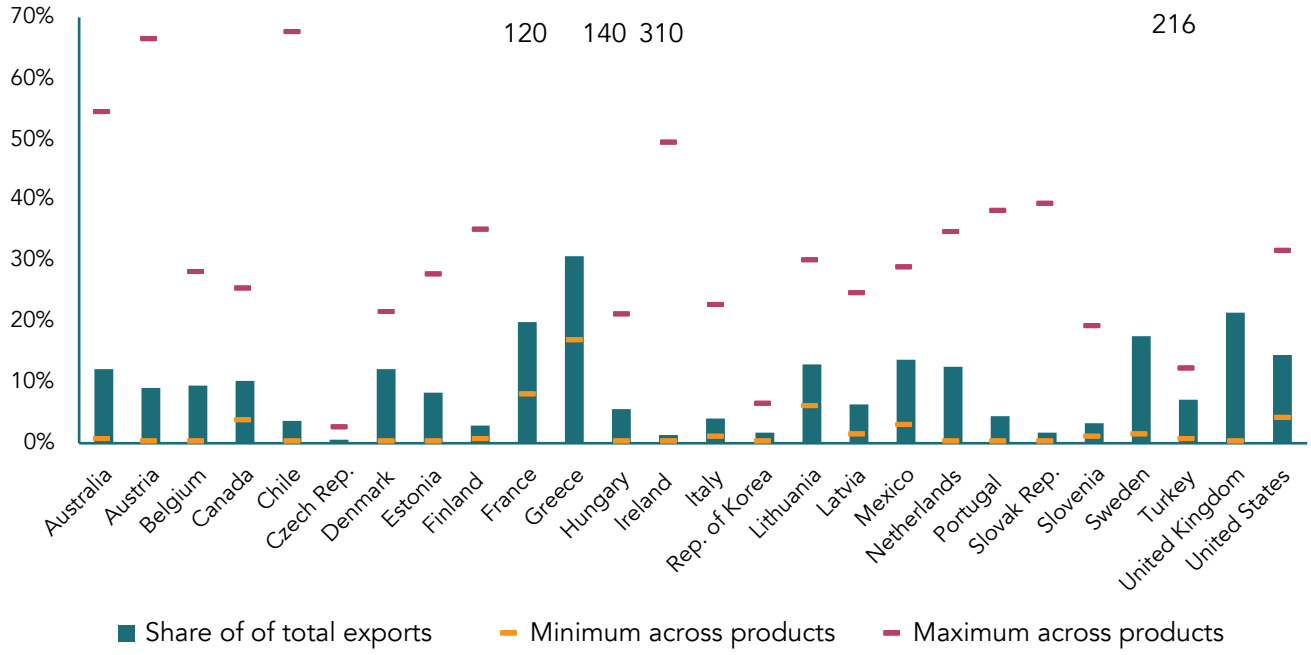
The upshot is that by decoupling the distribution costs involved in transporting a good from the factory gate to the customs frontier from the production costs of the good, the basic price concept creates an arguably *downward-biased* estimate of the overall contribution of exports of that good to the local economy. Exacerbating this downward bias is the fact that the

FIGURE 8.11 Factory gate to exporting country's customs frontier, recorded distribution margins (% of basic price of recorded exports)

A: By product



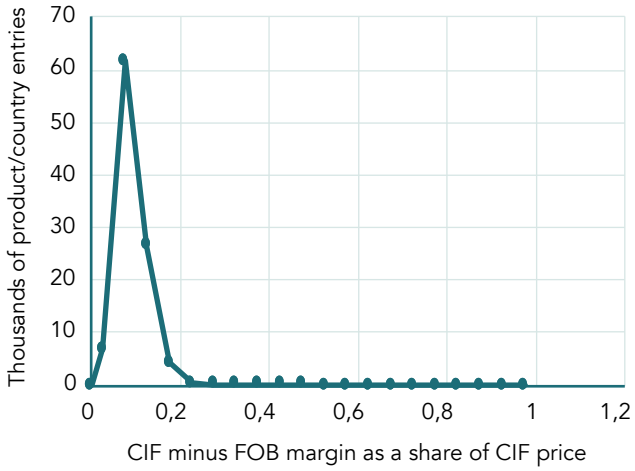
B: By country



Note: Data for Australia refers to 2014, Austria 2012, Belgium 2010, Canada 2013, Chile 2015, Czech Republic 2017, Denmark 2014, Estonia 2014, Finland 2014, France 2014, Greece 2010, Hungary 2014, Ireland 2011, Italy 2014, Republic of Korea 2010, Lithuania 2014, Latvia 2010, Mexico 2013, Netherlands 2014, Portugal 2013, Slovak Republic 2012, Slovenia 2015, Sweden 2015, Turkey 2012, United Kingdom 2010, United States 2016.

Source: OECD Supply-Use Table database.

FIGURE 8.12 International transportation margins on US imports

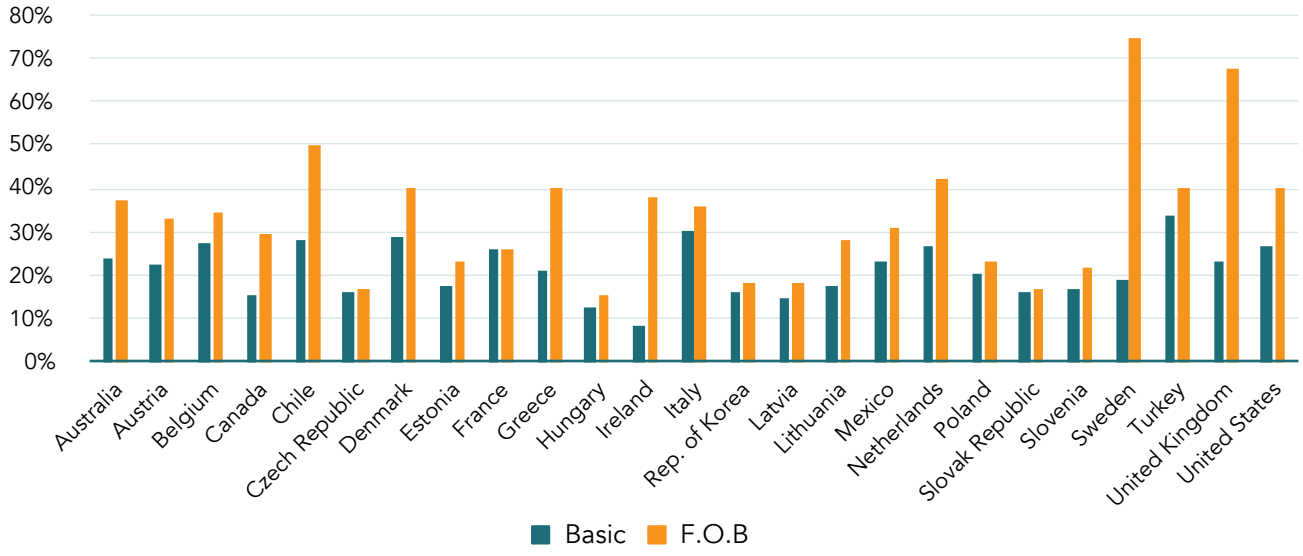


Source: OECD International Transport and Insurance Costs of Merchandise Trade.

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.

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. For example, a country may have restrictions on the provision of these services by foreign operators, as well as high relative prices that are absorbed only through the increased international competitiveness of goods-producing sectors purchasing these distribution services. This country 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 is the more likely scenario.

FIGURE 8.13 Domestic services value-added content of textiles exports (basic versus F.O.B. prices)

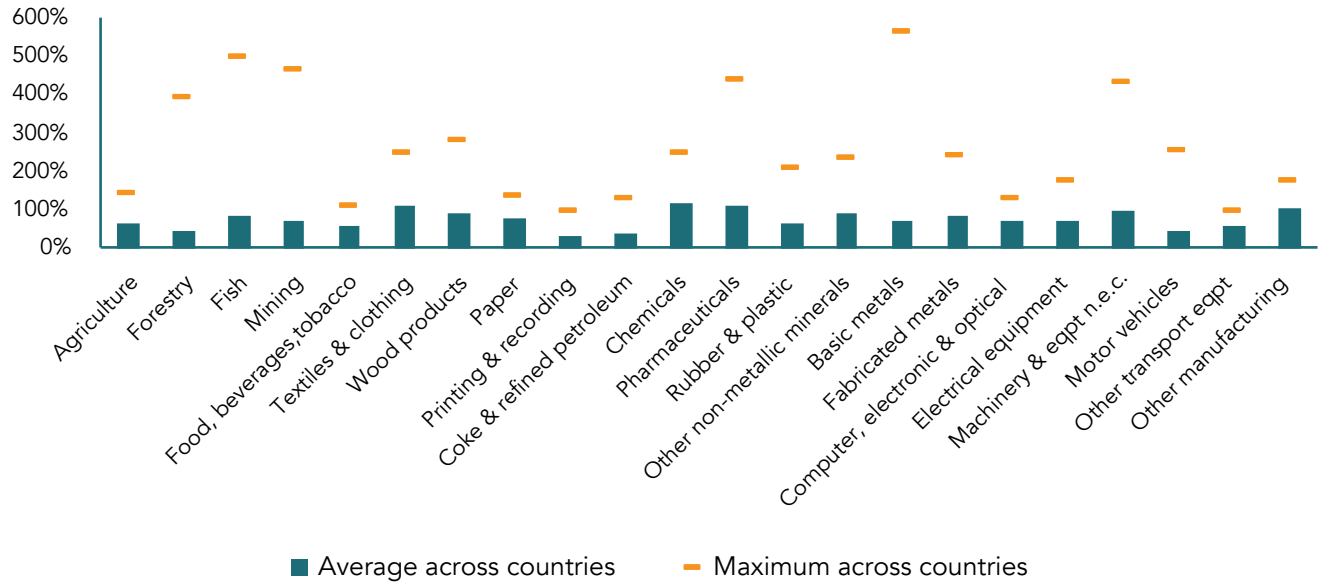


Note: Data for Australia are 2014, Austria 2012, Belgium 2010, Canada 2013, Chile 2015, Czech Republic 2017, Denmark 2014, Estonia 2014, France 2014, Greece 2010, Hungary 2014, Ireland 2011. Italy 2014, Republic of Korea 2010, Latvia 2010, Lithuania 2014, Mexico 2013, Netherlands 2014, Poland 2013, Slovak Republic 2012, Slovenia 2015, Sweden 2015, Turkey 2012, United Kingdom 2010, United States 2016.

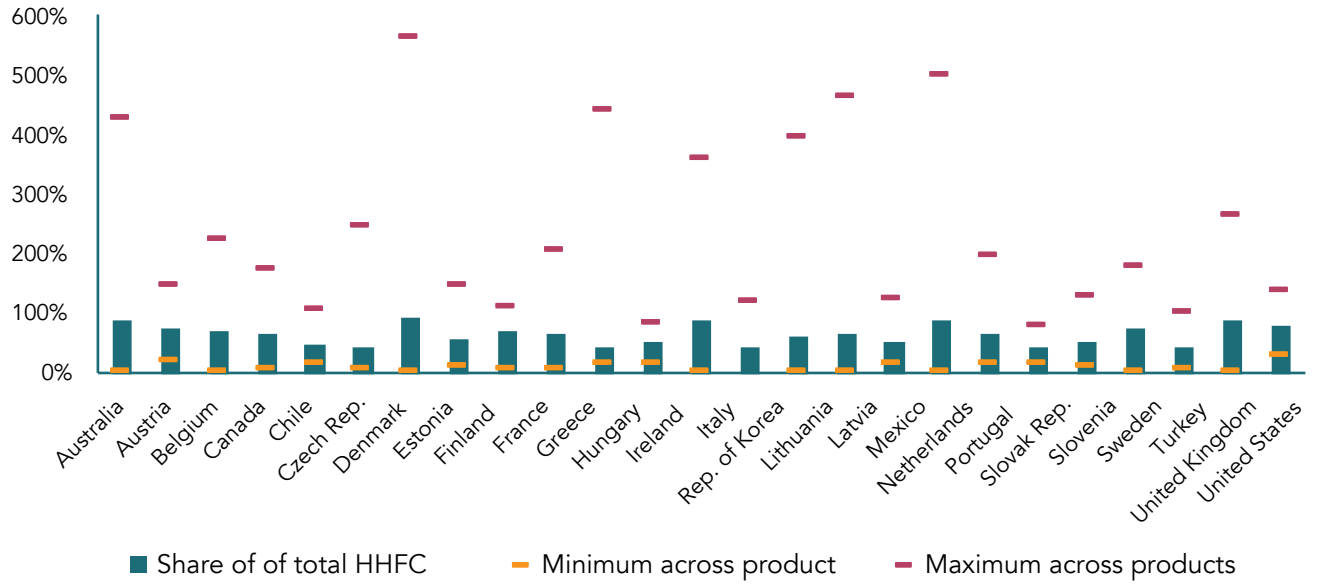
Source: OECD Supply-Use table database and OECD-WTO TiVA.

FIGURE 8.14 Margins on household final consumption, % of basic price

A: By product



B: By country



Note: Data for Australia are 2014, Austria 2012, Belgium 2010, Canada 2013, Chile 2015, Czech Republic 2017, Denmark 2014, Estonia 2014, Finland 2014, France 2014, Greece 2010, Hungary 2014, Italy 2014, Republic of Korea 2010, Lithuania 2014, Latvia 2010, Mexico 2013, Netherlands 2014, Portugal 2013, Slovak Republic 2012, Slovenia 2015, Sweden 2015, Turkey 2012, United Kingdom 2010, United States 2016.

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

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.

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 consumption (market) price. Not surprisingly, these charges can make a significant difference to the overall price of a good (see Figure 8.14).

For products, taking an average across countries' margins adds (a low of) 31% to the 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.

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.

But it is clear that some care is needed in interpretation. As shown above, for analyses of global value chains, taking a perspective from purchasers' prices rather than basic prices 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 Smile Curve, which is looked at in the following section.

3.2 Looking anew at the Smile Curve

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 Smile Curve, even with these limits it remains an important looking glass.

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.

TABLE 8.1 Derivation of Apple's gross margin on 30GB video iPod

Retail Price	$299
Distributor Discount (10%)	($30)
Retailer Discount	($45)
Sub-total (estimated wholesale price)	$224
Factory Cost	$144
Estimated Apple gross profit	$80

Source: Dedrick et al, 2008.

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.

Perhaps the most well-known of these is Dedrick *et al.*'s seminal 2008 work looking at the decomposition of value creation in an iPod (Table 8.1).

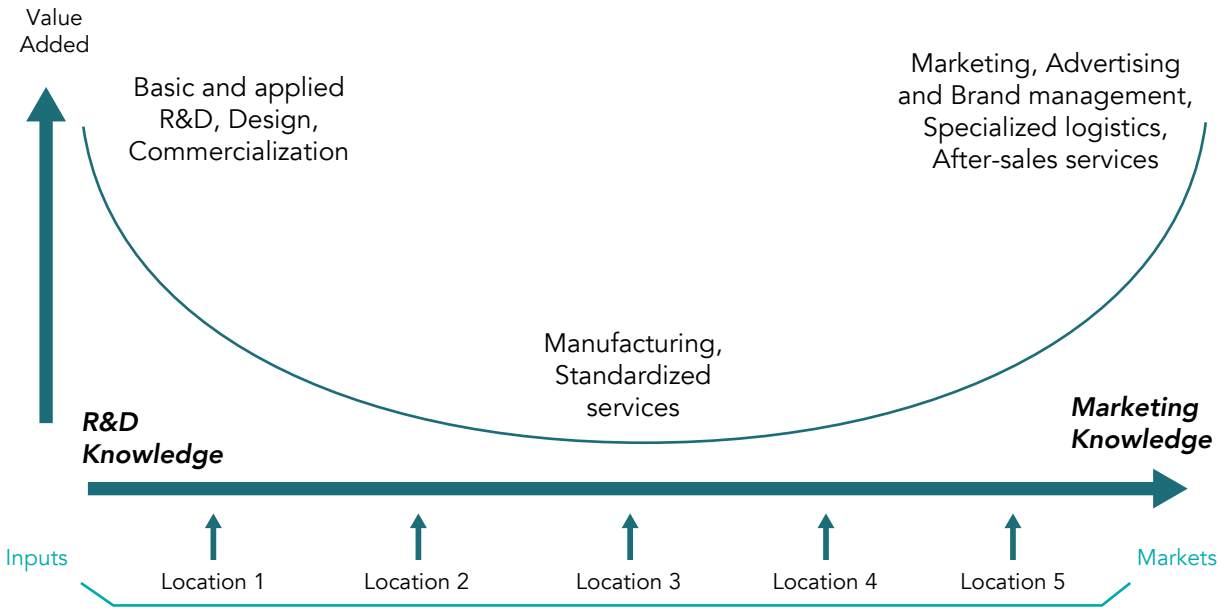
As noted in their study, the factory gate price (roughly equivalent to what would be recorded in trade statistics) was less than half the total retail price, and, indeed, Apple's contribution (measured as its gross profit), and compensation for design, marketing and research and development, is completely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

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 8.15) 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.

An underappreciation 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.

Intuitively, all of their charts plotting relationships for various products (see below Figure 8.16, 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 labor costs), where Degain *et al.* explain: "Post-fabrication service industries with higher labor compensation per hour – such as wholesale (20) and inland transportation (23) in

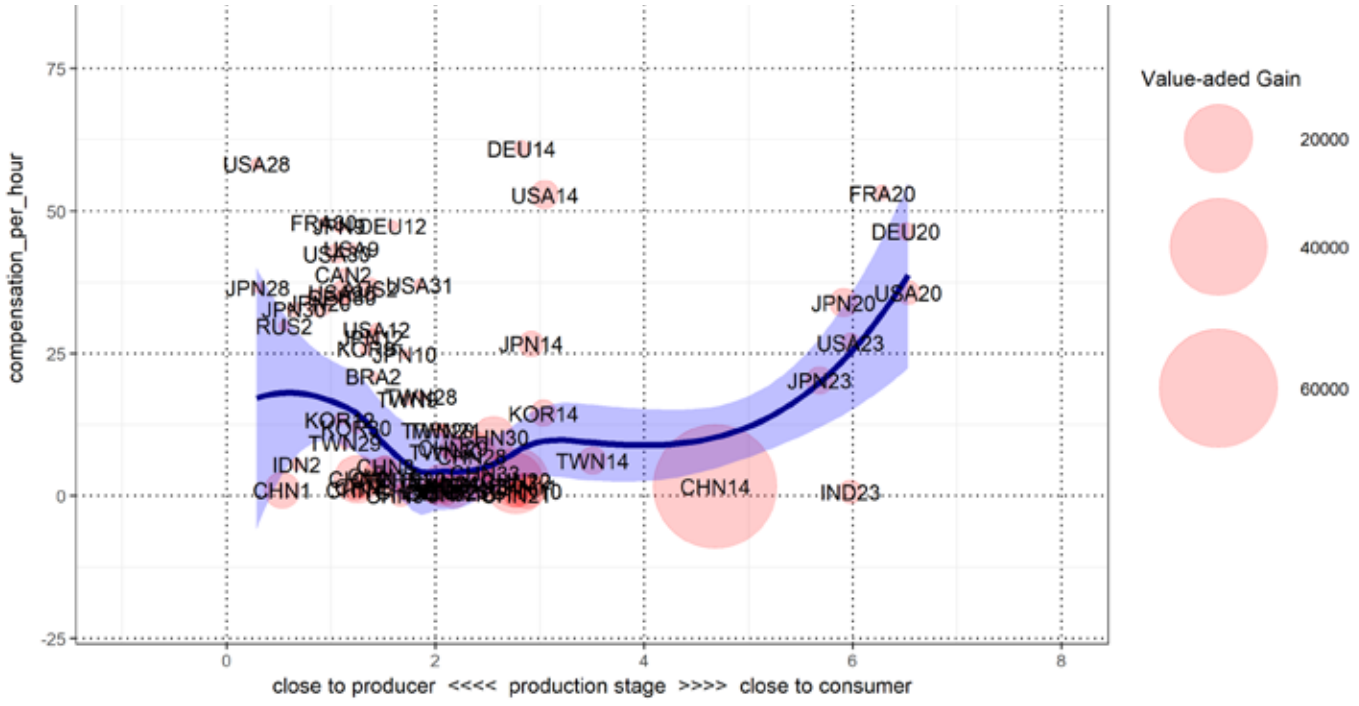
FIGURE 8.15 Conceptual framework of the Smile Curve



Source: Mudambi, 2008.[17]

FIGURE 8.16 Smile Curve for China's exports of electrical and optical equipment, 2009 (basic prices)

Compensation per hour ($)



Source: Meng Ye and Wei 2017.

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."

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.

This is why Degain *et al.* estimate the contribution of the distribution activities at generally no greater than 20%, while this chapter finds significantly higher estimates (around 40% when the decomposition is for an export, as in Figure 8.13, and significantly higher when the decomposition relates to the price paid by the final consumer, as in Figure 8.14).

To re-emphasize, 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, these 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).

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). However, 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. 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. This reflects 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 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.*

3.3 Marketing, design and R&D services

Thus, an aggregated view of the position of the distribution sector in global value chains is unlikely to accurately reflect the position of intermediate services 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 is also often bundled within the final distribution margin, 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.[18]

This is particularly relevant for the position of high-value tasks such as research and development and design. These 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 complicating matters is the industrial classification of the firm itself, discussed in more detail below.

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, and 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.[19] 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 (as are secondary activities that are separately identifiable when input-output tables are constructed on an industry by industry as opposed to product by product basis).

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 8.11A and B). 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.

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 materialize 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. These will instead materialize 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.

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 factory-less 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.

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).

3.4 A new perspective on the role of imports

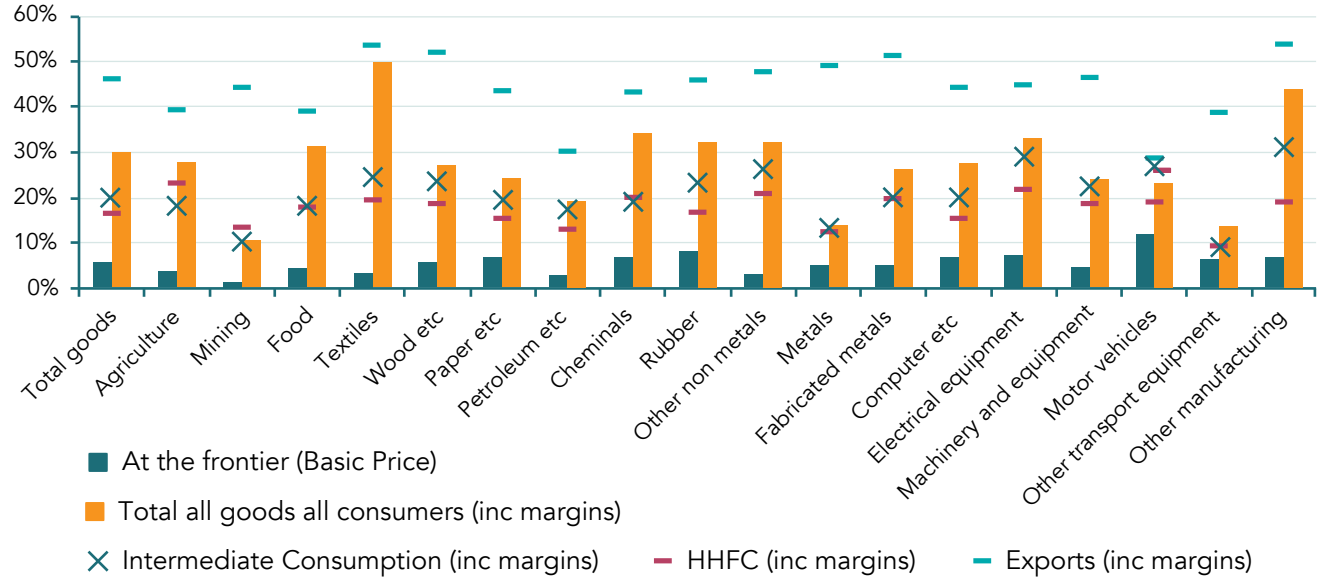
Another area, among many, where a purchaser's price perspective can provide an important complementary view to a basic price concept concerns the role of imports. One highly sensitive indicator produced in TiVA-type analysis is the domestic content of a country's imports, typically used to highlight the potentially counter-productive impact of tariffs as they may affect upstream domestic exporters. In the United States, the US content of its total goods imports amounts to, on average, 6% in recent years (Figure 8.17). 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.[20]

Conventional input-output approaches, using the basic price concept, de facto decouple and break the link between these costs and the imported good. But a purchasers' price approach treats the distribution services as integral, revealing, in turn, much higher US "dependencies" (or US "content") of 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%[21] 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.

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, and 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 8.18).

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 8.19). Unsurprisingly, the contribution is 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

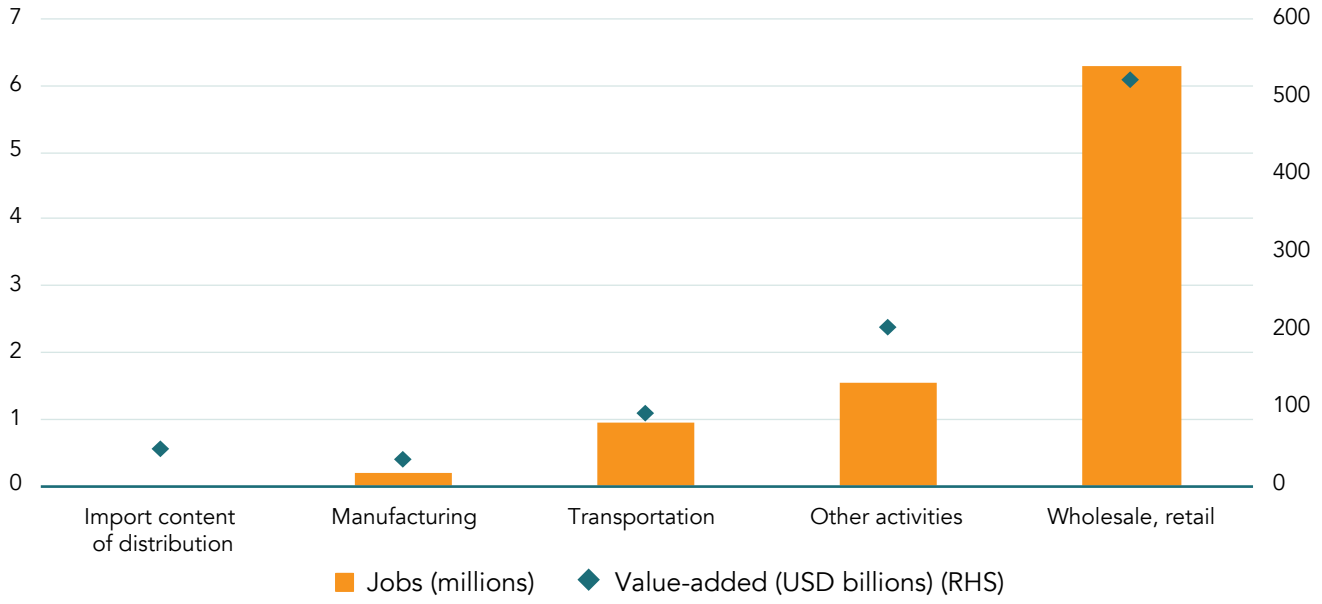
FIGURE 8.17 US value-added content of imports at the frontier (% of basic price) and as percent of consumer's price (excluding taxes) (2016)



Note: MHHFC, Household final consumption.

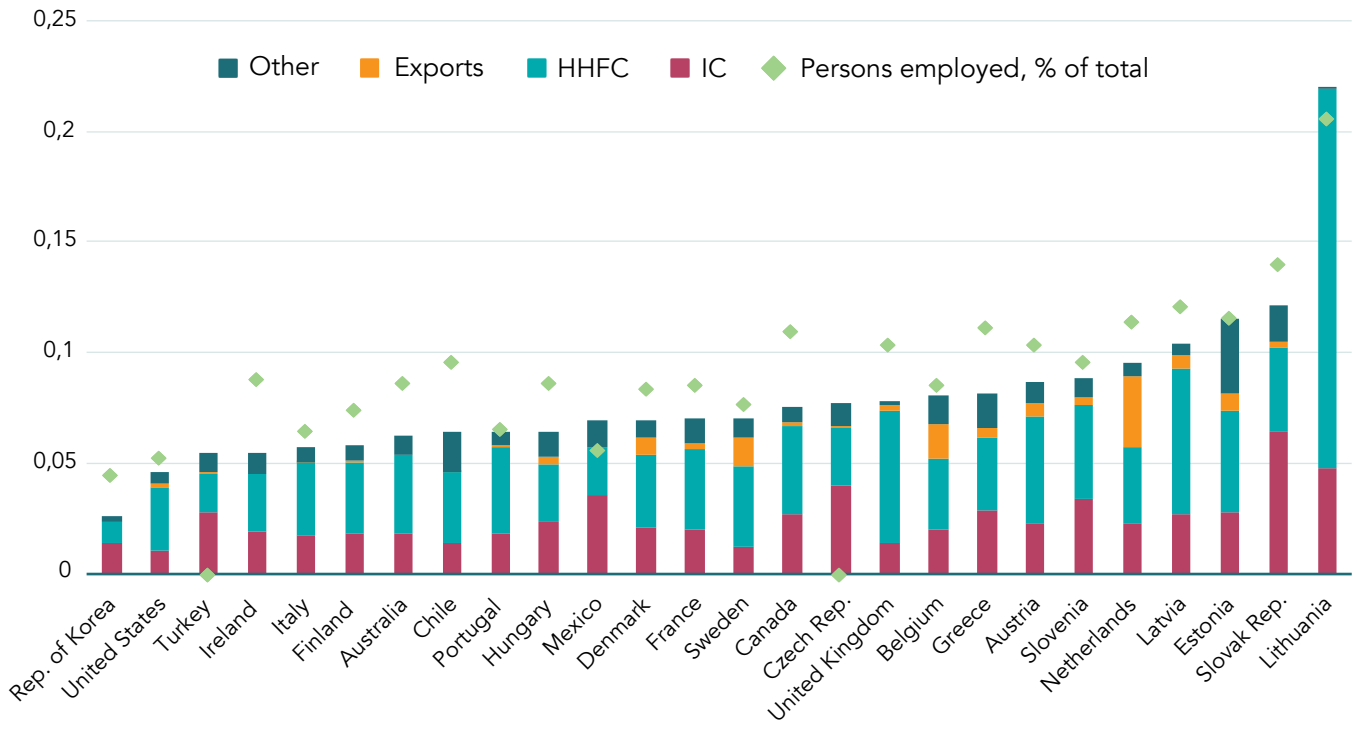
Source: Calculations based on OECD-WTO TiVA and OECD Supply-Use Table database.

FIGURE 8.18 Jobs supported and value added via sales and export of imports in the US, by source (2016)



Source: Calculations based on OECD-WTO TiVA, OECD Supply-Use Table database and OECD National Accounts.

FIGURE 8.19 Domestic value added generated and persons employed through sales of imports, by source of demand
% of GDP and persons employed



Note: Data for Australia are 2014, Austria 2012, Belgium 2010, Canada 2013, Chile 2015, Czech Republic 2017, Denmark 2014, Estonia 2014, Finland 2014, France 2014, Greece 2010, Hungary 2014, Ireland 2011. Italy 2014, Republic of Korea 2010, Lithuania 2014, Latvia 2010, Mexico 2013, Netherlands 2014, Portugal 2013, Slovak Republic 2012, Slovenia 2015, Sweden 2015, Turkey 2012, United Kingdom 2010, United States 2016.
Source: OECD Supply-Use table database and OECD-WTO TiVA and OECD National Accounts. HHFC: household final consumption. IC: Intermediate consumption.

services related to re-exports, accounting, for example, for over 3% of GDP in the Netherlands. Total persons employed[22] (providing distribution and upstream services) are generally higher than shares of GDP, reflecting the lower labor productivity[23] seen in the distribution sector compared to other activities in the economy.

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. This would, in turn, reduce value added generated and jobs sustained through distribution activities related to the sale of imports.

3.5 Developing market-price input-output frameworks

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. However, care is needed in their interpretation.

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 with distribution services or because they are performed in-house by manufacturers) nor on the actual positions of various activities within value chains.

In addition, basic price decompositions can also introduce asymmetric results for 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. 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) would also be excluded. 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[24]). As such, even if the assembly costs in Mexico and China were identical and the shipping route (i.e. Republic of 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.

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. That is, 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. However, the same distribution services used to ship the product to the country's frontier before it is finally consumed will not be recorded in the home-country's content of imports (the difference between the C.I.F. and the basic price), nor (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 8.17) for complementary insights based on the purchasers' price.

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. Even here, however, while the basic price concept is better it 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, and the difference as shown in Figure 8.11 above can be significant.

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 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).

Developing such a complementary view in practice is, however, far from trivial (see Ahmad 2019, forthcoming). It would, in effect, require a very different presentation of the role of distributors in the accounting framework. They would be shown either as providers of intermediate services, resulting in changing the value of output of industries from basic prices to purchasers' prices (excluding taxes on products), or they would be shown as purchasers of the goods they sold. Thus, 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.

4. Conclusions

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 C.I.F. or F.O.B.).

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.

Notes

1. This chiefly relates to the fact that no statistical information system in the world actually has this information for all firms (by product produced and consumer) but even if this were the case, the need to preserve confidentiality of respondents to statistical business surveys, would make it impossible to release such firm-level data for public consumption.
2. http://www.oecd.org/daf/inv/investment-policy/trade-investment-gvc.htm
3. Albeit a relocation that satisfies the accounting rules regarding economic, as opposed to legal, ownership. See the 2008 System of National Accounts.
4. It also includes taxes and subsidies on production.
5. Not all labor compensation will necessarily stick in the economy, for example for cross-border workers.
6. Such as land and other intangible assets not recognised as Intellectual Property Products in the SNA.
7. http://www.cso.ie/en/csolatestnews/pressreleases/2017pressreleases/pressstatementmacroeconomicreleasesyear2016andquarter12017/
8. See Ahmad and Araujo 2011 "Measuring Trade in Value-Added and Income using Firm-Level data". Available at: http://siteresources.worldbank.org/INTRANETTRADE/Resources/Internal-Training/287823-1256848879189/6526508-1283456658475/7370147-1308070299728/7997263-1308070314933/PAPER_8_Ahmad_Araujo.pdf
9. Where results have been generated using national tables only – in other words the domestic content of imports is recorded as zero.
10. http://www3.inegi.org.mx/sistemas/tabuladosbasicos/LeerArchivo.aspx?ct=44462&c=33654&s=est&f=4
11. http://scholar.harvard.edu/files/jorgenson/files/4a.1_paper.pdf
12. See the 2008 System of National Accounts
13. 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 merchant acquires and sells the goods differ, in which case margin ratios in the period when the goods are acquired will be biased upwards as the acquired goods will appear as a negative export).
14. 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 8.13 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.
15. 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 is based on the partner shares observed for actual direct imports (and also, often, as part of the balancing process, exports) of these same services.
16. Dedrick, Kraemer, Linden (2008): "Who Profits from Innovation in Global Value Chains? A Study of the iPod and notebook PCs".
17. Mudambi, R. (2008). "Location, Control and Innovation in Knowledge-Intensive Industries". Journal of Economic Geography, 8(5), 699-725.
18. 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.
19. See also Chen, Los and Timmer (2018), *Factor Incomes in Global Value Chains: The Role of Intangibles, NBER Working Paper, 25242*, which attempts to estimate the underlying contribution made by intangibles.
20. 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 trillion 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 input-output tables.
21. 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.
22. Note that persons employed rather than jobs (as in Figure 8.18) are shown here as fewer countries provide estimates of jobs by activity
23. Labor 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 number of individuals dependent on sales of imports.
24. 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.

References

Ahmad, N and S. Araujo (2011) "Measuring Trade in Value-Added and Income using Firm-Level data".

Ahmad, N and J. Ribarksy (2014), "Trade in Value Added, Jobs and Investment"

Ahmad N, (2018), "Accounting for Globalisation: Frameworks for Integrated International Economic Accounts"

Ahmad, N. (2019), "A new look at Trade in Value-Added and Global Value Chains: A view from the Consumption Perspective" OECD Statistics Working Paper, forthcoming.

Chen,W, B.Los and M.Timmer (2018), "Factor Incomes in Global Value Chains: The Role of Intangibles", NBER Working Paper, 25242,

Dedrick,J, K.Kraemer, and G.Linden (2008): Who Profits from Innovation in Global Value Chains? A Study of the iPod and notebook PCs.

De La Cruz, J. R.Koopman, Z.Wang and S.Wei (2011) "Estimating Foreign Value-Added in Mexico's Manufacturing Exports"

Degain, C, B.Meng and Z.Wang (2017), "Recent trends in global trade and global value chains", Global Value Chain Development Report (2017), Chapter 2

Fetzer, J, T. Howells, L.Z Jones, E.H. Strassner, and Z.Wang (2016) "Estimating Extended Supply-Use Tables in Basic Prices with Firm Heterogeneity for the United States: A Proof of Concept", paper prepared for the the Fourth World KLEMS Conference Madrid, Spain

Miao, G and F. Fortanier (2017), "Estimating Transport and Insurance costs of International Trade" OECD Statistics Working Paper, No. 80

Mudambi, R. (2008). Location, Control and Innovation in Knowledge-Intensive Industries. Journal of Economic Geography, 8(5), 699-725.

Ming Y, B. Meng, and S.Wei (2015), "Measuring Smile Curves in Global Value Chains" IDE_Jetro Discussion paper, 530.

Saborío, G.M. (2015), "Costa Rica: An Extended Supply-Use Table". Paper prepared for 23rd IIOA Conference México City.

Statistics Denmark: Nordic Countries in Global Value Chains (2017)

United Nations (2009): System of National Accounts, 2008.