

Introduction and Overview

Challenges of Globalization in the Measurement of National Accounts

Nadim Ahmad
Brent Moulton
J. David Richardson
Peter van de Ven

The content of this conference volume is in some ways a return to the roots of the Conference for Research in Income and Wealth (CRIW), and in others a needed modernization of the national accounting framework that has grown from those roots.

The primal concern of the CRIW in its early years in the late 1930s was measurement:

1. measurement of economic activity within a space and over time, and of how the fruits of economic activity were distributed among groups of workers and resource-owners in that space and time, and
2. measurement of economic activity between spaces and over time periods.

Those measurement concerns remain central today and are reflected in the current international statistical standards, such as *System of National Accounts 2008* (2008 SNA), as well as in the update to these standards that is currently underway [European Commission et al., 2009; United Nations Statistical Commission, 2021]. But the environment in which measurement concerns are addressed has changed in fundamental ways, many of which relate to varieties of globalization.

The first “environmental” change is that the categories of “space” have expanded to include corporate space as well as geographic space. In some sense, that was always true, but in the modern era corporate and geographic space no longer co-vary or overlap as tightly as they once did. For example, traditional geographic measurement may miss or mismeasure cross-border economic activity when it comes to activities of multinational enterprises (MNEs).¹ Furthermore, it is less-and-less meaningful to differentially measure “our” (domestic) multinational corporate activity from “their” (foreign) multinational corporate activity. Modern MNEs have owners and stakeholders, such as employees and subcontractors, spread around the world.

The second environmental change is that inputs into the production of goods and services are increasingly sourced abroad. While it has long been the case that raw materials have been sourced from around the world, it is more recent that manufacturing processes have become fragmented and specialized with extensive supply chains that combine many components, often supplied from many countries. These fragmented supply chains have rendered some traditional measures of bilateral trade misleading and have led to the development of new ways of summarizing trade flows, such as trade in value added [Ahmad (2015)].

The third environmental change is that the long-lived input that we call “capital,” that links economic activity over time in a variety of conceptions, has become increasingly intangible [Haskel and Westlake (2018), Corrado et al. (2009)]. Intangibility, however, is not its most important trait for this conference volume. What really matters in the chapters that follow is that

¹ See Baldwin, Lipsey, and Richardson (1998) for an early consideration of issues and for additional citations.

intangible capital is nearly perfectly mobile across space (“footloose”), and that intangible capital is a non-rival collective input to its owner. That is, its use in one of its owner’s spaces does not heighten its scarcity in other spaces. How to value such non-rival capital—for tax reasons as well as more conventional reasons—has much in common with valuing public goods, such as military security and orderly institutions, that are prototypically non-rival and “owned by everyone.”

Intangible capital’s mobility correspondingly challenges our ability to conceive and identify its exact location; to what space or country does it “belong”? Perhaps to all spaces in which it is used? If so, then its global value may come close to the sum of the various national values where it is employed on behalf of its global multinational owner.

Modern multinational corporate research and development (R&D) provides an illustration of this third change and its measurement challenges.² Branstetter et al. (2019a,b) describe the proliferation of US-MNE-owned R&D affiliates abroad, all generating innovation that gets added to the MNE parent’s productive-though-intangible capital stock. But it is equally available to the same MNE’s affiliate abroad, which is not deprived of it (nor therefore is its country of residence deprived). One of their figures shows a strong and intriguing correlation between a typical affiliate’s own patenting—an indicator of its own innovation—and the concentration of the U.S. parent’s other affiliates in India, Israel, Japan, and a handful of high-innovation host countries.³

All this can render dubious familiar, yet simple-minded, measures of formulary apportionment discussed in several chapters below. It also complicates rules for imputing ownership of MNE intangible capital, and challenges statisticians to creatively consider innovations in methods of apportionment and imputation.

Underlying Measurement Challenges

The first group of chapters focuses on the organization of MNEs, the problems associated with establishing their residence and their economic ownership of intangible assets, and the implications of those problems for economic measurement. The problems are three-fold. Over the last three decades, the largest MNEs have grown in size and extent, representing a much larger and more important share of global economic activity than formerly. Digitization has amplified the importance of intangible assets—not only computer software and databases, but also R&D and designs for high-tech products, as well as entertainment and artistic intellectual property that can be easily streamed or otherwise distributed around the globe. And the adaptation of the international statistical standards to these developments, as reflected in the capitalization of most of these newer forms of capital, has resulted in national accounts that are quite sensitive to the residency of MNEs and the assignment of economic ownership to intangible capital.

This volume opens with “Addressing the Challenges of Globalization in National Accounts” by Brent R. Moulton and Peter van de Ven, which provides a broad overview of the measurement challenges associated with globalization. It examines the difficulties associated with applying the concepts of residency and economic ownership to MNEs and their intangible assets. It reexamines long-standing problems with transfer prices within a multinational group when there

² Supra-national government-sponsored and owned R&D illustrates in the same way. See Chapters 13 and 14 by De Haan and Hayne and by Ker, et al. below.

³ Branstetter et al. (2019b, Figure 9, p. 14). Their affiliate-level regression explaining its number of patents controls for its own R&D spending, its specific U.S. parent, and the year of observation.

are no market equivalent prices to which they can be compared. It looks at the financial risks and vulnerabilities that may be disguised by intra-firm financial connections.

The chapter concludes with an extensive discussion of possible ways to address the measurement challenges described in the paper. Some of the suggested remedies are available within the current economic guidelines, while others would require going beyond the guidelines of the current 2008 SNA. Most, or all, of these remedies will require the development of new data sources and mechanisms for exchanging individual data on MNEs across countries. These mechanisms will require the development of legal frameworks for exchanging data for statistical purposes. Statistical practices will need to adapt to meet the challenges of the increasingly globalized real economy.

In his discussant comments, Marshall Reinsdorf endorsed the need for more communication and better documentation to enable users to interpret the standards and supplementary data. He also agreed that consideration should be given to possible changes in the SNA that might assign intellectual property assets and profits in a manner that is more reflective of economic activity and less driven by taxation rules. Such changes, however, would “require international cooperation to overcome source data obstacles.” He also suggested that, if possible, accounting rules that would pass through retained earnings of corporations to their shareholders should be considered.

European statisticians, policy makers, and data users were taken aback when Ireland reported that its real GDP increased more than 25% in 2015, due to the relocation of MNE headquarters and intellectual property product into the country. Silke Stapel-Weber, Paul Konijn, John Verrinder, and Henk Nijmeijer of Eurostat explain how new indicators may be needed to isolate domestic developments in a highly globalized context in their chapter, “Meaningful Information for Domestic Economies in the Light of Globalization – Will Additional Macroeconomic Indicators and Different Presentations Shed Light?” They describe the development of the EuroGroups Register—a statistical register covering 110,000 MNE groups operating in Europe.

To focus the presentation of statistical data on domestic activities, Stapel-Weber et al. suggest that certain existing series such as adjusted disposable income of households may be featured more prominently. They also suggest splitting the nonfinancial corporations sector into subsectors of domestically operating corporations and affiliates of multinational enterprises. They also consider developing an adjusted measure of gross national income that excludes the retained earnings of companies that are mainly owned by foreign investors and the depreciation of foreign-owned capital. An empirical comparison of EU countries shows that while Ireland is an important outlier, these globalization issues also affect the interpretation of national accounts figures of other countries.

“National Accounts for a Global Economy: The Case of Ireland” by John Fitzgerald sits prominently as an exemplar of issues not only for Ireland, but for the world and for this whole volume. In Ireland, as well as in some other MNE-friendly countries like the Netherlands, the issues are quantitatively arresting. Elsewhere, the issues are still vital to understanding, using, and comparing national accounts meaningfully across countries, though their quantitative impacts are more modest.

Not only did measured Irish GDP rise by over 25% in 2015, but the Irish stock of productive capital rose by 40% as non-Irish MNEs moved headquarters and intellectual property capital into the country. In addition, because of the SNA’s treatment of global production arrangements, Irish GDP included the value added generated by the production of goods that were the result of Asian contract manufacturing. Irish exports of services associated with the movement of intellectual property capital, through licensing and leasing, were especially large in the

pharmaceutical and aircraft industries, causing equally astounding measures of change in the Irish current account.

Following the principle that the most natural constituents for measures of Irish GDP and trade are Irish-resident persons and firm owners not affiliated with foreign MNEs, Fitzgerald shows that the impacts on them were far smaller and needed considerable supplementary measurement (denoted with an asterisk, reminiscent of athletic record accomplishments).

Fitzgerald's generalization of these findings beyond Ireland is that most users of national accounts data are lost without separate, parallel, comparable, twin measures of economic activity for MNEs and for "strictly domestic" economic activity, illustrated in his Table 6 for Ireland during 2013–2018, albeit in non-deflated nominal measures. An important takeaway from that discussion is that MNE operations contribute disproportionately more to Irish value-added than they do to Irish income (NNI), a provocation for users who fret about trends in inequality.

Fitzgerald's chapter is cornucopia as well as exemplar, a cornucopia of essential ingredients for this volume, if not fully refined or blended or digested for countries beyond Ireland.

In his instructive and colorful discussion, Tebrake amplifies and memorably illustrates Fitzgerald's main points (e.g., he conjures up an Irish super-star app developer who the statisticians must track). Toward the end he raises the idea of an Irish-resident-owned aggregate that he calls gross owned product (GOP). Such a measure might be especially useful for countries with disproportionately concentrated ownership of MNEs.

Echoing Stapel-Weber et al. in Chapter 2, Tebrake observes that "the bigger issue that needs to be addressed by national statistical offices is consistency in measurement – we need to tell a global story to achieve consistency and cross-national comparability, but we are still using national collection tools and national data. ... We need a fundamental shift in how we collect data from large MNEs." In contrast, Fitzgerald's implicit approach is to encourage a thousand flowers to bloom at the national level to enlighten data users about nationally distinctive issues (e.g., aircraft leasing for Ireland).

Maria Borga and Cecilia Caliendo, in "Eliminating the Pass-Through: Towards FDI Statistics that Better Capture the Financial and Economic Linkages between Countries," focus on a longstanding traditional measure of MNE presence, foreign direct investment (FDI). FDI measures yearly ownership additions of one country's residents in another country's firms, where such additions are in equity that conveys and reflects corporate control. FDI traditionally is an important component of long-term investment by one country in another.

But FDI measures are a far cry from Fitzgerald's measures of MNE contributions to a nation's (Ireland's) GDP and current account. L. Kamran Bilir makes this point right at the beginning of her discussion. And the ensuing general discussion noted that traditional FDI accounting reveals little about characteristics of MNE operations such as shares of value added, payrolls, and capital formation by industry.

FDI accounting can be improved, as Borga and Calliandro demonstrate.⁴ Their two interrelated frontiers of FDI measurement are first, how to identify or measure the ultimate owners of cross-border equity by tracing through global chains of holding-company equity to the foundational equity owners and their country of residence, and second, how to distill inter-company financial borrowing and lending along the ownership chains, often through company-owned financial sub-

⁴ They build on FDI measurement developments pioneered for decades by the Organization for Economic Cooperation and Development (OECD).

companies called special purpose entities (SPEs). Though the authors provide valuable guidance, its relevance for measuring economic activity in a domestic economy is more distant. For example, though the MNE headquarters that Ireland welcomed in the 2000s are a sort of “headquarters SPE,” Borga’s and Caliandro’s focus is on netting them out of traditional FDI measurement, rather than on measuring their effects on national income and product.

The next three chapters of this volume refocus on a key part of national income, corporate profits, as affected by the ownership chains and SPEs of the previous two chapters. In environments with large numbers of MNEs, corporate profits can easily be “shifted”—assigned and re-assigned by company accountants to their affiliates abroad or to the MNE parent in response to tax and regulatory incentives. Strategic pricing of intra-company transactions is an obvious way of doing so,⁵ but advantageously assigning the residence of an MNE’s intangible capital is a growing alternative (see the discussion of Chapters 12–14 below).

Jennifer Bruner, Dylan G. Rassier, and Kim J. Ruhl, in “Multinational Profit Shifting and Measures throughout Economic Accounts,” focus illustratively on measurement of United States MNE corporate operating surplus in 2014. Their measurements of “what might have been” if the MNEs had allocated their operating surplus differently from their actual arrangements that involved profit-shifting are dramatic.⁶ Aggregate U.S. operating surplus would have been 3.5 percent higher, and U.S. GDP 1.5% higher, than conventionally measured. Consequently, labor income shares would have been correspondingly lower.

Using unpublished firm-by-firm data for U.S. MNEs, the authors reassign operating surplus by a formula that re-weights each affiliate’s reported operating surplus by an average of the affiliate’s employee compensation and its nonaffiliated (non-intra-company) sales, each expressed as a share of the whole MNE’s compensation and sales. They essentially force an MNE’s profits to reflect its payrolls and sales among the countries in which it operates. They view the specific choice of their two weights as natural, not exclusive, because the weights reflect the concerns of national income and product accounting. They would be open to alternative weights and formulas because their purpose is to show how quantitatively large and misleading is naïve reliance on current MNE corporate accounting, albeit legal from a statutory perspective.

Redding’s discussion invites such alternative weights and types of averages, all in the spirit of seeing how robust their quantitative calculations are. He also recommends additional checks of robustness by assessing the computations by industry and affiliate location—do their formulas create the largest differences where we might expect them, e.g., in industries with large amounts of intangible capital and in host countries renowned for being tax havens?

Derrick Jenniges, Raymond Mataloni, Jr., Sarah Stutzman, and Yiran Xin, in “Strategic Movement of Intellectual Property within U.S. Multinational Enterprises,” focus on U.S. regulations governing parent-affiliate cost-sharing agreements (CSAs).⁷ Using a sample of 237 MNEs that are especially dependent on R&D inputs, they confirm that U.S. MNEs relocate and reduce corporate taxes. But, as Jensen observes in his discussion, their ambition is rather narrow—they make no attempt to estimate the aggregate size or impact of CSAs. And, as Jensen noted in the discussion, they leave important measurement questions unanswered: “For example, it would be useful to show that CSAs are more prevalent in R&D-intensive firms and industries, and by how much. Another important fact to document is whether low-tax affiliate jurisdictions are more intensive in MNEs with CSAs than others and, if so, by how much. Last, it

⁵ See Bernard et al. (2006).

⁶ Redding finds them large in his discussion. They build on similarly large calculations of US productivity effects using the same re-apportionment formula by Guvenen et al. (2017).

⁷ Sadly, Raymond Mataloni Jr. has passed away since the conference took place.

would be very helpful to show that the large multinationals with large R&D stocks but with no CSAs are, somehow, unusual outliers.”

“The Relationship between Tax Payments and MNE’s Patenting Activities and Implications for Real Economic Activity: Evidence from the Netherlands” by Mark Vancauteran, Michael Polder, and Marcel van den Burg is less about macroeconomic measurement and more about microeconomic forensics. Using a panel of micro-data for Dutch-resident innovating firms, including MNE affiliates, over two subperiods since 2000, they find that firms facing low corporate tax rates to stimulate innovation are marked by two performance premiums. First, they patented more and “better” than other firms. And second, they generally enjoyed better labor- and R&D- productivity⁸ performance than other firms. These results are a reminder that even after measurement is refined, many important economic questions remain to be answered. This chapter’s specific question is whether policies that lower Dutch taxes on corporate innovation (by both MNEs and local firms) may be justified by the boost to innovation that they generate. If so, and if so for other countries to which MNEs shift profits, then attempts to reign in profit-shifting and the MNEs that practice it may discourage economic growth, possibly even global growth.

Global Value Chains for Intermediate Products

The next group of chapters looks at a set of issues around the lengthening of global value chains. A half century ago, it would not have been unusual to think of trade as flows largely consisting, on the one hand of raw agricultural and material commodities and, on the other hand of finished products that were destined for use in final consumption or capital formation. But with improvements in technology, reduced costs of transport, and opening of trade barriers, the supply chains for manufacturing now often entail a wide variety of intermediate products from many countries reflecting multiple stages of processing. The globalization of supply chains has adversely affected the usefulness of the traditional industry data provided in the national accounts, such as supply and use tables (SUTs). The analysis of input-output relationships based on national statistics necessarily hits a wall when intermediate products are imported or exported. Statistical agencies have made various attempts to provide more information to fill in the blanks—for example, foreign affiliate trade statistics (linking trade to the activities of MNEs) and trade in value added (linking the SUTs of many countries and identifying trade in terms of value added rather than gross flows). While these sources have revealed important information that isn’t apparent in traditional trade statistics, they also have their limitations in that traditional SUTs are not designed to identify or highlight the activities of multinational enterprises (MNEs). So additional information is desired to understand the changing relationship between inputs and outputs in the face of globalization.

In “Accounting Frameworks for Global Value Chains: Extended Supply-Use Tables,” Nadim Ahmad observes that the additional information that analysts desire needs to supplement the information from the traditional supply and use tables (SUTs), so he suggests a set of extended SUTs. The first part of his chapter provides an extensive menu of possible extensions, along with explanations of why each extension may be useful. For example, a relatively simple extension is to separately identify goods processing transactions (that is, manufacturing services arrangements in which a processor does not own the material inputs or the output that is being processed) from those not involving processing. Another example is an extension that separates production taking place within a free trade zone from that taking place outside those

⁸ They measure R&D productivity by patents per Euro of R&D spending.

zones.⁹ Ahmad addresses several practical difficulties associated with some of the possible extensions to the SUTs, such as difficulties in blending data from different sources and involving different statistical units. His chapter also provides examples of extended SUTs from several countries, including China, Mexico, the United States, Costa Rica, Canada, and five Nordic countries. While it would not be practical for a statistical agency to pursue all, or even most of the extensions presented in this chapter, it is nevertheless useful to understand the set of options that might be undertaken in a particular implementation.

A sophisticated and interesting example of this methodology is provided by “Accounting for Firm Heterogeneity within U.S. Industries: Extended Supply-Use Tables and Trade in Value Added Using Enterprise and Establishment Level Data” by James J. Fetzer, Tina Highfill, Kassu W. Hossiso, Thomas F. Howells III, Erich H. Strassner, and Jeffrey A. Young. They estimate extended SUTs for the United States that account for two types of firm heterogeneity: type of ownership (MNEs and non-MNEs) and firm size. Most analytical uses of input-output relationships rely on an assumption of homogeneity in the technical coefficients, but globalization has made homogeneity less common. The chapter shows that accounting for the type of ownership and the firm size is useful for reducing heterogeneity in the value-added share of production, thereby providing more useful estimates. The compilation primarily combines data from the U.S. SUTs with BEA survey data on the activities of multinational enterprises (AMNE); several additional Census Bureau datasets were also utilized. Because the SUTs are based on establishment data, while the AMNE data are compiled for enterprises, adjustments had to be made to convert the enterprise data to an establishment basis. For semiconductors, the estimates used Census of Manufactures microdata that were linked to BEA AMNE surveys—an important proof of concept of the benefits building the estimates up from the microdata. They found that value added as a share of output is highest for U.S. MNEs and lowest for foreign MNEs. Their results provide evidence that firm heterogeneity in both ownership and firm size matters in measuring industrial production.

In discussant comments, Susan N. Houseman recommends that caution is needed if the estimates from this chapter are used to compare productivity between MNEs and non-MNE establishments. Implicitly, comparisons of labor productivity across establishments are based on assumptions that production functions are homogeneous—an assumption that is almost certainly incorrect. Just as MNEs and non-MNEs use different imported inputs, they also are different in the stages of production that they engage in. MNEs are more likely to outsource stages of production to nonresident affiliates or producers.

In “The Role of Exporters and Domestic Producers in GVCs: Evidence for Belgium Based on Extended National Supply-and-Use Tables Integrated into a Global Multiregional Input-Output Table” by Bernhard Michel, Caroline Hambÿe, and Bart Hertveldt, heterogeneity is addressed by identifying export-oriented and domestic market firms. The authors combine Belgian SUTs and input-output tables with firm-level data that allow them to disaggregate the tables. In a subsample of larger firms, they identify firms with an export-to-turnover ratio of at least 25% as export-oriented. The data are then balanced to ensure consistency with the aggregated data in the standard SUTs. The extended SUT for Belgium are then linked to a global multiregional input-output table for the same year from the World Input-Output Database. They confirm that there is heterogeneity between export-oriented and domestic market firms. Export-oriented firms have a lower ratio of value added to output and a higher share of imported intermediate inputs.

⁹ Saborío and Torres (2018) discuss how to estimate extended SUTs that focus on the role of free trade zones for Costa Rica.

Their work also illustrates that for a smaller country, such as Belgium, the sample sizes may sometimes be inadequate to estimate the desired splits at the most detailed industry level.

Bart Los and Marcel P. Timmer, in “Measuring Bilateral Exports of Value Added: A Unified Framework,” return to the measurement of trade in value added. The general idea can be illustrated by a production process involving four countries and three stages of production. Country A produces a raw material valued at 1, which it exports to Country B; B produces an intermediate product valued at 2, which it exports to C; and C produces a final product valued at 3, which it exports to D, which consumes it. Countries A, B, and C each produce value added of 1, but only in Country A does that match its gross exports. Country C produces value added of 1 and exports 3. Los and Timmer are looking for measures of value added that are relevant for measuring bilateral trade flows, so they can answer questions like “which countries are most important in demanding the value-added content of a country’s exports?” They discuss three types of measures, which focus on (a) value added for direct use, (b) value added for the final stage of production, and (c) value added for final consumption. In the example, the Country A’s value-added exports are with Country B for the direct use measure, with Country C for the final stage of production measure, and with Country D for the final consumption measure. They apply these concepts with an empirical example based on data from the World Input-Output Database.

Globally Intangible Capital

“A Portrait of US Factoryless Goods Producers” by Fariha Kamal ties together the concerns about the geographical location of production discussed in the last section with the problem of measuring the role of intangible R&D in production, which will be the focus of this section. The chapter is rooted in firm-level microeconomics with implications for macroeconomic measurement.

It characterizes American factoryless goods producers (FGPs). FGPs are a type of firm in the value chain whose outputs are almost entirely intangible—principally management, design, and coordination of other commercial establishments. In some cases, there are other establishments that reside within the same national boundary as the FGP, but they often reside abroad. These other establishments may or may not be affiliates owned by the FGP.

The macroeconomic significance of such firms is revealed in two comparisons, comparisons that also hold for a less extreme “hybrid” form of manufacturing firm.¹⁰ First of all, FGPs have larger shares of “high-end” employees and of intellectual property (intangible capital) relative to both traditional manufacturing firms and generic services firms. Relative to other firms, they perform more R&D and patent more. Secondly, they are younger and rely more on imports—and implicitly, exports—than other firms do. They are obviously an extreme type of firm born of fragmented value chains that are themselves globalized. But they are just as obviously dynamic contributors to a country’s aggregate economic growth and its stock of desirable jobs and globally deployable intangible capital.

Classifying, measuring, and evaluating firms and their respective industry aggregates along globalization and fragmentation continuums is an ongoing challenge for statistical communities and researchers world-wide. The challenges include valuation of a firm’s own intangible capital, which can be shared or licensed across national boundaries without depleting the stock that

¹⁰ Hybrid manufacturing firms outsource and offshore many, but not all, manufacturing activities, relative to traditional manufacturers.

remains, and consistent measurement of the exports and imports of such intangible capital. These are also the concerns of the closing chapters of this volume, as illustrated by R&D.

Mark de Haan and Joseph Hayne, in “R&D Capitalisation: Where Did We Go Wrong?” diagnose the central concern of the last group of this volume’s papers, how to measure gross domestic product and national income in a globalized world where a large and growing share of capital and capital formation is intangible—specifically R&D. The diagnosis includes the following challenges:

1. geographically locating such infinitely mobile capital and its ultimate owners,
2. valuing it in cases where its availability to the last user does not diminish its availability to the next (the classic collective-goods trait), and
3. employing the answers to 1 and 2 to assign capital services and income measures to the jurisdictions that host the owners and users (sometimes licensees, more often MNE affiliates) of the capital.

The chapter gives few detailed prescriptions for what to do about the diagnostic challenges it so succinctly summarizes. Michael Connolly observes in his discussion that “this is a concept paper, so the practical difficulties associated with the implications of the authors’ recommendations are not fully explored.” Notwithstanding this lacuna, practical implementation is urgently urged for statistical agencies and communities since R&D and all intangible capital are growing globally as a share of total capital. And the chapter provides a rich array of illustrative case studies (Samsung, Philips, Apple, Nike, and Google-Ireland/Google-Netherlands/Google-Bermuda) as well as suggestive conceptual parallels. Among the latter, the most important is a comparison of R&D to infrastructure investment and their often-differing capacities for nailing down ownership and corresponding income streams.

In their otherwise comprehensive treatment, the authors spend hardly any time on the mushrooming frequency of MNE R&D that is “public-within-the-firm” and undiminishable to any part of the MNE in its global use/application. A statistician compiling national accounts for a country that hosts such MNE affiliates must decide on what part (none? all? some proportional-yet-arbitrary share?) of the MNE’s cumulative R&D “belongs” in the country and its statistics. The measurement challenge almost begs for satellite accounts reflecting alternative coherent approaches. This rich chapter includes much more on related issues, e.g., corporate vs. national accounting differences, how to think about depreciation of R&D capital, national tax policy and MNE corporate tax planning.

“Capturing International R&D Trade and Financing Flows: What Do Available Sources Reveal about the Structure of Knowledge-Based Global Production?” by Danial Ker, Fernando Galindo-Rueda, Francisco Morris, and John Jankowski extends the previous chapter’s discussion. Focusing also on R&D, it uses the so-called Frascati methods described in OECD (2015) to add measurements of its cross-border trade and ownership. These methods complement those in the familiar SNA approaches, but they also, all too frequently, contradict them quantitatively.¹¹

Compared with the chapter by de Haan and Haynes, this chapter’s scope and time coverage is wide. OECD-member data for 1995–2015 on R&D production (“performance”), exports and imports (services trade, licensing), and funding sources are all discussed and presented in tabular cross-country comparisons. The dry term “funding sources” obscures the chapter’s interesting detail on MNE R&D compared to aggregate national R&D, on R&D trade among

¹¹ See especially the chapter’s discussion of its Tables 1 and 2.

MNE affiliates and arms-length R&D trade, and on patents and ultimate (beneficial) ownership of R&D services. Bilateral nation-to-nation counterparts to all these data are also discussed, showing even larger-than-usual divergences between one country's exports of R&D to another in its own data and the receiving country's corresponding imports of the same.

One of the chapter's most intriguing, though tentative, conclusions is that R&D production is becoming less concentrated within countries, leading to a growing decoupling of R&D production and its use and application. This is exactly what we might expect as R&D becomes increasingly "globalized," the phrase the authors use recurrently in their chapter text but not in its title.

Concluding remarks and recommendations for the way forward

During the past decades, the world economy has changed dramatically. Global production arrangements have grown significantly, although the COVID-19 crisis and growing geopolitical tensions may have led to a refocus on international interdependencies and just-in-time deliveries. In addition, the ever-increasing intangible nature of capital has led to capital and related production becoming less tied to geography. MNEs looking for opportunities to minimize their global tax burden can create worldwide fiscally advantageous constructions, including the use of SPEs and transfer pricing, with the result that the allocation of output and value added to countries has become far more challenging. This volume has demonstrated with various examples the challenges that these changes have created and the resulting direct impacts on the measurement of GDP and national income.

The volume includes several proposals to address the measurement challenges. Within the context of the current international standards for compiling national accounts, one can distinguish five ways forward:

- Focus on other indicators in addition to GDP. The tax-motivated allocation of output and value added across countries directly affects GDP, as well as the measurement of capital stocks and services of intangible assets. Other macroeconomic indicators, such as net national income (NNI) and household (adjusted) disposable income, are far less affected by the way in which MNEs have organized their production processes.
- Include further breakdowns in supply and use tables and institutional sector accounts. Here, a delineation of MNE-activities, both foreign and domestic MNEs, may support a better understanding of what exactly drives the domestic economy.
- Invest in arriving at better international consistency of data on MNEs. The exponential growth of international interdependencies, including the frequent changes in the global production arrangements, have resulted in numerous inconsistencies in the recording of international flows and stocks. As some examples in this volume have shown, this can even lead to output and value added not being recorded at all. The international inconsistencies can be addressed, at least to a certain degree, by improving international cooperation and coordination, such as the alignment of business register information for MNEs, and the international exchange of information on bilateral flows and stocks, especially in the case of large events such as mergers and acquisitions, relocation of activities, and corporate inversions.
- Invest in arriving at better national consistency of data on MNEs. National accounts are based on numerous source data: foreign trade statistics, balance of payments and international investment positions, data on the finances of corporations, production statistics, and the like. Often the information on MNEs that can be derived from these source statistics contain major inconsistencies. In many national statistical offices, so-

called “Large Case Units” have been set up to arrive at a more aligned recording of MNE activities in the domestic economy.

- Finally, alternative types of analysis can result in an improved understanding of developments in the domestic economy. They may also lead to an improved analysis of productivity and competitiveness of the national economy. An example is trade in value added, which looks at the domestic value added in the context of foreign trade instead of looking at gross trade flows.

However, one may also wonder whether changes in the current international standards could possibly result in improved measures of GDP, which better reflect economic substance, instead of basically following money flows which are governed by global tax considerations as currently the case. Some of the chapters in this volume include suggestions for possibly improving the international standards, such as consolidating SPEs or alternatively allocating operating surplus and intangible capital to countries. Notwithstanding the conceptual attractiveness of some of these proposals, the consensus of the participants in this conference appeared to have been very hesitant to introduce such rather dramatic changes in the international standards, first and foremost because of practical problems.

Many proposals would require a massive exchange of individual enterprise data across countries, which is currently impossible because of legal limitations on data sharing. An alternative solution would be to arrive at an internationally centralized collection of data on MNEs, which would then be distributed to the relevant national statistical offices. Whatever the case, it would thus require a paradigm shift in the (international) compilation of national accounts, including the organization of statistical processes across countries. For these reasons, statisticians across the globe tend to focus on the five ways forward presented in the above.

References.

Ahmad, Nadim (2015), “Measuring Trade in Value-Added and Beyond.” In Susan N. Houseman and Michael Mandel (eds.), Measuring Globalization: Better Trade Statistics for Better Policy, Volume 2. Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research.

Baldwin, R. E.; Robert E. Lipsey; and J. David Richardson, eds. (1998). Geography and Ownership as Bases for Economic Accounting. Chicago: University of Chicago Press for the National Bureau of Economic Research, Studies in Income and Wealth Volume 59.

Bernard, A.B., J.B. Jensen, and P.K. Schott (2006). “Transfer Pricing by U.S. Based Multinational Firms,” National Bureau of Economic Research Working Paper No. 12493, August.

Branstetter, Lee G., Brita Glennon, and J. Bradford Jensen (2019a). “The IT Revolution and the Globalization of R&D,” in Josh Lerner and Scott Stern, Innovation Policy and the Economy, Cambridge, MA: National Bureau of Economic Research.

_____. (2019b). “The Rise of Global Innovation by US Multinationals Poses Risks and Opportunities,” Peterson Institute for International Economics Policy Brief 19-9, Washington, D.C.: June.

Corrado, Carol, Charles Hulten, and Daniel Sichel (2009). “Intangible Capital and U.S. Economic Growth,” Review of Income and Wealth, Series 55, No. 3.

European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, and World Bank (2009), *System of National Accounts 2008*, New York, <https://unstats.un.org/unsd/nationalaccount/sna.asp>.

Guvenen, Faith; Raymond J. Mataloni, Jr.; Dylan G. Rassier; and Kim J. Ruhl (2017). "Offshore Profit Shifting and Domestic Productivity Measurement," Cambridge, MA: National Bureau of Economic Research Working Paper No. 23324.

Haskel, Jonathan and Stian Westlake (2018). Capitalism Without Capital: The Rise of the Intangible Economy. Princeton, NJ: Princeton University Press.

Organisation for Economic Cooperation and Development (2015). Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development.

Saborío, Gabriela and Rigoberto Torres (2018), "Costa Rica: Integrating Foreign Direct Investment Data and Extended Supply and Use Tables into National Accounts," paper presented at CRIW Conference: The Challenges of Globalization in the Measurement of National Accounts, http://conference.nber.org/conf_papers/f100627.pdf.

United Nations Statistical Commission (2021), "Report of the Inersecretariat Working Group on National Accounts," 52nd session, 1–3 and 5 March 2021, E/CN.3/2021/8, <https://unstats.un.org/unsd/statcom/52nd-session/documents/2021-8-NationalAccounts-E.pdf> .