

Global Value Chains and Economic Globalization

- Towards a New Measurement Framework



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For information on the background of Eurostat's work on global value chains and international sourcing, and related available statistics, please access via www.globalvaluechains.eu



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ABSTRACT

There is broad agreement that the world economy is becoming more deeply integrated and interdependent along multiple dimensions: economic, cultural and political. While one might expect cultural or political integration to be difficult to measure with precision, global economic integration has also proven resistant to detailed quantification and empirical characterization. We have a strong sense of profound changes in the world economy, and see signs of it everywhere, but cannot fully describe the new patterns and structures that are taking shape, not least because the official statistics at our easy disposal were created for other purposes and in simpler times.

Economic globalization is a dynamic, long-term historical process that ebbs and flows, waxes and wanes, and changes its character and extent over time, all with profound effects on countries in the trading system. Advances in information technology, better codification schemes, and improvements in transport and logistics increase the potential for the geographical fragmentation of work. Because of this, the potential for economic globalization appears to be increasing rapidly.

As it becomes more likely that value chains in large, economically important enterprises and industries will be spread across multiple countries, it is more difficult to conceive of national industries as self-contained systems and national economic performance as endogenous. The measurement and policy challenges posed by these changes are non-trivial. Thus, it is essential that the statistical resources to fully characterize and better respond to the process of economic globalization be put in place as soon as possible.

After an extended background discussion that maps the shift from simple internationalization to the more complex patterns of economic globalization that are developing today, Part I provides a conceptual framework for determining the data resources required, centered on Global Value Chains. Part II provides an assessment of existing and experimental resources in the European statistical system and identifies the data gaps. Part III emphasizes the use of micro-data resources as part of a plan for moving forward while expending the least resources. Part IV provides a vision for moving forward and a list of priorities and is followed by some concluding remarks.

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BACKGROUND

International trade and foreign direct investment (FDI) have long been important features of the world economy, and both have grown steadily since the end of World War Two. Peter Dicken (2011, p. 5) has referred to this process as *internationalization*, defined as the “simple extension of economic activities across national boundaries.”

Today the picture has grown more complex, with multilayered international sourcing¹ networks and new technology-enabled business models that better integrate and accelerate cross-border economic activity. This report characterizes these changes, develops a conceptual framework for economic globalization statistics, reviews the European Union’s current statistical resources and identifies data gaps, sets out a list of priorities for improving the European Statistical System, and advocates for an International Integrated Data Platform (IIDP) to link new and existing data resources.

The report intends to convey a sense of urgency. Even as most economic activity remains nationally-, and even locally-bounded, the enterprises driving economic globalization tend to be the most economically potent: large, fast growing, dynamic, and innovative. Furthermore, the concept of global economic integration, by definition, includes an assumption that cross-border business linkages will continue to connect more places.

Because economic activity is increasingly linked across national jurisdictions it is prudent, even essential, for all producers of economic statistics — within Europe and beyond — to respond in coordinated fashion. However, because regional economic integration has proceeded the farthest in Europe, it seems logical for Eurostat, the statistical office of the European Union, to take the lead in developing a new framework for economic statistics that takes the emerging realities of economic globalization more fully into account. The purpose of this report is to provide guidance for such an effort.

FROM INTERNATIONALIZATION TO ECONOMIC GLOBALIZATION

Internationalization is largely driven by two mechanisms: 1) the spatial expansion of *markets* through arms-length trade, and 2) the expansion of the internal structures of *multinational enterprises* (MNEs) through foreign direct investment (FDI) and subsequent intra-group trade between enterprises of the same group (e.g., global group heads and foreign affiliates).²

¹ In this report *sourcing* refers to the acquisition of goods and services by enterprises. The terms *internal sourcing* and *intra-group sourcing* are used when goods and services are obtained from within the enterprise or enterprise group (sometimes called “in-house” sourcing). The term *external sourcing* is used when goods and services are purchased from suppliers, vendors, and service providers that are not part the enterprise or enterprise group. Internal sourcing may occur domestically or, when foreign affiliates are used, internationally. Likewise, external sourcing may rely on independent non-affiliated domestic suppliers or suppliers in other countries. The term *international sourcing* used here refers to the use of both foreign affiliates and foreign suppliers. Throughout the report, the terms *international intra-group sourcing* and *international external sourcing* are used to refer to the internal and external versions of international sourcing (see Figure 2 on page 15 for full definitions and discussion of these terms).

² This definition covers only the most important drivers of internationalization. Other common forms of global engagement include international portfolio investment, licensing, franchising (UNCTAD, 2011), and

The statistical resources to monitor internationalization and analyze its effects are far from perfect, and the accuracy and timeliness of statistics in traded goods is regularly and rightly questioned (van Leeuwen and Schout, 1987; Van Der Linden and Oosterhaven 1996). While improvements are needed, very detailed information is readily available on the value and (in some cases) quantity of goods traded among hundreds of partner countries (e.g., from Eurostat's COMEXT and the UN's COMTRADE databases). International trade statistics have proven extremely useful to researchers and policy-makers. They have served as a basis for the development and implementation of policy for very specific categories of traded products (e.g., tariff thresholds and voluntary export restraints, lists of excluded or restricted products) and helped to answer urgent policy questions, such as the scale and impact of goods imports on domestic employments and enterprises (e.g., Feenstra, 1984; Hausmann *et al*, 2006).

However, lack of detail on traded services has caused enough concern to cause data producers to expand product lists and make other improvements to classification schemes and associated surveys (Jensen, 2011). Statistics on the activities of MNE foreign affiliates (e.g., from Eurostat's Foreign Affiliate Statistics, or FATS dataset), while useful, provide no information about intra-enterprise trade, and European statistics on international trade in goods and services do not identify intra-group transactions.³ Statistics on FDI (e.g., from Eurostat's balance of payment accounts or from the tables published annually in UNCTAD's World Investment Report) provide little detail on the activities of foreign affiliates, and cannot be linked to information about outward or inward investors in business registers.

The producers of official statistics in Europe and elsewhere are aware of these shortcomings, and improvements are being made. Still, there is a perception that recent changes in the global economy have begun to widen the data gaps to alarming proportions. The reasons are both quantitative and qualitative. On the quantitative side, the opening of China, Russia, and India added huge product and labor markets that had been all but outside the capitalist trading system prior to 1989, nearly doubling the field of play for internationalization (Freeman, 2006, 2010). Faced with slow growth at home, large enterprises rushed to set up operations in these newly opened markets, especially China, in an effort to carve out brand recognition and market share in rapidly expanding consumer markets and to cut costs on goods produced for export to international and home markets. For goods that require shorter supply lines, the countries of East Europe have joined traditional "export processing" locations such as Mexico and North Africa.

Related to this — and not — there was more work to be relocated. On the advice of business school 'gurus' (Prahalad and Hamel, 1990) and under pressure from financial markets (Williams, 2000), large American and European enterprises⁴ embarked on a "2nd unbundling" of corporate functions during the 1990s (Baldwin, 2011). In an effort to focus on "core competencies," nearly every business function deemed "non-core" was subject to consideration for possible external sourcing from more specialized, lower cost,

looser forms of cross-border "strategic alliances" and memorandums of understanding between enterprises (Simonin, 1999).

³ Data on MNEs collected by the United States Bureau of Economic Analysis do cover affiliated, intra-group trade, see: http://www.bea.gov/iTable/index_MNC.cfm

⁴ Large Japanese manufacturing companies have been slower to embrace the large scale external sourcing, but have been very active in setting up operations overseas. In doing so, they have often asked their main suppliers to come with them (see Sturgeon, 2007).

and often less unionized suppliers (see Sturgeon, 2002, for a detailed case study of the trend toward external sourcing in the electronics industry). Manufacturing functions were among the first to be externally sourced.

It was common for service functions such as IT, transport, and facilities maintenance to be externally sourced almost as early as manufacturing, but by the 2000s the computerization of work and emergence of low-cost international communications enabled a surprisingly wide range of service tasks to be standardized, fragmented, codified, modularized, and more readily sourced externally and cheaply transported across vast distances. Aspects of R&D even fell under consideration for external sourcing. As in goods production, the application of information technology to the provision of services allows some degree of customization within the rubric of automation and high volume production, or what Pine and Davis (1999) call “mass customization.”⁵

When India’s new role as a location for large-scale “services offshoring” and “business process outsourcing” came to light in the early 2000s, existing trade in services statistics proved to be woefully inadequate to answer basic questions such as the scale of the trend or the content of the work involved (Sturgeon *et al*, 2006; NAPA, 2006; Graham, 2007). With 70-80% of OECD employment in services, and prior transformations in manufacturing easily invoked, these questions took on a sudden urgency. If the political changes after 1989 doubled the field of play for internationalization, the idea that services could follow the same path as manufacturing expanded the potential field again and by a similar proportion.

On the qualitative side, the rise of industrial capabilities in less developed countries created many more options for relocating work, and new players came onto the field. What previously had to be done within the confines of the MNE could be externally sourced from newly competent *global suppliers* and service providers with offices and factories around the world (Sturgeon and Lester, 2004). The twin trends of external and international sourcing⁶ meant that existing suppliers simultaneously received vast quantities of new work and pressure to follow their customers to offshore locations (Humphrey, 2003). At the same time and for the same reasons, the most competent suppliers based in developing countries also grew rapidly and became MNEs in their own right (Kawakami, 2011).

As a result, the character of MNEs changed. It is no longer accurate to conceptualize MNEs only as large brand-carrying enterprises such as IBM, Nokia and Toyota. Suppliers, vendors, and service providers of all kinds have joined the ranks of MNEs. While this is straightforward enough for the enterprises involved — branded “lead” enterprises want to simplify and centralize their supplier relationships as they globalize by relying on their largest suppliers and service providers in multiple locations — it alters the structure of the global economy and renders the statistical resources underlying internationalization even less adequate. Statistics on MNEs and their affiliates no longer can capture the myriad of “vertical” sourcing relationships that exist in the global economy.

⁵ For example, the pre-determined sales pitches or responses to customer questions (known as scripts) used by call center workers are often embedded in IT systems, and can be quickly and easily changed to sell or provide customer service for a range of different products.

To complicate matters further, a set of highly influential *global buyers* gained scale and influence in the 1990s, including retailers such as Wal-Mart and Tesco and branded merchandisers such as Nike, Zara, and Uniqlo (Feenstra and Hamilton, 2006). Building on successful experiments in 1970s and 1980s by a handful of pioneering retailers such as JC Penny and Sears, global buyers began placing huge orders with suppliers around the world without establishing any factories or farms of their own (Gereffi, 1999; Ponte and Gibbon, 2005). Unlike traditional MNEs, where equity ties link headquarters with foreign affiliates, global buyers link to their suppliers via non-equity external sourcing ties that are much more difficult to discern in official statistics. Often, intermediaries (e.g., trading companies such as Hong Kong's Li & Fung⁶) are used to link buyers to producers in multiple countries.

For enterprises, however, engaging in external international sourcing is not the same as engaging in simple arms-length trade. Global buying/sourcing relationships often come with specifications and requirements for product design, quality, input sourcing, and logistics that are as detailed and stringent, or even more so, than those set by MNEs for their foreign affiliates (UNCTAD, 2011). Even with stringent requirements, contracts are often “incomplete,” in that the characteristics of products and services cannot be fully specified in advance, triggering iterative communication, frequent business travel, successive contracts, and long-term linkages between buyers and sellers (Johanson and Matsson, 1987).

It has been widely noted that these structural changes in the global economy have made it more common for value to be added to products and services in two or more countries prior to final use (Escaith and Timmer, 2012). However, transformations in the global economy run deeper than that. Within this new, spatially and organizationally fragmented system, high levels of monitoring and control, more precise coordination of logistics, and the transfer of highly complex design parameters, requirements and instructions are enabled by the computerization of design and manufacturing processes, low cost data communications, and improved software to manage the flow of information both within and between enterprises. As a result, distance has become less of a hindrance to segmenting and relocating business processes and the international trading system has become more dynamic, flexible, responsive and complex. New, previously unimagined business models have arisen to leverage and arbitrage globally “distributed” capabilities, labor markets, regulatory regimes, and markets. Producing for global markets provides opportunities for scale — even in narrow segments of the value chain — that never existed when markets were only local, domestic or regional. Internet retailing allows individual shoppers to assess and purchase the wares of sellers the world over. What we are witnessing is not a simple fragmentation of existing industrial systems but a basic transformation of how buyers connect to sellers, how work is accomplished, how production is organized, and how distribution is coordinated.

Peter Dicken (2011, p. 5) argues that the combination of these quantitative and qualitative changes requires a different term: *globalization*, defined as “the functional integration of internationally dispersed activities.”⁷ Today, *economic globalization* combines the

⁶ http://en.wikipedia.org/wiki/Li_%26_Fung

⁷ Of course, in common usage the term globalization signifies a much broader set of changes, including long-term tendencies toward deeper cultural and political interconnection (if not integration). Broadly defined, globalization involves larger and more immediate flows of money, ideas, and people and the concomitant, if uneven rise of regional and global institutions meant to govern them. This report narrows

traditional drivers of internationalization (arms-length trade and intra-enterprise trade related to FDI) with external international sourcing that requires high levels of *explicit coordination* that differentiate it from arms-length trade (Gereffi *et al*, 2005). As this report highlights, external international sourcing comprises a largely unmeasured third form of trade (in addition to arms-length and intra-group trade) that is, apparently, growing in importance. In essence, external international sourcing arrangements imbue inter-enterprise trade with characteristics similar to intra-group trade: better control from the center, higher levels of bi-lateral information flow, tolerance of asset specificity, and a harmonization and immediate integration of business processes that increase the potential for foreign activities to substitute for activities performed at home.

It is this last point, in particular, that underscores the policy concerns associated with current trends in economic globalization. Patterns of cross-border investment and trade based on product-cycles, where less developed countries receive older, *outmoded* products from more advanced economies (Vernon, 1966; 1979), are rapidly giving way to more unified global production systems and markets, with different countries specializing in specific aspects, or stages, of the development and production of *leading edge* goods and services.

THE CHALLENGES OF ECONOMIC GLOBALIZATION FOR STATISTICAL MEASUREMENT

To be clear, external international sourcing has not supplanted traditional forms of internationalization. Arms-length trade and the activities of MNEs continue to be the main drivers of economic globalization. With internationalization, MNEs production was sometimes fragmented. Ford, for instance, began by exporting vehicle “kits” from integrated production facilities in the US and Canada for final assembly in foreign markets in the 1900s. But, as local content requirements demanded, local parts production gradually substituted for imported items. The result, in general, was a replication of production structures, leaving home organizations largely unaffected (Sturgeon and Florida, 2004).⁸

While MNEs continue to set up production behind (existing or potential) tariff walls for better market access and to capture the rents from protectionism, the fragmentation and day-to-day (and sometimes hour-by-hour, minute-by-minute, or even real time) integration of detailed work across high- and low-cost geographies is creating larger potential for large scale *substitution* of work, triggering substantial changes within home organizations and economies. In fact, external international sourcing and the use of foreign affiliates are not mutually exclusive strategies, but are often entwined in dynamic ways. Case study research has shown that international sourcing creates ample

this lens by referring to “economic globalization.” Global economic integration is partly, but not wholly responsible for driving the broader processes of globalization forward.

⁸ In the context of internationalization, employment in foreign affiliates tends to *complement* domestic employment. Research by Borge (2005) and, Desai *et al* (2005), and Slaughter (2003) all conclude that that expansion of U.S. multinationals abroad *stimulated* job growth at home, and research that focuses on affiliates in low wage locations found very small displacement effects (Harrison and MacMillian 2010, p. 4). Harrison and MacMillian (2010, p. 7) estimate that a ten percent increase in U.S. MNE offshoring to affiliates in low-wage countries reduces U.S. manufacturing employment by .2 percent, while offshoring to affiliates in high-wage countries increases U.S. manufacturing employment by .8 %. However, when measurement of inter-industry flows of workers out of the manufacturing sector were taken into account, larger effects were found.

opportunities for re-organization and automation, both at home and in new locations (Dossani and Kenney, 2003). Small scale “tactical international sourcing” of a few narrow tasks can lead to “transformational international sourcing” that drives fundamental changes in home organizations (Kedia and Lahiri, 2007). Jensen and Petersen (2013, p. 67) provide a description of how this process unfolded for a Danish software company:

In March 2008, SimCorp, a successful provider of asset management software, announced the opening of a wholly owned subsidiary in the Ukrainian city of Kiev. The announcement kicked off the phasing out of the company's large-scale outsourcing operation in the Ukraine, which had been launched with two local service providers as a small pilot project in the spring of 2005. In the intervening years, the small-scale, relatively basic outsourcing operation was transformed into a large-scale transformational undertaking involving significant investments in local human assets. From March 2008 and for the next 18 months, SimCorp's Kiev subsidiary was staffed by a few expatriates from the Danish headquarters and about 100 software developers from the two service providers. This massive transfer of personnel, which took place in full agreement with the two local service providers, safeguarded SimCorp's extensive human asset investments in the Ukraine.

In this example we see external international sourcing leading to the formation of a MNE affiliate, but there are many opposite examples as well, as when GE Capital spun off its Indian IT services arm as Genpact in 2005. Genpact began in 1997 as a small Indian office of GE Capital, performing back-office functions such as remote processing of car loans and credit card transactions for U.S. customers because it was having difficulty selling financial services in the heavily regulated Indian market. By 2011, Genpact had grown into a \$1.26 billion publicly traded business process and technology management services company with 43,000 employees worldwide (Bhasin, 2011).

The greater scale, complexity, and transformational potential of economic globalization demand that we ask more from our economic statistics: ways to systematically differentiate arms-length trade from intra-group trade and external international sourcing, ways to track services trade in more detail, ways to determine the real location of value added, and ways to differentiate globally-engaged from non-globally-engaged enterprises so the performance of these very different segments of national economies can be tracked in terms of profits, innovation, employment, and wages paid. Old and new data sources must be better harmonized, integrated, and linked, not only to each other but to “international business registers” that identify the ownership structures of enterprises across borders and link to detailed information on employment, investment, and economic performance. Only with an integrated international data platform (IIDP) of this sort will policy-makers be able to understand the impact of economic globalization and develop appropriate responses (see 44 for a full discussion of this concept).

Five main issues arise from this discussion:

- First, the barriers to international and even domestic inter-agency data sharing can be significant. Some if this is determined by legislation related to confidentiality, but more often the barriers are created by institutional inertia, inter-agency competition, lack of leadership, funding, and ultimately, political will. If data and data infrastructure can be more easily linked across countries and regions, more can be done with existing data.
- Second, information on intra-group trade is missing; a glaring data gap given the central role MNEs play in economic globalization. Ownership matters because it

often determines when and where further investments are made, where profits are taken, and where technological capabilities and intellectual property truly lie (Linden *et al*, 2009, 2011). With full information on ownership, “trade in income” could begin to be tracked along with trade in value added (Escaith and Timmer, 2012).

- Third, external international sourcing, because it cannot be differentiated from arms-length or affiliated trade in current statistics, represents a largely unmeasured third form of trade.
- Fourth, data on traded services is quite weak, in part because large-scale trade in services is relatively new and in part because services trade is difficult to account for.
- Fifth, the vastly expanded trading system has brought in countries with poorly developed statistical resources. More effort is needed to help these countries improve their statistical systems.

DATA GAPS LEAD TO POLICY GAPS

The implications of economic globalization for policy are far reaching. How can workers, enterprises, and industries be provided with the best environment for engaging with the global economy? How can we be sure that enough wealth, employment, and innovative capacity are generated at home as economic globalization proceeds? How much of the rewards of innovation and new industry creation can be captured domestically, and for how long? What are the motivations for investing in domestic innovation if the bulk of the jobs and value will likely be created in other countries? How much national specialization – and by extension, interdependence with other societies – is too much? These are open questions. Even if policy-makers seek few direct interventions in the areas of trade, industrial, or innovation policy, economic globalization can make the process of economic adjustment more difficult because it accelerates the pace of change.

With stakes this high, there is broad interest in finding mechanisms to ensure that MNEs and external international sourcing networks not only thrive but also work to elevate, rather than depress, the welfare of societies in which they are embedded. But with multiple externalities, high complexity, and mixed outcomes, the challenge at hand is to understand the effects of economic globalization more precisely, and for this there is an urgent need to develop better statistical resources.

Because the picture of economic globalization provided by current official statistics is incomplete, the causal links to economic welfare indicators such as employment and wages tend to be weak and unconvincing, allowing a set of highly charged, politically motivated, and unproductive debates over the basic facts of economic globalization to flourish. New thinking and new data will be required to develop clear, incontrovertible, evidence-based insights into the character and implications of economic globalization.

Perhaps the most pressing need is to make full use of existing data resources, for a system that ties data from business surveys to the wealth of information from administrative sources. Of course, new data also needs to be collected, but the additional information needed is actually quite modest. The most important, and more challenging step, is to develop an International Integrated Data Platform (IIDP) to link existing and new data in an easy-to-use statistical product that can rapidly deliver useful analysis in ways that protect confidentiality. A vision and list of priorities for the steps are laid out in Part IV of this report (page 44). Before recommendations for improvement can be made,

however, a clear conceptual framework and evaluation of the current situation is required.

THE GLOBAL VALUE CHAINS AND ECONOMIC GLOBALIZATION PROJECT (GVC-EGP)

The Global Value Chains and Economic Globalization Project (GVC-EGP) is intended to provide technical background for an eventual Eurostat manual to help EU member states collect and produce appropriate statistics on economic globalization. The aim of this report is to help stimulate and contribute to Eurostat's and the European Statistical System's internal deliberations on the best ways to move forward.

Two critical points need to be stressed at the outset.

1. First, because economic globalization is by definition a cross-border phenomenon, international standardization is essential. Compatible, if not identical, data sets will need to be developed, not only in EU member states, but also — eventually — in all countries in the trading system. While this is a big challenge in Europe and OECD nations, it is even greater in developing countries where data resources are less developed. But in this lies opportunity: to develop new, internationally standardized data resources that are on one hand parsimonious, to save resources and minimize respondent burden, and on the other rich by current standards because they shed light on aspects of economic globalization that have so far remained nearly invisible in economic statistics.
2. Second, an integrated approach is needed to make better use of existing data and tie it to new resources meant to fill the data gaps. No single statistical resource will answer all of the questions that need to be asked or fill all of the requirements of policy makers. However, the use of common classifications within a unified, integrated conceptual framework can create a broad vision of the statistical resources required. This will provide the guidance needed to evaluate current data collection programs and devise new ones. A holistic framework will help statisticians identify redundant data resources, appropriate standards for detail and accuracy, and insure maximum use of existing data resources (including administrative micro-data). In this way managers of data agencies can move quickly to develop new data resources with full confidence that they are urgently needed to fill known data gaps within a larger, integrated vision.

While adapting European — and eventually the world's — statistical systems to the realities of economic globalization will take time and be difficult to achieve, a concerted effort is needed now. Again, this report is intended to create a heightened sense of urgency that can help motivate and inform this process. Part I provides a framework for identifying the data needs related to economic globalization: Global Value Chains (GVCs). Part II reviews how far traditional data resources related to internationalization can go toward fulfilling these needs, and identifies a few key data gaps. Part III identifies some innovative surveys, concepts, and methods for improving statistics related to economic globalization. Part IV offers a vision and set of priorities for moving forward.

PART I: A CONCEPTUAL FRAMEWORK FOR STATISTICS RELATED TO ECONOMIC GLOBALIZATION

ECONOMIC GLOBALIZATION, A WORKING DEFINITION

How do we define economic globalization for statistical purposes? The scope of this report is limited to *the cross-border activities of for-profit enterprises and other organizations,*⁹ specifically investment, production, trade, sales, and international sourcing of intermediate goods and services.

The analysis specifically excludes labor markets, employment, and the specific content of jobs as units of statistical analysis. Of course the quantity, quality, and content of jobs are central concerns, and both are affected by economic globalization. The movement of workers — skilled and unskilled — is an intrinsic feature of economic globalization (Saxenian, 2005, 2006). The cost and quality of labor are central drivers of economic globalization: for example when enterprises internationally source from places with low labor costs or set up affiliates in places where labor markets provide access to specific skills. However, the effects of economic globalization on employment and jobs will *mainly* require an improved picture of the global engagement¹⁰ of enterprises, especially of the activities (just mentioned in the above definition) that drive the process of globalization economic integration forward: investment, production, trade, sales, and international sourcing. Hiring patterns and skill requirements can be most usefully judged in the context of these basic measures of economic globalization. In other words, while data on employment is readily available at the national level, very little is known about how employment is affected by economic globalization. To make this link, better statistical information on the global engagement of enterprises is the main requirement.

Therefore, the working definition of economic globalization for this report is as follows:

- *The inward and outward flow of goods, services, and investment across national borders, along with the functions —including functions related to innovation — that enterprises and organizations use to set up, support, and manage these flows.*

This definition includes primary products, intermediate goods and services, and final goods and services. It includes not only the flow of products, services and investment, but the equity and ownership ties and channels of control and information exchange that enable and structure these flows.

⁹ The reference to “other organizations” here is in recognition to the fact that all organizations, for-profit, non-profit, and public sector all have the potential to engage in FDI and/or international sourcing. Examples include non-profit and public sector organizations that source call center or customer support services internationally, non-profit universities that set up satellite campuses outside of their home country. All organizations of this sort are all excluded from FATS.

¹⁰ Again, global engagement is a two-way concept that includes importing and exporting, as well as accepting and engaging in inward and outward international investment and sourcing.

FOUR BASIC USES FOR STATISTICS ON ECONOMIC GLOBALIZATION

What are the basic questions that need to be answered about economic globalization? Before outlining the data resources needed, this question needs to be addressed. Four important (and interrelated) uses for statistics related to economic globalization can be identified as follows:

1. To develop a full set of enterprise characteristics, including the enterprise's global engagement. Is the enterprise domestic or foreign-owned? Is the enterprise part of an MNE or non-equity business network? What products and services does the enterprise make itself and what does it source domestically or internationally? These data can be used descriptively to characterize global engagement at the level of localities, industries, or countries; and also as control variables in other analysis, especially a deeper analysis of international trade than is currently possible.
2. To gauge how pervasive global engagement is and what the trends are.
3. To better understand the impact of global engagement on the quantity and quality of employment, including wages and social, inter-industrial, and international mobility. While the statistics on employment are rich, and business registers include information about the number of employees per enterprise, a European-level register and links to trade and other economic statistics will need to be established before they can be made useful for the analysis of economic globalization.
4. To better understand the impact of global engagement on innovation.

GLOBAL VALUE CHAINS: A CONCEPTUAL FRAMEWORK FOR ECONOMIC GLOBALIZATION STATISTICS

The central question addressed by this report is: What are the minimal statistical resources required to answer these four critical policy and research goals? The approach to answering is to apply the logical concept of *lex parsimoniae*, or Occam's Razor. The goal of Occam's Razor is to achieve maximum parsimony, economy, or succinctness in the construction of theory and methods. The basic conceptual framework should first be developed by "shaving off" any data elements that are unnecessary and include only those that are absolutely required to provide statistical support for the above-stated goals with the fewest built-in assumptions. In a context where official information must be optimized under budgetary constraints, the first step should be to target the collection of very specific, broadly harmonized data, not to collect every bit of information from every source possible. But this is only a first step. Once the proper conceptual framework and international data infrastructure is in place, more existing data sources can be integrated and linked to better serve policy goals. To accomplish this, a guiding framework is needed to help visualize the required data elements.

THE VALUE CHAIN

The concept of *global* value chains (GVCs) can provide a conceptual framework for economic globalization statistics. To build this conceptual model in step-wise fashion, we can start with the simple concept of the value chain. It is useful to think of economic

activity as a series of value added stages, or steps. Following Kaplinsky and Morris (2001) we can define a value chain as follows:

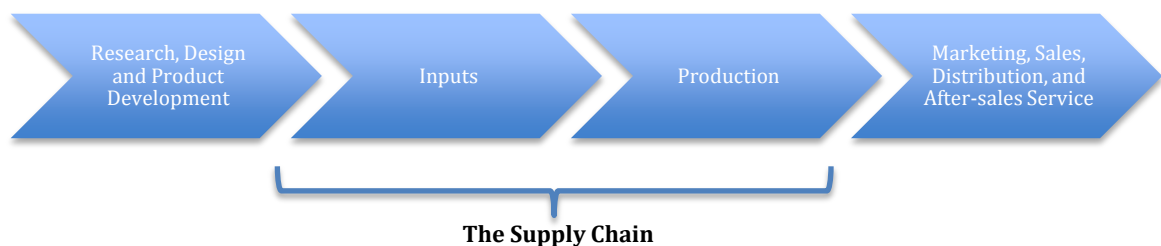
- *The value chain describes the full range of activities required to bring a product or service from conception through the different phases of production, delivery to final consumers, and final disposal after use.*

At a simple level, value chains include sequential value added functions such as design, production, marketing, transportation, logistics, distribution and support and after-sales service to final consumers. Value chains can produce goods, services, or (quite typically) some combination of the two. The activities that comprise a value chain can be contained within a single enterprise or divided among different enterprises, serving internal needs or the open market. Therefore, a single value chain stage can describe a functional group or division within an enterprise or an entire industry segment (e.g., in-house manufacturing vs. contract manufacturing; in-house call centers vs. external call center services; internal information technology (IT) support vs. externally sourced IT services).

Clearly, the real economy is not so simple, linear, or unidirectional. Value chains are profoundly shaped by the institutions and regulatory regimes in which they are situated (Henderson *et al*, 2002). They cannot be simply traced in stepwise fashion from simple inputs to complex final goods and services. Value chains, especially in service-producing industries, are filled with iterative work, consisting of feedback loops where ‘drafts’ of products and projects are created, reviewed, and altered over time. ‘Support’ functions such as management, administration, IT services, and facilities maintenance tend to cut across sequential activities (Porter, 1985). Intermediate goods, capital equipment, and services enter value added chains along multiple vectors as discrete inputs but also as fully formed machines, subsystems or ‘blocks’ of useful services and knowledge that are incorporated by organizations in a variety of ways. Materials, components, machinery and IT systems each have their own value chains, add value to production both directly and indirectly, and can be amortized over time across a variety of products and services.¹¹

Nevertheless, the value chain concept provides a useful heuristic device for more fully accounting for goods and services as they are created and flow into markets. In its simplest level, a value chain can be said to consist of four steps, 1) research, design, and product development; 2) inputs; 3) production; and 4) marketing, sales, distribution, and after-sales service, with most trade (generally) occurring in the “supply chain” portion consisting of intermediate inputs and the production of final goods, and most value (generally) created in the first and last steps of R&D and sales (see Figure 1):

Figure 1. A simple value chain in four basic steps



¹¹ Figure 1 is highly simplified. After-sales functions such as disposal and recycling are increasingly important and highly regulated activities that can transform waste back into inputs for future use, creating a “value cycle.”

BRINGING IN GLOBALIZATION; INTERNATIONAL SOURCING FROM INTRA-GROUP AFFILIATES AND EXTERNAL SUPPLIERS

The strength of the value chain concept is that it leads us to consider the entire range of activities needed to bring products and services from conception to end-use and beyond. The usefulness of this approach is enhanced by the fact of economic globalization. When business networks extended beyond the boundaries of the enterprise or the nation, the use of the value chain concept demands that the flow of work be traced along its various stages and locations to end use and even beyond into after-sales service, disposal, and recycling.

Because value chains can be contained within a single geographical location or linked across multiple locations, it is appropriate to use the term *global* value chain or GVC to capture the full range of possibilities. The term GVC as used here is not meant to exclude the domestic components of value added or even entirely domestic value chains, it is simply meant to increase the scope of consideration to include the possibility that value chains can span international borders, especially continental borders.

In theory, each segment, function, activity, or node in the value chain can contribute a set of highly specialized tasks and inputs to finished products or services. The dividing points between value chain stages are not given, but are influenced by points of technological, process, or scale dissimilarity (Richardson, 1972) as well as the quality and ubiquity of codification schemes and standards that ease the exchange, or “hand off” of appropriate technical information between specialized tasks (Langlois and Robertson, 1995; Baldwin and Clark, 2000; Sturgeon, 2002; and Principe *et al*, 2003). If knowledge and information are fully tacit and uncoded, as they are more likely to be in the research, design, and product development phases of the value chain, it stands to reason that co-location within an enterprise or urban industrial cluster is more likely. Specialized labor markets and exchanges of tacit knowledge are especially dense, efficient, and vibrant when it is possible for agents to meet face to face (Storper, 1995). Localization is important in the creation of new knowledge because innovative work necessarily involves the generation and exchange of knowledge that has not been rendered portable through codification (Malmberg and Maskell, 1997; Martin and Sunley, 2006). However, the opposite is also true. When knowledge and information is rendered portable (e.g. through digitization) it stands to reason that work can more easily spread geographically (Sturgeon, 2009). Such technical factors can influence how work is divided, not only within a factory or single enterprise, but also in globe-spanning business networks that link several — if not dozens — of enterprises, facilities, offices, carriers, and workshops as a product or service takes shape as it moves along a value adding chain of activities. However, technology can only enable specific patterns of economic geography. It is the strategic decisions of managers, in the end, that create these patterns.

The implication for corporate strategy is that each value chain stage in Figure 1 (or in fact, each business function or *activity required to bring a product or service from conception to end use*) presents managers with four distinct sourcing options when it comes to organization and location (see Figure 2). In terms of location managers have two domestic options: 1) internal domestic sourcing from within the enterprise of enterprise group, and 2) external sourcing from independent domestic suppliers; and two

international options: 3) internal international sourcing from within the enterprise group (i.e., using foreign affiliates), and 4) external international sourcing from independent suppliers.

Similarly, in terms of organization managers have two internal sourcing options: 1) internal domestic sourcing from within the enterprise of enterprise group, and 3) internal international sourcing from within the enterprise group (i.e., using foreign affiliates); and two external sourcing options: 2) external sourcing from independent domestic suppliers, and 4) external international sourcing from independent suppliers.

Figure 2. Organization and location in GVCs; four sourcing options

ORGANIZATION	LOCATION	
	DOMESTIC SOURCING	INTERNATIONAL SOURCING
<u>INTERNAL SOURCING:</u> sourced from within the enterprise or enterprise group	1) Domestic intra-group sources <i>Work performed within the enterprise or enterprise group within the compiling country (work sourced "in-house")</i>	3) International intra-group affiliates <i>Work performed within the enterprise or enterprise group outside the compiling country</i>
<u>EXTERNAL SOURCING:</u> sourced from outside the enterprise or enterprise group	2) Domestic external suppliers <i>Work performed outside the enterprise or enterprise group by non-affiliated enterprises within the compiling country (e.g., sourced from independent suppliers, service providers, contractors, etc.)</i>	4) International external suppliers <i>Work performed outside the enterprise or enterprise group by non-affiliated enterprises outside the compiling country (e.g., sourced from independent suppliers, service providers, contractors, etc.)</i>

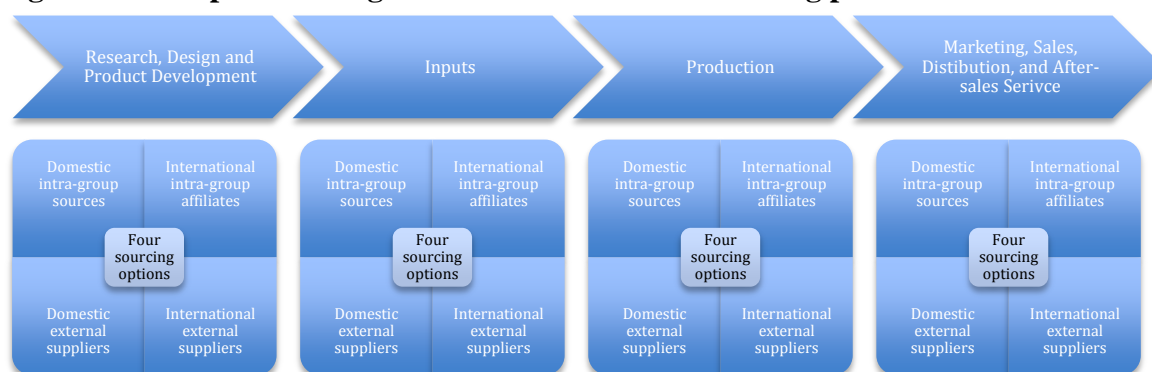
Source: adapted from Nielsen, 2008, and Eurostat's methodology for international sourcing surveys.

The next step is to combine the simple value chain in Figure 1, containing four basic activities, or functions, with the four sourcing choices in Figure 2. This yields sixteen possible sourcing realms that need to be considered to develop a more complete view of economic globalization (see Figure 3). Of course, in practice, there are many more value chain steps, and many more realms of activity (European international sourcing surveys use seven functions as shown in Table 1 below), and enterprises and other organizations have the choice to mix all four sourcing options for any value chain activity in complex and dynamic ways. While they are not included in Figure 2, arms-length transactions are still important in international trade and cannot be ignored.¹² If intra-group trade and external sourcing can be identified or estimated in trade statistics, arm-length trade can be derived as a residual category of international trade. With this caveat firmly in mind,

¹² UNCTAD (2013, p. 16) estimates that arms-length trade (i.e. trade unrelated to MNCs or external international sourcing) represents 20% of world trade.

Figure 3 can be said to concisely illustrate the range of GVC activity realms where statistics need to be produced to create a fuller picture of economic globalization.

Figure 3. A simple four-stage value chain with four sourcing possibilities



The final step is to recognize that foreign (or extra- EU) enterprises and enterprise groups have the same choices as domestic (or EU) enterprises do when it comes to economic globalization. Here, it becomes clear that economic globalization is a very complex process, with the sixteen sourcing options depicted in Figure 3 multiplied in bi-lateral and multi-lateral networks of international trade, investment and sourcing. The importance of foreign enterprises in these networks, as investors and suppliers, underscores the need for international standardization and cooperation in the effort to create and maintain cross-border business registers. Compiling full statistics on trade, investment, and sourcing practices for all sixteen quadrants in Figure 3 for all enterprises in the EU will never be enough if they cannot be linked to compatible statistics on enterprises based outside of the EU.

In Part III, the GVC framework developed here will be used to summarize the economic globalization resources available in the European statistical system (see Figure 6). First, those resources need to be assessed.

PART II: A REVIEW OF CURRENT EUROPEAN STATISTICS RELATED TO ECONOMIC GLOBALIZATION

This section reviews the current data regime in Europe related to economic globalization. While there is more work to do, several important steps have been taken to fill in missing data and create links to business registers to allow profiles of globally engaged enterprises to be systematically aggregated and analyzed to reveal trends and apparent effects related to economic globalization. The review is not meant to be comprehensive or encyclopedic. The Eurostat web portal can link readers seeking more information to meta-data descriptions and to the data itself.¹³ The goal here is to assess current data resources and identify the most important data gaps so clear recommendations for moving forward can be developed in Parts III and IV.

¹³ See: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

Internationalization is a venerable process. Trade has been an important feature of the global economy for thousands of years, with important inter-continental trade routes for spices and incense established between Rome and India as far back as the 1st Century.

The motivations for arms-length trade have been identified in economic theory as 1) exporting goods produced at lower cost than is possible in trading partners (Smith, 1776), 2) exploitation of comparative advantage based on the natural factor endowments of countries, such as trading Spanish wine for English wool (Ricardo, 1817), 3) exporting goods (or goods relying on production factors) that are unavailable or scarce in importing countries (Ohlin, 1952; Kravis, 1956), 4) trading similar but specialized goods with trading partners with similar demand profiles (Linder, 1961), and 5) exporting goods that have technological advantages over local products (Rogers, 1962).

Multinational enterprises (MNEs) also have a long pedigree. The British East India Company was granted a Royal Charter by the English Crown in 1600. With the rise of mass production the Ford Motor Company, to provide just one example, established assembly plants in Canada, England, France, Spain, Italy, Belgium, Germany, Denmark, Sweden, Argentina, Brazil, Mexico, Chile, Japan, Australia, South Africa, India, and Malaysia between 1904 and 1929 (Sturgeon and Florida, 2000).

INTERNATIONAL TRADE IN GOODS

Historically, national governments have had an interest in measuring trade in goods where tariffs and duties were collected or where other trade policy measures were applied.¹⁴ To support this, governments collect and publish detailed information on the value of imported and exported goods. The main trading countries (the U.S. and many European countries) began to publish bilateral disaggregated merchandise trade data in the 1850s, and an international convention for the publication of customs tariffs was established in 1890. Countries used these statistics to support elaborate tariff regulations meant to protect local industry, increase local content, and collect revenue from both arms-length trade and intra-group trade within MNEs. This drove both an expansion of MNCs and retaliatory policy responses between trading partners in a classic “trade-war” dynamic. In the face of waxing nationalist sentiments in the run-ups to the two World Wars, progress towards more harmonized trade data was interrupted (as was trade itself during wartime), but this progress resumed in the 1940s.

Today, European policy-makers see promotion of international trade as a key driver of economic growth and job creation within the common market region. In fact trade policy is an exclusive power of the EU – *only the EU*, and not individual member states, can legislate on trade matters and conclude international trade agreements. The harmonized customs rules ensure that these rules are followed and necessary data for statistics will be available.¹⁵ For this reason European statistics on international trade tend to distinguish trade between European Union (EU) Member States and non-EU countries from trade within the EU. On the other hand, the EU is a single market with free movement of goods. Since January 1993 controls on the movement of goods within the EU have been

¹⁴ For example, it is sometimes deemed necessary to ban, restrict, or otherwise exclude trade in specific items for legal, public health, or national security reasons.

¹⁵ See: <http://ec.europa.eu/trade/>

abolished; the European Union is now a single territory without internal frontiers. The abolition of customs tariffs promotes intra-EU trade, and this accounts for a large portion of the total imports and exports of the Member States.

Statistics on trade within the EU are collected through the Intrastat system.¹⁶ In this system, intra-EU trade data are collected directly from trade operators, which send monthly declarations to the relevant national Statistical Institutes (NSIs).¹⁷ Data on international trade in physical goods and commodities are available in considerable detail on-line in the COMEXT dataset.¹⁸ The database contains information on import and export of goods between individual and groupings of European countries and 200 trading partners (plus various groupings), from 1988 to the current year.

Regional integration in Europe has driven the creation and application of high standards for the collection of goods trade in Intrastat. However, statistics on trade statistics reported by non-EU countries are not required to adhere to European standards. Because trade data are collected from customs forms by different national statistical institutes (NSIs), they vary in quality and coverage. Evidence of inaccuracy in trade statistics can be found in analysis of “mirror statistics”, where the exports between specific trading partners are compared to imports in the same commodity (van Leeuwen and Schout, 1987; Van Der Linden and Oosterhaven 1996). Errors in trade statistics can result from poor compliance, unrecorded re-exporting, and deliberate falsification. In general, exports statistics tend to be less accurate than imports because requirements for compliance tend to be less stringent for exports than for imports.¹⁹ This is because governments are financially motivated to collect tariffs and duties on imports and tend to screen banned or limited products more aggressively than exports.²⁰

Nevertheless, statistics on traded goods are very rich. The COMEXT database publishes information on imports and exports by value and in some cases by the number of units or volume shipped, by product, industry, tariff regime, and mode of transport, according to five different product (commodity) lists (CN8, HS, CPA, SITC, and BEC), the most detailed being the CN8 list, which follows the structure of the World Customs Organization’s Harmonized System (HS) but adds additional detail and is updated annually, currently encompassing to more than 9,000 product descriptions at the eight-digit level. All European importers and exporters have established unique ID codes that can be linked to administrative data in the business registers of Member States. The Trade in Enterprise Characteristics project is an example how this has been utilized to examine the employments effects of international trade in specific countries (see page 36).

➤ *Data issue: there are inconsistencies in reporting (e.g., differences in mirror statistics and different classifications for imports and exports of the same product) and lack of*

¹⁶ See http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/International_trade_introduced - soon to be revised by a burden-reducing new initiative called “SIMSTAT”

¹⁷ See: http://epp.eurostat.ec.europa.eu/portal/page/portal/international_trade/introduction

¹⁸ See: http://epp.eurostat.ec.europa.eu/portal/page/portal/international_trade/data/database

¹⁹ An exception is intra-EU trade, where exports statistics are considered to be more accurate because they are based on surveys (rather than customs forms) of fewer companies with higher trade volumes in fewer products categories relative to mirrored imports where there are more importers and more products.

²⁰ Exceptions include products that are excluded from export for national security reasons.

*accounting for re-exports. Ongoing work to reconcile bilateral trade flows and track trade for processing with trading partners should continue.*²¹

- *Data gap: Statistics on international trade in goods do not differentiate affiliated from non-affiliated trade. A “related party” flag should be included on all customs and survey forms.*
- *Data issue: Statistics on the gross value of goods trade do not account for double counting of trade from the value of imported intermediate inputs in exports. They also render information about country of origin relevant only for the last stage of production. International Input-Output databases are seeking to address this problem from the top down, but rely on the gross estimations and assumptions of Leontief type modeling to estimate the embodied imports in exports (see page 39 below). The situation could be helped, if not solved, by more useful broad categories in international trade statistics that identify customized vs. generic intermediate goods²² that might be used to link imports and exports flows.*

INTERNATIONAL TRADE IN SERVICES

Data gaps are especially acute in services, where product and geographic detail has historically been lacking and vast inferences are made to settle national accounts, even in domestic industries. While the situation is improving (especially in Europe), the easy availability and richness of trade in goods data in datasets such as COMEXT and COMTRADE has tilted research and policy related to the impact of international trade towards the goods sector. Research on the goods sector has contributed greatly to our understanding of international trade and its impacts on various national economies and industries, but the lack of similar detail, geographic coverage, and quality on data on international trade in services has created a significant knowledge gap (Jensen, 2011).

Why are the data resources related to services so poor? One reason is that the data are difficult to collect. While companies might track the source of many physical inputs to manufacturing, for warranty or quality control purposes, services expenditures are typically grouped into very coarse categories in company records, such as “purchased services” In business statistics, services inputs are often grouped with goods as “purchases of goods and services.” The absence of tariffs on services, and their non-physical character, means that no customs forms are filled out and little if any administrative data are generated when service work moves across borders. The Manual on Statistics of International Trade in Services (2002) frames the issues as follows (section 1.21, p. 4):

Measurement of trade in services is inherently more difficult than measurement of trade in goods, inasmuch as services are more difficult to define. Some services are defined through the use of abstract concepts rather than by pinpointing any specific physical attribute or physical function. In the case of trade in services, unlike that of trade in goods, there is no package crossing the customs frontier with an internationally recognized commodity code; a description of the contents;

²¹ It is important to note that inconsistencies in reporting can also arise because of intrinsic differences in trade reporting or because specific business practices result in complicated goods flows. For instance, the exporting country may not know the ultimate destination for exports but importing countries are still required to report the country of origin. If any intermediate processing takes place, the country of origin may or may not reflect this stage of production. So, bilateral reconciliation studies can correct errors but also lead to better understanding of the global value chain itself.

²² The current revision of the Broad Economic Categories (BEC) under development by the UN Statistical Division proposes a division of this sort for intermediate goods in international trade for both goods and services.

information on quantity, origin and destination; and an invoice. Nor is there an administrative system associated with customs duty collection that is practiced at assembling these data. Obtaining the required information on services trade, once defined, is dependent on the reaching of a common understanding of concepts with data providers. Measurement of trade services relies on information that may be reported either from business accounting and record-keeping systems or by individuals, and on a variety of data sources, including administrative sources and surveys, and estimation techniques.

Another reason why services trade has received less attention from data producers and policy-makers is that service work has historically been thought to consist of non-routine activities that require face-to-face contact between producers and users. Services as different as haircuts and legal advice have traditionally been consumed, in place, as soon as they are produced. The customized and ephemeral nature of many services has led them to be considered “non-tradable” by economists or at least very ‘sticky’ in a geographic sense relative to the production of tangible goods. Because of this, there has been little motivation to collect detailed information on international trade in services in the past.

Finally, services have long been viewed as ancillary to manufacturing, either as direct inputs (e.g. transportation) or as services provided to people who worked in manufacturing (e.g. residential construction, retail sales, etc.). As such, services have been viewed as a by-product, not a source, of economic growth. Thus, data collection on services has historically been given a low priority by policy makers and statistical agencies (Sturgeon et al, 2006).

These conditions and attitudes are changing quickly. Almost all of the defining features of services: that they are non-tradable, non-storable, customized, and insensitive to price competition are changing in ways that enable and motivate international sourcing (through intra-group and external sourcing). As a result, task fragmentation and trade in services is burgeoning, both domestically and internationally. With computerization and inexpensive data storage, services can be stored and reused. Tariff and non-tariff barriers to international trade in services are falling. Global “business process” service providers such as Wipro and IBM Global Services have come onto the scene. The costs of voice and data communications have plummeted with the rise of the Internet. As a result, services have become the focus of intense international competition and dynamic innovation. With standardization, commodification, and increasing scale, labor inputs to services have become more sensitive to costs, providing enterprises with the motivation to take advantage of the new domestic and international sourcing options for a wide range of services and business functions, including software coding, “back office” administrative tasks, sales, customer service, and even elements of R&D.

The rising importance of international trade in services, especially in trade negotiations, led to the 1995 General Agreement on Trade in Services (GATS). This, in turn, increased demand for more comprehensive and better data on trade in services. In response the Interagency Task Force on Statistics of International Trade in Services (ITFSTIS)²³ issued its first Manual on Statistics of International Trade in Services

²³ The ITFSTIS is mandated by the United Nations Statistical Commission and convened by the Organization for Economic Cooperation and Development (OECD) with representatives from the World Trade Organization (WTO), the United Nations Statistics Division (UNSD), the International Monetary

(MSITS) in 2002, updated in 2010 as the Extended Balance of Payments Services (EBoPS 2010) classification.²⁴

In Europe, trade in services data are an integral part of the balance of payments (BoP) information provided by central banks, though NSIs may provide data to central banks in some instances. Data collection methods are uneven; some EU Member States collect trade in services information from administrative data, some from surveys, some use estimation techniques, and some use a combination of these methods. Eurostat publishes services trade data in flows of value (in Euros) between residents and non-residents as debits and credits to national accounts about 90 product categories based on the EBoPS 2010.²⁵

- *Data gap: Product detail in services trade. With about 90 product categories trade in services detail in Europe is in far better shape than in the United States, where the Bureau of Economic Analysis collects import and export data for only 23 service product categories (up from 17 in 2003). Statistics Canada collects only 28, and the OECD, which relies on member countries for data, publishes only 11. Contrast the poor detail in traded services with detail on goods in the COMEXT database (9,000 product codes in CN-8) and the magnitude of the data gap becomes clear. This paucity of detail in services means that we have little information about what is happening in the service product categories that have been mentioned as opening up to international sourcing, e.g. back-office functions such as accounting, customer support, R&D and software programming. What is less clear is if the detail on the goods side will need to be maintained. With roughly equal numbers of products in goods and services (about 150 product classes each at the four-digit level) the UN's Central Product Classification (CPC) and equivalent European Central Product by Activity (CPA) probably provide the appropriate level of detail. Services should also be clearly mapped to the list of support business functions contained in international sourcing surveys (as discussed on page 23 and shown in Appendix B. Definitions of Seven Business Functions and Correspondence with Central Product Classification (CPC, ver. 2)*
- *Data gap: Geographic detail in services trade. A major limitation of the trade in services data published by Eurostat is that only countries in the European Union, Euro area, and EU Member States plus Croatia, Turkey, Norway, Iceland, Switzerland, the United States and Japan are reported. India, for example, a major location for the offshoring of service work, is not represented. Of course, data from non-EU countries may only be published if Eurostat has made an agreement with them to disseminate data. Eurostat should pursue agreements with a full range of current and potential trading partners.*
- *Data issue: Poor data quality in services trade. Because of the afore-discussed issues, data quality for trade in services tends to be low. However, the Interagency Task Force on Statistics of International Trade in Services based at the UN Statistical Division has a stated commitment to help the producers of statistics improve the quality of data on traded services, and has requested that a task force be set up to build capacity in this area.*

Fund (IMF), the Statistical Office of the European Union (Eurostat), the United Nations Conference on Trade and Development (UNCTAD) and the World Tourism Organization.

²⁴ See: <http://unstats.un.org/unsd/tradeserv/tfsits/manual.htm>

²⁵ The exact number varies because there are mandatory and non-mandatory items and different levels of EBoPs.

FOREIGN AFFILIATES AND FOREIGN DIRECT INVESTMENT (FDI) STATISTICS

MNEs have long been a focus of research and debate among scholars of the global economy. A central question of research in the field of International Business and Development Studies is why enterprises choose to take on the risk and expense of FDI rather than engaging in simple arms-length trade. This work has examined and debated the methods, timing, and motivations of MNEs and the degree that they acted as conduits for the transfer of capabilities from developed to developing countries (Lall, 2000). In addition to providing a mechanism to gain the advantages of international trade mentioned already, motivations for FDI have been identified in theory as 1) exploitation of monopolistic advantage in superior products by locating production across tariff barriers (Hymer, 1960), and 2) moving production of older products to less developed countries to wring additional value from fully amortized technology and equipment while making way for new products at home (Vernon, 1966; 1979). The “eclectic paradigm,” or OLI model developed by Dunning (1977), argues that MNEs form when internationalization costs are lower inside the enterprise than when trading externally. Specifically, MNEs provide three cost advantages, Ownership (brands, organizational and operational skills, and scale benefits), Locational (access to lower cost materials, labor, or taxes or tariffs) and Internalization advantages (lowering costs through the use of international licensing or joint ventures).

While global sourcing is often channeled through international MNE affiliates (sourcing option #3 in Figure 3), the rise of global suppliers means that FDI has become commonplace at every level of the value chain, and that international sourcing from independent suppliers (sourcing option #4 in Figure 3), may well connect MNE to MNE (Sturgeon and Lester, 2004; Gereffi and Sturgeon, forthcoming). As a result, the ability to link FDI statistics to the enterprise groups involved has become an important requirement for understanding the processes of economic globalization.

Eurostat’s investment position dataset from the balance of payments provides data on inward and outward foreign direct investment abroad (equity capital and reinvested earnings) for about 70 industries (NACE revision 2) and nearly 200 partner countries. Summary tables are provided for industry and geography, both within Europe and in various recipient regions (e.g., NAFTA, etc.).

In Europe data is available on foreign affiliates in the inward and outward Foreign Affiliates Statistics (FATS) datasets.²⁶ There are three main variables in the Outward FATS data set, namely ‘number of enterprises’, ‘turnover’ and ‘number of persons employed’. For a limited number of countries ‘value added at factor costs’, ‘gross investments in tangible goods’, and ‘personnel costs’ are published as well. The data are available for nearly 200 recipient partner countries and many useful country groupings.

Data on foreign controlled enterprises in the EU, known as Inward FATS, is much richer, with 11 main variables:

1. number of enterprises
2. turnover
3. production value
4. value added at factor cost
5. total purchases of goods and services

²⁶ The OECD refers to Foreign Affiliate Trade in Services as “FATS”, which can cause confusion.

6. purchases of goods and services purchased for resale in the same condition as received
7. gross investment in tangible goods
8. personnel costs
9. number of persons employed
10. number of R&D personnel.
11. total intra-mural R&D expenditures

The nationality of the Ultimate Controlling Institutional Unit (UCI) or Global Group Head is also collected and data is published for the 27 EU countries for about 130 activities at different NACE breakdowns.

In terms of ownership and control, the definitional bar is set higher (50% of voting rights) for inclusion of affiliates in FATS than in FDI dataset (10% of voting rights). Because of this, the FATS population can be seen as a sub-group of the population of FDI investments; in other words, affiliates are a special case of FDI where the Ultimate Controlling Enterprise (UCI) has either direct or indirect controlling interest. So, FDI statistics cover equity investment while FATS statistics provide business statistics on affiliates. These are quite detailed in the case of inward FATS, and less so in the case of outward FATS.

- *Data gap: In inward FATS the foreign-owned enterprise population cannot currently be identified among trading enterprises, so information about their imports, exports, and sourcing practices cannot be isolated. This situation could improve in the near future when the Trade in Enterprise Characteristics (TEC) initiative (see page 35) identifies foreign affiliates in Structural Business Statistics data sets.*
- *Data gap: In outward FATS no information about outward investors is collected. This could be easily remedied because these UCIs are in the business registers of EU member countries and have business statistics collected on them. The new EuroGroups Register (see page 37) will help to fill this gap, but eventually enterprise structures outside of Europe will also need to be tracked, most likely with international cooperation.*

DATA RESOURCES FOR INTERNATIONAL SOURCING, A REVIEW

The rise of international sourcing (via affiliated trade and external international sourcing) has led the users and providers of official statistics to acknowledge a growing knowledge gap in regard to the location of value added, industrial capabilities, and other important statistical indicators related to trade and economic globalization. A spate of recent conferences, reports, and data enhancements efforts led by Eurostat, the WTO, UNIDO, OECD, UNSD, the World Bank, the ILO and many others reflect these concerns. The sense is that the data gaps are rapidly growing wider.

As discussed earlier, the roots of international external sourcing can be found in the experiments with external international sourcing by a handful of pioneering retailers (e.g., JC Penny, Sears) and manufacturing enterprises (e.g., IBM, General Motors, Volkswagen, Fairchild Semiconductor) that set up production in East Asia, Mexico, and a handful of other locations around the world beginning in the late 1960s with the explicit purpose of lowering production costs and exporting finished goods back to home markets (Fröbel *et al*, 1980; Dassbach, 1989; Gereffi, 1994). Over time retailers and branded manufacturers in wealthy countries became more experienced with international

sourcing. MNEs too began to stress the “locational advantages” of exporting from places with low operating costs (as referenced in Dunning’s OLE model above). In response, developing countries acquired the infrastructure and capabilities needed to sustain more complex operations, and suppliers upgraded their capabilities in response to larger orders for more complex goods.

In the 1990s, as the integration of the transition economies opened up vast new areas for external international sourcing, the most successful U.S.- and Europe-based suppliers quickly became huge global players, with facilities in scores of locations around the world (e.g., Siemens, Valeo, Flextronics). A handful of elite East Asian suppliers (Pao Chen, Quanta, Foxconn – all based in Taiwan with extensive operations on Mainland China) and trading companies (Li & Fung – based in Hong Kong but with links to contract factories worldwide) also grew rapidly by taking on more tasks for MNE affiliates and global buyers. These enterprises expanded production, not only in China, but also in other Asian countries and more recently in Africa, East Europe, and Latin America as well. As the resources in this “global supply-base” improved, more lead enterprises gained the confidence to embrace the twin — and often entwined — strategies of external and international sourcing.

This process has been driven in part by competitive dynamics. Firms are constantly searching for better options as they carefully watch the performance of other enterprises in their industry. When one of these actions is successful it is likely to be retained by the enterprise and eventually become routine (Nelson and Winter 1982). Should enterprises using these new methods prove successful, other enterprises in the same industry are likely to see them as “best practice” and respond with similar strategies. If publically held enterprises chose to ignore such lessons, they can be swiftly compelled to do so by financial markets (Williams, 2000). This is of course not purely an evolutionary story, since management fads can lead groups of enterprises to make poor choices (DiMaggio and Powell, 1983). Fund managers and financial analysts can fall into the same traps of “conventional wisdom” as corporate managers, and can get things famously wrong.

Nevertheless, the fact remains that the trend toward using external suppliers and vendors for everything from accounting to manufacturing to logistics initiated a *co-evolutionary* dynamic between lead enterprises and large suppliers (Sturgeon and Lee, 2005). International external sourcing drives increases in scale and competency in the supply-base, which in turn stimulates new rounds of external sourcing because better supply base capabilities make it more attractive for lead enterprises. Thus, the process of industry co-evolution typically extends beyond the intentions of the pioneering enterprises as it opens up new possibilities for the enterprises that follow. Today, the existence of highly competent and diverse global supply base provides opportunities for even SMEs and start-up enterprises to either be “born global” or quickly scale up their activities via external international sourcing (Moen and Servais, 2002; Knight and Cavusgil, 2004).

In sum, international external sourcing emerged in part from a self-reinforcing cycle of external sourcing and supply-base upgrading that connects enterprises across developed and developing countries. It is important to note that external sourcing does not exclude the involvement of MNEs; today’s MNE is as likely to be a supplier to other MNEs (e.g. Foxconn) than to be a brand-carrying MNE in its own right (e.g., Apple).

Today, external sourcing networks have grown up across the world to offer ready access to highly efficient, large-scale capital and low cost labor, both skilled and unskilled.

Leading-edge production, services, and logistics capacity can be hired easily and as needed. While evidence from recent research suggests that most European enterprises still engage in little if any international sourcing (Nielsen, 2008; Alajääskö, 2009), the largest, most technologically adept, and most economically important enterprises are deeply globally engaged (Bernard *et al.*; 2005; Mayer and Ottaviano, 2007; Slaughter, 2009; Brown and Sturgeon, forthcoming). While enterprises may pull back to domestic sourcing during severe economic downturns, longer-term analysis suggests that enterprises increase and even accelerate international sourcing when demand accelerates in a recovery (Sturgeon, 2003; Johnson and Noguera, 2012). If this pattern remains consistent, further accelerations in international sourcing can be expected with full economic recovery.

The frontiers and capabilities of economic globalization continue to evolve very rapidly. The process is very unlikely to fully reverse; if anything, it will accelerate. At the same time, the processes of economic globalization are complex, uneven, and take a variety of forms. To understand the character and implications of economic globalization and put policies in place that respond to it effectively, it is essential to have statistical resources in place to adequately characterize international sourcing, especially external international sourcing. As MNEs and external international sourcing networks continue to expand and the technical, psychological, and (perhaps) political barriers to relying on them diminish, it will be critical to have the needed statistical resources in place to track them, gauge their consequences, and respond to them with evidence-based policy responses. International sourcing surveys can help by making direct measurements of sourcing patterns, including direct comparisons of sourcing from international affiliates and external international sourcing to unaffiliated enterprises.

INTERNATIONAL SOURCING SURVEYS

There is a pervasive dynamic working against the usefulness of current business statistics. On one hand, production is becoming increasingly bundled with services, and on the other hand, it has become easier to fragment the value chain geographically. While we know very little about service inputs, a range of largely intangible “support” functions (e.g., R&D, sales, marketing, IT systems, etc.) clearly add value, and like physical inputs, these support functions are available from suppliers and service providers outside the enterprise and in a variety of locations around the world (Dossani and Kenny, 2003; Fernandez-Stark *et al.*, 2011).

These trends require a standardized method for grouping enterprise activities to supplement the main production function of the enterprise – i.e., the business function – and new surveys to capture how they are sourced and to quantify their cost to the enterprise. Business function surveys are useful for collecting new information on economic globalization for three reasons. First, because they consist of intangible services, the value added by support functions has proven very difficult to capture, classify and quantify. Second, the parsimony of business function lists (see Table 1) reduce respondent burden, while still generating new data that can be compared and aggregated across enterprises, countries and industries (assuming harmonized lists). Third, experience with pioneering surveys suggest that data quality tends to be high because business functions are in keeping with the way many managers think about and account for their operations (Brown, 2008; Nielsen and Luppés, 2012; Brown and Sturgeon, forthcoming).

Not only is the business function classification useful for measuring service inputs in any type of organization, but also as a high-level stand-in for occupational categories, since jobs can also be tallied according to their general function within and across organizations, industries, and geographies.

Table 1. Seven business functions used in the Eurostat survey on international sourcing

In the European International Sourcing survey, seven business functions (plus a residual “other” category) were identified using the European Central Product by Activity classification (CPA).

1) Core/Primary business functions:

Production of final goods or services intended for the market or third parties carried out by the enterprise and yielding income. The core business function usually represents the primary activity of the enterprise. It may also include other (secondary) activities if the enterprise considers these to comprise part of its core functions.

Support business functions:

Support business functions (ancillary activities) are carried out in order to permit or facilitate production of goods or services intended for sale. The outputs of the support business functions are not themselves intended to be directly for sale. The support business functions in the survey are divided into:

2) Distribution and logistics:

This support function consists of transportation activities, warehousing and order processing functions. In figures and tables, “Distribution” is used as an abbreviation for this function.

3) Marketing, sales and after sales services including help desks and call centers:

This support function consists of market research, advertising, direct marketing services (telemarketing), exhibitions, fairs and other marketing or sales services. Also including call-centers services and after sales services, such as help-desks and other customer supports services. In figures and tables “Marketing, sales” is used as an abbreviation for this function.

4) ICT services:

This support function includes IT-services and telecommunication. IT services consist of hardware and software consultancy, customized software data processing and database services, maintenance and repair, web-hosting, other computer related and information services. Packaged software and hardware are excluded. In figures and tables “ICT services” is used as an abbreviation for this function.

5) Administrative and management functions:

This support function includes legal services, accounting, bookkeeping and auditing, business management and consultancy, HR management (e.g., training and education, staff recruitment, provision of temporary personnel, payroll management, health and medical services), corporate financial and insurance services. Procurement functions are included as well. In figures and tables “Administration” is used as an abbreviation for this function.

6) Engineering and related technical services:

This support function includes engineering and related technical consultancy, technical testing, analysis and certification. Design services are included as well. In figures and tables “Engineering” is used as an abbreviation for this function.

7) Research & Development:

This support function includes intramural research and experimental development. In figures and tables “R&D” is used as an abbreviation for this function.

Note: In the 2012 Survey Engineering and related technical services were combined with R&D.

Source: Nielsen 2008

Business function lists

Enterprises, or their main operating units²⁷ typically have one or more main output, consisting of goods, services or a mix of both. In a statistical context, the business function that produces the main output(s) typically determines the enterprise’s industry

²⁷ Large enterprises may have several distinct operational units with distinct outputs. These are variously called divisions, lines of business, or business segments. For such enterprises it is sometimes best to collect sourcing data at this level.

classification(s) using standardized activity/industrial codes (e.g., ISIC, NACE, or NAICS). Inputs of goods are sometimes recorded in great detail, but services inputs have proven difficult to capture or characterize. Business function surveys provide an easy solution to this problem by providing a parsimonious, standardized, generic, mutually exclusive, and exhaustive list of support functions (see Table 1). In the business function frameworks developed so far, the main productive function of the enterprise has been designated variously as “production” (Porter, 1985), the “core function” (Nielsen, 2008), “operations” (Brown, 2008), and the “primary” business function (Brown and Sturgeon, forthcoming). Even if the terminology used differs, the approach is similar in the sense that it distinguishes between the primary business (output) function and a generic list of functions that “support” it. While collecting economic data according to business functions is still in an early stage of development, business function lists might provide an initial, generic list of service inputs to complement industry-specific input product lists that underlie input-output tables. Respondent burden would be lower than using the more detailed classifications for services trade found in EBoPS or the Central Product Classification (CPC). Full definitions of the seven business functions in Table 1 and correspondence with the CPC (ver. 2) can be found in Appendix B. The main strength of the business function approach is its potential to identify and measure support activities and other intangible assets and service inputs to the enterprise (R&D or customer service capabilities) in a way that is easily comparable across sectors and countries.

Using business function surveys to collect data on domestic and international sourcing: The 2007 and 2012 Eurostat International Sourcing Surveys

Eurostat has been a leader in collecting international business function sourcing data.²⁸ Economy-wide ad-hoc surveys (covering the so-called non-financial business economy) were carried out by the National Statistical Institutes (NSIs) of 12 European countries in 2007 and 14 countries in 2012. The 2007 survey asked about sourcing decisions made by European enterprises in the period 2001–2006, and the 2012 survey for the period 2009–2011. The focus of the surveys was on larger enterprises, as these were considered to be the key drivers of international sourcing. A cutoff threshold of 100 or more employees was used, although statistical offices in several countries decided to lower the threshold to enterprises with 50 or more persons employed to increase the sample size and pick up more enterprises. Samples sizes, employment thresholds, and preliminary response rates for the 2012 Eurostat International Sourcing Survey is presented in Table 2.

The 2007 Eurostat International Sourcing Survey found that 16 per cent of the enterprises with 100 or more employees had sourced one or more business function abroad. More than twice as many enterprises in Ireland and the United Kingdom did so (38 per cent and 35 per cent, respectively). The two small and open Nordic economies, Denmark (25 per cent) and Finland (22 per cent), were also significantly above the average. Germany (13 per cent) was just below the average.

At the time of writing this report, the results of the 2012 survey are only available for a few countries (Denmark and the Netherlands). In Denmark, 19 per cent of all enterprises with 50 or more employees sourced internationally in the period 2009–2011 (any function). Manufacturing enterprises were the most likely to engage in international sourcing, although the share in 2009–2011 fell slightly compared to 2001–2006. In the 2009–2011 period, the core function was the most commonly sourced internationally,

²⁸ See: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/International_sourcing_statistics

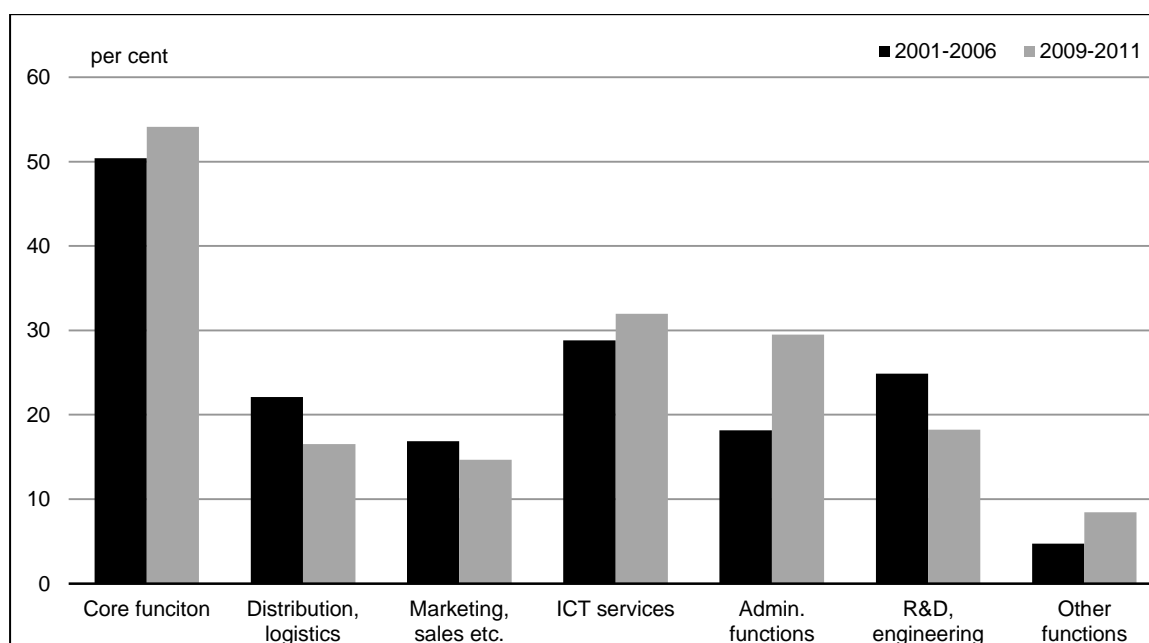
followed by ITC services. Instances of enterprises internationally sourcing administrative functions increased substantially, while distribution and R&D/engineering both decreased slightly (see Figure 4).

Table 2. 2012 Eurostat international sourcing survey, sample sizes and preliminary response rates

Country	Sample size	Size Threshold (minimum number of employees)	Preliminary response rate %
France	8,100	50	72
Portugal	1,000	100	92
Netherlands	2,200	100	79
Romania	3,000	100	96
Slovakia	1,300	100	78
Sweden	1,000	100	UA
Lithuania	1,000	100	UA
Latvia	600	100	95
Estonia	500	50	87
Ireland	1,400	100	41
Belgium	1,000	100	UA
Norway	2,300	50	94
Denmark	4,500	50	96
Finland	2,000	50	75

Source: Nielsen and Luppés, 2012, based on Eurostat data

Figure 4. Business functions sourced internationally by Danish enterprises engaged in international sourcing, 2001-2006 and 2009-2011



Note: R&D and engineering one function in the survey covering 2009-2011, but was included as two functions for 2001-2006. Enterprises sourcing both in 2001-2006 have only been counted once in calculating the 2001-2006 shares.
Source: Nielsen, 2012, based on Eurostat-coordinated sourcing surveys

Quantifying sourcing in business function surveys: the 2011 National Organizations Survey

Neither the 2007 nor the 2012 Eurostat International Sourcing Survey asked respondents to quantify the value of their external and international sourcing, only to indicate if they had made such choices or not. Both economic theory and case study research suggest that managers often experiment with a variety of “make” or “buy” choices in regard to both domestic and international sourcing (Bradach and Eccles, 1989; Berger et al., 2005). Quantifying sourcing costs according to the four quadrants of Figure 2 is important because enterprises can, and often do, use a combination of sources for specific business functions. For example, the core/primary business function (e.g., component manufacturing or assembly) may be externally sourced, but only as “overflow” work when internal capacity is fully utilized. Or, enterprises might combine internal and external sourcing for strategic reasons, such as pitting in-house operations against external sources to create competition in the realms of cost, quality, or responsiveness. Combinations of internal and external sourcing might show a transitional phase of sourcing, the movement of work back in-house (sometimes referred to as insourcing), or building up new in-house functions, and quantitative sourcing data collected over time can capture these trends. Most importantly, quantitative information can reveal the scale of external and international sourcing. With a binary answer, it cannot be determined if a “yes” response to an international sourcing question represents a small or a large contract, a small portion of the costs of the business function or most or even all of the function’s costs.

Quantitative employment, wage, and sourcing information by business function were recently collected in the United States by the 2011 National Organizations Survey (NOS), funded by the National Science Foundation.²⁹ The purpose of the study is to generate direct comparison of domestic employment characteristics with sourcing practices in eight business functions according to all four sourcing options shown in Figure 2. The 2011 NOS was administered online and by phone to a representative sample of United States businesses plus an oversample of the largest U.S. companies.

As they have been in the Eurostat International Sourcing Surveys, questions about business functions in the 2011 NOS were apparently well understood and easily answered by senior executives. Respondents at large and small enterprises, non-profits, and public organizations were able to quantify the number of jobs, wage ranges, and sourcing “locations” by business function according to their “best estimate.” For example, in the 336 completed surveys, only 4.5% (15) respondents indicated “don’t know” to the question asking for the share of the organization’s total United States employment according to business function. Of these, twelve were able to supply information about ranges of employment for each function (e.g., 1-10%, 11-30%, etc.), leaving only three respondents unable to answer the question. For each of the eight functions (unlike the Eurostat surveys, the NOS survey asked about sales and marketing functions separately from after sales service functions) the survey asked for sourcing costs in each of the four quadrants of Figure 2 as a per cent of total costs for the function (see Figure 5).³⁰

²⁹ See: <http://scienceofsciencepolicy.net/award/national-survey-organizations-study-globalization-innovation-and-employment>

³⁰ In the 2011 NOS survey, sourcing “costs” are defined as follows. For a *manufacturing* business the costs of goods sold (COGS) includes materials, labor, and factory overhead. For a *retail* business COGS what the company pays to buy the goods that it sells to its customers. For a *service* business, it is the cost of the persons or machines directly applying the service, typically called “cost of sales.” by accountants. For a

Figure 5. Data collection grid for four sourcing options by business function

NATIONAL ORGANIZATIONS SURVEY

Thinking about the same functions, now we're going to ask you some questions about how your organization is structured. Within each functional category, we'd like to know about where the work takes place, whether within your organization or by an outside supplier either in the U.S. or in a foreign country. For each function, please indicate the percentage of costs for each location during calendar year 2010. Please indicate the **percentage of costs** (click definitions link below for an explanation) incurred during calendar year 2010 for PLG Retail in each of the following locations.

(The locations for each function should total 100%)

	...by your organization? DOMESTICALLY	...by an independent supplier or suppliers (no ownership of 10% or more)? DOMESTICALLY	...by a foreign affiliate of your organization (ownership of 10% or more)? INTERNATIONALLY	...by an independent supplier or suppliers (no ownership of 10% or more)? INTERNATIONALLY	TOTAL	Not Applicable
Primary business function	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Research and development of products, services, or technology	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Sales and marketing	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Transportation, logistics, and distribution	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Customer and after sales service	<input type="text" value="90"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="10"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Management, administration, and back office functions	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Information technology systems	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>
Facilities maintenance and repair	<input type="text" value="100"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text" value="100"/>	<input type="checkbox"/>

[View Business Function & Other Definitions Here](#)

Progress - 50%

If you have any questions please call 1-877-737-5782 ext. 286 between 9am to 5pm Pacific Time Mon. - Fri.

[Frequently Asked Questions](#)

Source: National Organizations Survey

- *Data gap: Valuation of sourcing. In the 2007 and 2011 European surveys, respondents only provided binary responses: indicating yes or no by checking a box (an exception was R&D sourcing costs, which were quantified). Since enterprises use mixed sourcing practices and a quantitative measure is required to judge the*

consulting company, for example, the cost of sales would be the compensation paid to the consultants plus costs of research, photocopying, and production of reports and presentations. For a *public* organization, costs are typically defined in its operating budget.

magnitude of international sourcing, future international sourcing surveys in Europe should collect information on the value of sourcing for each business function.

- *Data gap: Current sourcing. In the 2007 and 2011 surveys, respondents were asked about sourcing events that occurred during a specific time period. Because of this, business functions externally sourced before the period were not captured. Quantitative panel data on international sourcing will reveal trends more reliably than asking respondents to recollect sourcing decisions made several years earlier.*
- *Data gap: External domestic sourcing. In the 2007 and 2011 surveys, no data was collected about external domestic sourcing (quadrant 2 of Figure 2), although a distinction was made between intra-EU sourcing and extra-EU sourcing. Domestic sourcing is important because it can draw attention to business functions soon to be sourced internationally, or a function that relies on proximity even if it is possible to be sourced externally. Either way, the implications for employment and policy making are important. When specific business functions are observed being externally sourced in large scale, either domestically or internationally, the data might be capturing the birth of a new industry such as call center services or IT services.*
- *Data issue: For quantitative international sourcing and other new data, a threshold may need to be crossed: for certain datasets, statisticians may need to accept more subjective data sources. More flexibility is needed in regard to data collection methods. This can mean moving away, in some instances, from an accounting model where respondents are asked to access and provide data from official company records. In subject areas where companies do not keep detailed and consistent records (e.g., purchased services, international sourcing), surveys may need to rely on the “best estimates” of informants. The key to data quality, in these instances, will hinge on the quality of the respondent — reaching “the right person” at the target enterprise or organization — and on the crafting of survey question to reflect the day-to-day experiences of practitioners.*

TRACKING SCIENCE, TECHNOLOGY, AND INNOVATION (STI) IN GLOBAL VALUE CHAINS

Research and development (R&D) and Innovation are widely believed to be a main source of economic development. The central idea is that new scientific discoveries and new technologies lead to new processes and products and these in turn lead to increased industrial output, exports, and employment.³¹ In Europe, following the “Oslo Manual,” the definition of innovation has gravitated toward the activities in the private sector, occurring in the context of the business practices and the open marketplace: “Innovation is defined as the introduction of new or significantly improved products (goods or services), processes organizational methods, and marketing methods in internal business practices or in the open marketplace” (OECD/Eurostat, 2005).³²

As a result of this broad agreement and interest in R&D and innovation, the data resources to measure domestic R&D and innovation have improved greatly. R&D expenditures by business, government, higher education, and private non-profit organizations are collected and published by Eurostat by source of funds, by type of costs, by type of economic activity (NACE), by enterprise size class, by type of R&D (basic, applied, and experimental research), and several other variables. R&D personnel

³¹ For results of the 2013 Innovation Union Scoreboard of the EU, see http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index_en.htm

³² Recently the United States’ National Science Board adopted this definition as well (NSB, 2012).

data is available in full-time equivalent and head count (HC) form, and as a % of employment and as a % of labor force. The data is further broken down by occupation, by qualification, by gender, by size class, by citizenship, by age groups, by fields of science. Data is published for all EU Member States (EU-27, EU-15 and EA-17), plus Candidate Countries, EFTA Countries, the Russian Federation, China, Japan, the United States and South Korea.

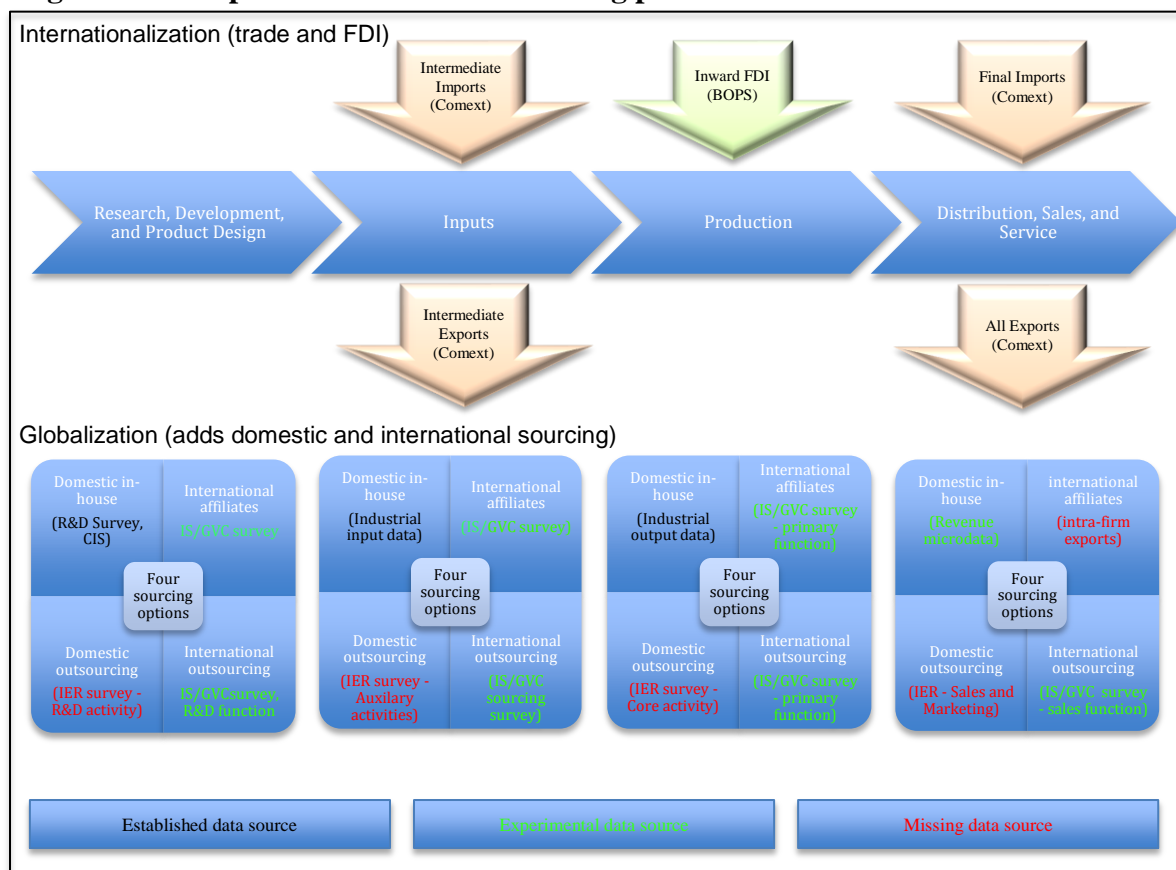
- *Data gap: Links between STI statistics and more detailed information on international trade in R&D services*
- *Data gap: Links STI statistics international sourcing of R&D function from international sourcing surveys*

International sourcing surveys ask about imports of R&D from both affiliates and independent suppliers (and quantitative information collected). For enterprises that engage in international sourcing of R&D, additional questions could be added to gain a fuller picture of the nature of the R&D activities being performed.

SUMMARIZING THE DATA GAPS AND ISSUES

Figure 6 shows the traditional data sources to characterize internationalization and then adds the sixteen sourcing realms realms in Figure 3 (four each for R&D, Inputs, Production, and Distribution of outputs). Established, experimental, and missing statistical resources are indicated by black, green, and red font colors.

Figure 6. A simple value chain with sourcing possibilities and data resources



Examining the upper section of Figure 6 (internationalization) from left to right, flows of goods inputs (imports and exports) can be observed through statistics on international trade in (intermediate) goods. Inward investment statistics (Inwards FATS) are available by industry, providing some notion of the scale of foreign investment in specific sectors, but the investment data cannot be tied to enterprises. Outward investment data is also not available in enough detail to be useful for observing or even estimating the activities of foreign affiliates owned by European enterprises, so it is omitted from in Figure 6.

Examining the lower section of Figure 6 (domestic and international sourcing) from left to right, information about in-house domestic R&D activity is captured by R&D surveys, while R&D sourced in foreign affiliates is international sourcing surveys, which asks if “R&D, engineering and related technical services” are sourced in either foreign affiliates or internationally to independent suppliers. No data is collected on R&D services externally sourced domestically except by the Inter-Enterprise Relations survey³³, marked as missing because it was only fielded once, in 2003. As discussed above, data on internal R&D activities is relatively rich, but it cannot be easily linked to information trade in R&D services at the European level. However, there is scope for research that links enterprise-level results from European R&D and innovation surveys to survey data on international sourcing of R&D from the experimental international sourcing survey.

Moving to the second value chain stage in Figure 6, inputs, it is clear that intermediate sourcing data for other support functions are harder to come by. There is no direct data collected about in-house provision of specific support services. Occupational employment statistics provide some clues in this regard, but job descriptions cannot be attributed to specific internal support functions without making some gross assumptions. While data in purchased inputs is included in the micro-data that underlie national input-output tables, it does not generally specify goods vs. services (much less contain product detail) or domestically sourced vs. imported inputs.

Rich information on the third value chain stage in Figure 6, production, can be found in structural business statistics (SBS), and coverage for services was improved in 2008. However, for European MNEs, information about the activities of affiliates is largely missing from outward FATS statistics. Information about the sourcing of enterprises’ primary function is available only from the experimental international sourcing survey.

Finally, some data on sales and distribution (i.e. wholesale and retail trade) can be found in turnover data collected in SBS, and outward FATS collect turnover and persons employed at affiliates. The experimental international sourcing survey asks if sales and distribution services are provided by affiliates or externally sourced from independent foreign enterprises. No data is currently collected on the use of domestic suppliers for sales, distribution, or aftersales service.

Several things become clear in this discussion. First, data on domestic sourcing is completely lacking. Second, the international sourcing survey is the only source for data on international sourcing to affiliates or independent suppliers, suggesting that this experimental survey needs to be further enhanced to collect more detail and made permanent and enhanced. Third, because the EBoPS classification for trade in services has limited correspondence with other classifications, links to enterprises can only be made for trade in goods, and so far only at the level of individual member states. Fourth,

³³ See http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Inter-enterprise_relations

and perhaps less obvious or even masked by Figure 6, is the fact that the various data sources listed have different conceptual frames, sample frames, periodicities, levels of detail, and modes and levels of accessibility. This can lead to situations where the statistical outputs of the various data sets cannot be readily compared or linked because the definitions, concepts and methodologies applied are partially or even totally different. Lack of compatibility and consistency make it difficult for data sources to be used in combination to tell a holistic story of economic globalization or provide support for the four main uses for statistics on economic globalization mentioned on page 10: enterprise characteristics, globalization trends, employment effects, or innovation effects.

There are many initiatives in the EU to address and improve above issues.

- The Eurostat International Sourcing Survey has already been discussed at length, including gaps and deficiencies in the current survey.
- Another is the European Statistical System Network (ESSnet) on Profiling, which is developing a methodology to identify, at the EU level, enterprises within multinational enterprise groups through an analysis of their legal, operational and accounting structure, delineated in terms of legal units.
- The ESSnet on Consistency Project is working to create consistent concepts, definitions and methodologies within the European Statistical System. Inconsistencies arise from incoherent concepts, definitions and methodologies, as well as from different implementation in Member States. Issues include target populations, sample frames, reference periods, classifications and their applications, as well as characteristics and their definitions. It would be advisable for all business related statistics, including statistics on international trade, to use common classifications like ISIC and CPC (NACE and CPA in the European context), or at least classifications that can be aggregated to ISIC/CPC (NACE/CPA). Where appropriate, compatibility with the System of National Accounts (SNA) framework, the international statistical standard for the national accounts adopted by the United Nations Statistical Commission (UNSC) and the European System of Accounts (ESA) should be pursued.
- There are efforts to in Eurostat to specify the Nature of Transactions (NoT) in international goods trade (purchase/sale, work under contract, etc.) for balance of payments and national accounts purposes. The flow of intermediate and final goods in some of these arrangements is sometimes characterized as “processing trade.” Processing trade typically occurs when parents or contract issuers send intermediate inputs from home countries to international locations where “contract production” is performed by affiliates or independent suppliers, sometimes in export processing zones (EPZs), where no duties are charged for imports and finished goods are imported back to home countries under preferential agreements that do not charge duties on foreign value added. The problem being addressed by these efforts (in cooperation with the United Nations Economic Commission for Europe) is that the preferential agreement programs do not necessarily track all transactions related to processing because it relies on customs and VAT rules for compliance. Enterprises engaged in processing trade do not have incentives to use these customs processing procedures because tariff rates are zero.
- Finally, work is also underway on a European System of Business Registers (ESBRs) within the framework of the European Statistical System Vision

Implementing Programme (ESS.VIP)³⁴. This would allow many of the data gaps just discussed to be more easily filled.

Several of these efforts are discussed in more detail in Part III.

To summarize, four main inward and outward *international flows* have been identified in the discussion so far:

1. arms-length trade,
2. intra-group trade,
3. external international sourcing, and
4. FDI.

Table 3 summarizes the most basic (e.g., domestic external sourcing is excluded) information required for measuring the GVC engagement of enterprises, along with the data sources and data gaps discussed in Part II.

Table 3. Information required for measuring the international flows at the enterprise level

Variable	Measure	Available?
Inward flows		
Arms-length imports	Value by product and trading partner country	<ul style="list-style-type: none"> • Yes. But there is no way to differentiate arms-length from other transactions (intra-group or externally sourced) in COMEXT or BOPs international services transactions data. • There are no links between trading partners (IDs).
Intra-group imports	Value by product and trading partner	<ul style="list-style-type: none"> • No. Not differentiated in COMEXT or BOPs international services transactions data
Inward external sourcing	Value of intermediate goods and services sold to foreign customers by business function (including R&D services)	<ul style="list-style-type: none"> • Partially. The experimental international sourcing survey has one question on inward sourcing, but no information on the value of services are collected
Inward FDI	Value of FDI by industry and recipient country	<ul style="list-style-type: none"> • Yes, but there are no links to enterprise IDs
Outward flows		
Arms-length exports	Value by product and trading partner country	<ul style="list-style-type: none"> • Yes. But there is no way to differentiate arms-length from other transactions (intra-group or externally sourced) in COMEXT or BOPs international services transactions data. • There are no links between trading partners (IDs).
Intra-group exports	Value by product and trading partner	<ul style="list-style-type: none"> • No. Not differentiated in COMEXT or BOPs international services transactions data
Outward external sourcing	Value of sourcing by business function (including R&D)	<ul style="list-style-type: none"> • Yes. The experimental international sourcing survey asks this question, but sourcing is valued only for R&D
Outward FDI	Value of FDI by industry and recipient country	<ul style="list-style-type: none"> • Yes, but there are no links to enterprise IDs and very little information about foreign affiliates in outward FATS data.

³⁴ See

http://epp.eurostat.ec.europa.eu/portal/page/portal/pgp_ess/news/ess_news_detail?id=134606438&pg_id=2737&cc=ESTAT_EUROSTAT

Table 4 summarizes the existing and missing GVC variables in the current European statistical system based on the main *established* datasets (black font color in Figure 6). In all cases links to enterprise identifiers (and therefore characteristics) at the enterprise group level are missing. Without these links, research and the production of indicators based on micro-data linking will not be possible.

Table 4. Existing and missing GVC variables in the European Statistical System (ESS)

Topic	Eurostat data set	Useful GVC variables	Missing GVC variables
Existing data sources			
International Trade in Goods	COMEXT	Value of trade by: <ul style="list-style-type: none"> • Product • Industry • Trading partner 	<ul style="list-style-type: none"> • Intra-group trade • International sourcing of intermediate and final goods
International trade in services	BOPS services trade	Value of trade by: <ul style="list-style-type: none"> • Product • Industry • Trading partner 	<ul style="list-style-type: none"> • Intra-group trade • International sourcing of services
Outward foreign direct investment	BOPS outward FDI	Value of outward FDI by: <ul style="list-style-type: none"> • Industry • Trading partner 	<ul style="list-style-type: none"> • Links to parent • Affiliate characteristics
Inward foreign direct investment	BOPS inward FDI	Value of outward FDI by: <ul style="list-style-type: none"> • Industry • Trading partner 	<ul style="list-style-type: none"> • Links to parent • Affiliate characteristics
Activities of European MNEs abroad	SBS outward FATS	Affiliate turnover Number employed	<ul style="list-style-type: none"> • Parent characteristics • Intra-group trade
Activities of foreign MNEs in Europe	SBS inward FATS	Affiliate turnover Number employed ...many others	<ul style="list-style-type: none"> • Intra-group trade
R&D	R&D survey	R&D spending, employment, etc.	<ul style="list-style-type: none"> • Links to enterprise characteristics • Links to trade in R&D services • International sourcing of R&D
Experimental data sources			
International sourcing	IS/GVC survey	Sourcing by: <ul style="list-style-type: none"> • Business function • Affiliate or independent supplier • Geographical location 	<ul style="list-style-type: none"> • Value of sourcing (cost of goods and services) • In-house costs by function • Domestic sourcing by function
Domestic sourcing	Inter-industry relations survey	Domestic sourcing by: <ul style="list-style-type: none"> • Core activity • R&D • Sales and marketing • ICT services 	<ul style="list-style-type: none"> • Value of sourcing (cost of goods and services) • Missing business functions (management and admin, transport and logistics, facilities maintenance, etc.)

Part III: LEVERAGING MICRO-DATA RESOURCES

Governments collect data for the purpose of administering programs such as tax collection, compliance with environmental protection laws, and the like. For this reason such data is typically referred to as “administrative data.” In national statistical institutes (NSIs) as well, more detailed “micro-data” underlie what is ultimately made available to the public. NSIs usually have (or should have) legal access to tax records and social security records. Administrative records for enterprises, known as “business registers” are critical elements of the statistical system. Data in business registers typically include business name, address, a unique establishment-level identifier, industry, employment, and the identity of the enterprise that owns the establishment. Linked tax information can include information on turnover, profits, and investments. Business registers can provide comprehensive sample frames for surveys and provide rich information when linked to data on individuals (work and wage histories, for example), international trade and other statistics related to economic globalization. Because they are responsible for maintaining and updating business registers, NSIs are well positioned to develop and maintain links between business registers and other statistics.

The work of making fuller use of business registers and other administrative data is only beginning. To state an important caveat again, administrative data are usually confidential. Researchers in and out of government who have security clearance and have their proposals accepted by the agencies that hold micro-data resources can gain access (as long as agency personnel screen the results before the research is published) and have conducted important research. But business registers and other micro-data resources are only now being made more assessable, put to more general use, and — crucially for the purpose of understanding economic globalization — linked internationally.

TRADE BY ENTERPRISE CHARACTERISTICS

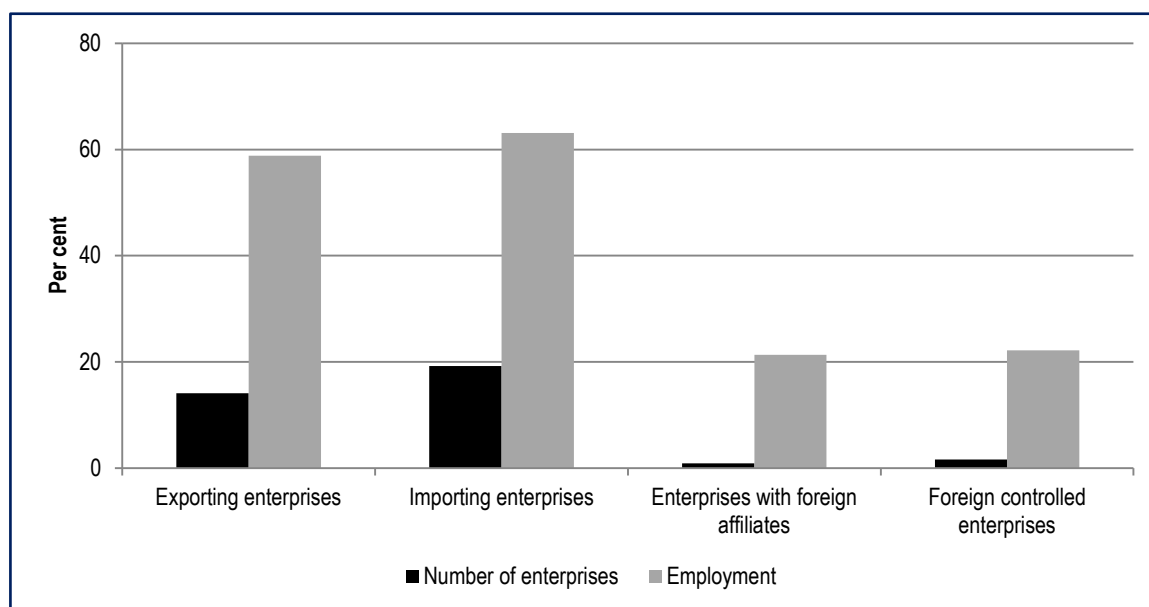
A recent Eurostat initiative called Trade by Enterprise Characteristics (TEC)³⁵ represents a major step forward because it links trade statistics to the enterprises that trade, creating new information about classes of enterprises in Europe, including firm size and industry, but also by ownership (domestic/foreign) and type of international engagement (i.e., exporters, importers, and both). Based on micro data linking of SBS, inward and outward FATS, and VAT statistics, Figure 7 shows the share of Danish enterprises in each of these latter categories. The figure reveals what has already been mentioned and will be discussed again below: internationally engaged firms tend to have an outsized impact.

- Because *COMEXT* and *BoPS* trade in services data cannot differentiate arms-length trade from intra-group trade and trade from external international sourcing, the picture provided by TEC is incomplete. Not only are ownership and direct involvement in trade important, but information about the enterprises engaged in external international sourcing might bring in enterprises that otherwise appear to be outside of the trading system. Again, three types of trade need to be identified: arms-length, intra-group, and external international sourcing.

³⁵ See

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/International_trade_by_enterprise_characteristics

Figure 7. Share of Danish non-financial enterprises and employment by trade and ownership categories (2010)



Note: Categories are **not** mutually exclusive.

Source: Nielsen and Luppés, 2012

THE EUROGROUPS REGISTER (EGR) AND EUROPEAN SYSTEM OF BUSINESS REGISTERS (ESBRs)

In any society, MNEs tend to be large, competitively dominant, highly productive, and technologically advanced enterprises that are large domestic employers and also the largest traders and investors in R&D. In other words, they are economically important actors that account for a large share of innovation and economic globalization. Slaughter (2009, p. 10), summarizing the work of Bernard et al (2007) makes the case very convincingly for the United States:

Companies in the United States that are part of a multinational firm account for a small fraction of one percent of all companies. But these firms account for 23.7% of all private-sector jobs—jobs that involve lots of knowledge creation, capital investment, and international trade, all activities associated with higher compensation. In 2006 these multinationals undertook 42.6% of all U.S. capital investment, shipped 66.9% of all U.S. goods exports and brought in 59.9% of all goods imports, and conducted a remarkable 89.6% of all U.S. private sector R&D. The bottom line that year for their nearly 27 million employees was an average compensation of \$64,121—over 25% above the economy-wide average.

In the United States, data on MNEs includes data on parents in the U.S. and intra-group trade for both U.S. MNEs and foreign MNEs with affiliates in the U.S. Taken together, MNEs account for nearly 60% of U.S. imports and 70% of exports, 24% of employment, and 90% of spending on R&D. It is important to note that the key innovation in the work of Bernard et al (2005) was the identification of enterprise characteristics in terms of trade and ownership and the creation of links to a wide variety of enterprise-level performance measures were derived from data in the business register. What is needed is full information on the characteristics of enterprises, connected a unique identifiers and information on intra-group trade, as mentioned earlier.

Mayer and Ottaviano (2007) found similar patterns in Europe (see Table 5).

Table 5. Concentration of exporters in total manufacturing exports (percent), 2003

Country of origin	Top one percent	Top five percent	Top ten percent
Germany	59	81	90
France	44 (68)	73 (88)	84 (94)
United Kingdom	42	69	80
Italy	32	59	72
Hungary	77	91	96
Belgium	48	73	84
Norway	53	81	91

Source: Mayer and Ottaviano, 2007, p. 8.

Note: France, Germany, Hungary, Italy and the UK provide figures on large firms only; Belgian and Norwegian data is exhaustive. Numbers in brackets for France are percentages from an exhaustive sample

An important step toward better micro-data infrastructure in Europe is being undertaken by Eurostat and by the NSIs of the EU and EFTA countries, which are developing the EuroGroups Register (EGR) to house information on MNEs, including global group heads and affiliates of foreign enterprises in the EU, information generally missing from business registers in Europe. The EGR provides enterprise information to at three levels as follows:

- **legal units:** identity, demographic, control and ownership characteristics;
 - **enterprises:** identity and demographic characteristics, activity code (NACE), number of persons employed, turnover, institutional sector;
 - **enterprise groups:** identity, demographic characteristics, the structure of the group, the group head, the country of global decision center, activity code (NACE), consolidated employment and turnover of the group.
- *Data gap: It is impossible to know the country of ownership of enterprises in Europe using current data sources. Even at the European level, the fragmentation of enterprises is causing problems for the compilation of key statistics related to economic globalization, including Foreign Affiliates Statistics (FATS), foreign direct investment (FDI), and external trade. For example, inward FDI statistics from EBoPS cannot be linked to enterprises. The EGR is a major step forward, but the scope is only to cover the “most important enterprises” (i.e., largest MNEs operating in Europe). The scope should be broadened to the extent possible.*
- *Data issue: The EGR should be linked to a full set of business registers that include ALL enterprises in Europe, MNEs and domestic enterprises. One reason is that not all enterprises that are globally engaged are MNEs. Again, a main point of this report is that external international sourcing can be practiced without FDI (by “global buyers” such as Nike for example).*

The European System of Business Registers (ESBRs) project, which is scheduled to deliver results by the end of 2017, envisions a fully interoperable system of business registers (national plus the EGR). It is important to note that the ESBRs are not meant to be a single register, but a series of compatible registers that can be linked. The European Statistical System is built upon the idea that National Statistical Institutes will maintain their national business registers in line with the relevant European regulations. The ESBRs will only serve national statistical institutes and national central banks and not be disseminated to the public. However, if an expanded EGR can be linked to a fully

interoperable set of ESBRs, the combined data infrastructure can become a platform to support the fuller use of micro-data in Europe. It can serve, not only as a complete sample frame for surveys on economic globalization and other topics, but also a basis for linking vast quantities of European enterprise-level administrative data, and for the more comprehensive Integrated International Data Platform (IIDP) envisioned below (see page 45).

INTERNATIONAL INPUT-OUTPUT DATABASES

It used to be safe to assume that all of an import's value was added in the exporting country. This meant trade statistics a great deal of analytic value and policy relevance. In this simpler world, industrial capabilities could be judged by the quality and technological content of exports and trade rules could be tied to gross levels of trade in specific products or product sets. "Rules of origin" labeling requirements are based on this assumption as well, but today, it is difficult to know what labels such as "made in China" or "made in the EU" really mean (OECD, 2011).

Because of economic globalization and the fragmentation of work in international sourcing networks, we simply cannot know what share of an imported product or service's value is added in exporting countries, and are less able to judge a country's level of development from the technological sophistication of its exports, following Lall (2000). Flows of intermediate goods provide hints about the structure of GVCs (see Feenstra, 1998; Brulhardt, 2009; and Sturgeon and Memedovic, 2010), but because we do not generally know the ownership of imported inputs, how they are used in specific products, or how they are combined with domestic inputs and value added, it is generally not possible to extract concrete information about the geographic distribution and flow of value added from trade statistics alone.³⁶

These data and policy gaps have triggered innovative efforts to link information in national accounts on intermediate input use and domestic value added by sector³⁷ with data on international trade in goods and services to create larger *international (global and regional) input-output* (IIOs) that researchers can use to move beyond simple measures of gross trade to estimates of trade in value added. IIOs show the international sources of value in goods and services produced and consumed throughout the world. With estimates of this sort, we can begin to answer the question of, "Who wins and who loses from globalization?" from the supply side (i.e., winners and losers in terms of value added, value capture, and employment), in addition to the demand side (i.e., winners and losers in terms of consumer prices). Figure 8 provides a simple, generic two-country model IIO table.

There are multiple significant efforts to create IIOs. The first (and apparently most accurate so far) is the Asian International Input Output (AIIO) Table created by Japan External Trade Research Organization's Institute of Developing Economies (IDE-JETRO), initially released in 2006. The AIIO is a regional table that links intermediate and final demand in nine largest Asian trading countries plus the United States. The table

³⁶ Processing data from China and Mexico are exceptions to this generalization. Links to enterprise characteristics have been used (see Dean *et al.*, 2007 and Koopman *et al.*, 2008).

³⁷ Some of IIOs are based on supply-use tables (e.g., WIOD), while some are based on IO tables (e.g., GTAP-based tables), and some are transitioning from IOs to SUTs (e.g., OECD/WTO)

also estimates imports and exports from Hong Kong, the EU (as a whole) and an aggregate “rest of the world” category.

Figure 8. A simple, generic two-country IIO table

		Intermediate use		Final Use		Total use
		Country 1	Country 2	Country 1	Country 2	
		1 ... N	1 ... N			
Supply	Country 1 1 ⋮ N	1's use of its own inputs	2's use of inputs from 1	1's use of its own final goods	2's use of final goods from 1	1's total output
	Country 2 1 ⋮ N	1's use of inputs from 2	2's use of its own inputs	1's use of final goods from 2	2's use of its own final goods	2's total output
	Value added	1's value added	2's value added			
	Total supply	1's total output	2's total output			

Source : Powers (2012)

The EORA dataset, developed at the University of Sydney, covers 160 countries at a detail of up to 500 sectors in time series covering 2000- 2007 (see Kanemoto et al, 2011). The Purdue University’s Global Trade Analysis Project (GTAP) has produced a publicly available IIO database that covers 120 countries/regions and 57 commodities for 2004 and 2007 (in the GTAP 8 Database). As noted below, these databases typically require additional processing before they can be used for analysis.

The World Input-Output Database (WIOD) is a large-scale EU project under the umbrella of the 7th Research Framework Program (FP7) centered at the University of Groningen in the Netherlands that began in May of 2009 and officially ended with the launch of a public use dataset on April 16, 2012. The dataset consists of an IIO covering 40 countries (including 27 in the EU and 13 other major developed and developing exporters), representing approximately 85% of world trade for the period 1995-2009, and covers 35 sectors (using the NACE Rev. 1) and 59 products (using the CPA classification). Non-EU countries in the data set include Australia, Brazil, Canada, China, India, Indonesia, Japan, Russia, Mexico, South Korea, Taiwan, Turkey, and the USA, and an aggregate “rest of the world” category.

To broaden its usefulness to policy makers, WIOD is linked to several satellite accounts, including capital and labor (in physical inputs and factor incomes), and environmental accounts, including CO² emissions, energy consumption, and resource use. These linked accounts allow researchers to use regression analysis to examine the relationship between GVCs and employment and CO² emissions.

On March 15, 2012, the OECD and WTO announced a joint initiative to develop a database of Trade in Value Added indicators (TiVA), drawing on WIOD and other sources, as a permanent fixture in the international statistical system. The first release of TiVA indicators was made on January 16, 2013. The TiVA database presents indicators for 40 countries (all OECD countries, Brazil, China, India, Indonesia, Russian Federation

and South Africa) covering the years 2005, 2008 and 2009 and broken down by 18 industries.³⁸ Indicators in the database include:

- Decomposition of gross exports by industry by domestic and foreign content
- The services content of gross exports by exporting industry by foreign and domestic origin
- Bilateral trade balances based on flows of value added embodied in domestic final demand
- Intermediate imports embodied in exports

Whether IIO datasets are publically available or not (GTAP and WIOD are), they can be used as building blocks for special use or elaborated data sets. For example, The United States International Trade Commission (USITC) has combined GTAP data with more detailed information on international trade (Koopman et al, forthcoming). In another project, the USITC linked GTAP data to detailed micro-data from the United States to create estimate for how outputs from small and medium-sized enterprises (SMEs) are linked to exports by larger companies, thus revealing how global engagement spills over to the rest of the economy (USITC, 2010). On February 28, 2013, the United Nations Conference on Trade and Development (UNCTAD) announced that it was using the EORA IIO to create the UNCTAD-Eora GVC Database, an IIO that will be combined with its own datasets on transnational firms and FDI in a broader “UNCTAD FDI-TNCs-GVC Information System.”³⁹

Despite the ferment in IIOs and the progress they represent, it is important to acknowledge the lack of detail, timeliness, and accuracy that inevitably arise from estimation and cross-border harmonization. National input-output matrices, in countries where they exist, are based on partial data to begin with, and rely on a range of inferences and assumptions, such as the proportionality of imported inputs across all sectors, where international trade is concerned. The industries in input-output tables are in fact, groupings of enterprises (e.g., industries), and data limitations in most cases force the assignments of the same production function across the group, including the content and value of imported inputs, and there are no possible links to enterprise-level data. When national input-output data sets are linked across borders, these limitations are compounded as industry categories are harmonized at high levels of aggregation and additional layers of assumption and inference are added to fill in missing data. The data gaps are particularly acute for services. Time lags are another important drawback of this approach; the most recent data available in any IIO is 2009.

The statisticians that develop IIOs work hard to ensure that the Leontief type modeling and other estimation techniques used are neutral, non-informative adjustments that are necessary given limitations in underlying data. Since it is known that globally engaged enterprises use more imported inputs than enterprises that do not, statisticians make prudent estimates to adjust for underreported imported inputs. But there is a need to go farther, since research suggests enterprises that export and two-way traders have significantly different characteristics, and that foreign-owned enterprises show additional variations (Bernard et al, 2005; Nielsen and Luppe, 2012), as shown in Figure 7.

³⁸ See: <http://www.oecd.org/industry/industryandglobalisation/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm>

³⁹ See: http://unctad.org/en/PublicationsLibrary/diae2013d1_en.pdf

However, problems can arise when researchers and policy-makers using IIOs do not understand the techniques and trade-offs that have been made, engage in uncritical, over-interpretation of estimated data: essentially interpreting it as real data. For example, Stehrer (2012) uses WIOD data to show the share of foreign value added in world exports rising from 19.1 percent in 1996 to 25.7 in 2009, driven almost entirely by intermediate goods. These are important statistics because the import content of exports provides an excellent proxy for the overall extent and growth rate of international sourcing in the world economy. The figures have intuitive resonance: international sourcing is a substantial, but not yet dominant form of economic globalization, driven by trade in intermediate goods. But given the heavy estimations that were used in creating the WIOD tables, it is impossible to know how much of this result is based on estimates (conditioned in part by the subjective assumptions of the researchers that built WIOD) and how much is based on real data.

Still, IIOs represent an important achievement. They provide a framework for delivering new, policy-relevant statistics related to economic globalization that can be used in a broad range of research and for the creation of useful indicators. IIOs can show the extent and character of GVCs, reveal national specializations, and link to satellite accounts on employment and the environmental effects of economic globalization.

In sum, bottom-up improvement of statistics related to economic globalization and the top-down approach of IIOs go hand in hand, since quality of IIOs is limited by the quality of the underlying data. What is needed now is support of the current efforts to extend, improve, and institutionalize IIOs. This will include on-going work to reconcile imports and exports using “mirror” statistics to improve the quality of the underlying trade statistics, and identifiers that would allow IIO tables to be split according to the characteristics of enterprises: export-oriented vs. domestic-oriented enterprises. New, improved, and internationally harmonized data resources, such as those proposed in this report, can be used to fill in missing and estimated data at the national level. Since this may not be realistic for most countries, business surveys should be used to provide information that can improve estimates. Sample frames for business surveys can be based on enterprise characteristics and linked through international business registers. This will yield a better approach than the current practice of assuming all enterprises are the same. In other words, new and improved business statistics should be designed with improving IIOs in mind and the managers of IIO databases as “customers.”

TAKING MICRO-DATA MAINSTREAM

As has already been discussed, administrative micro-data from public surveys and linked data sets can enrich our view of how domestic enterprises engage with the global economy. Micro-data collected from MNEs, for example, when combined with data on international trade, can provide new information about the cross-border activities of MNEs and how they use local resources in offshore locations. Such approaches can be difficult to replicate and extend, however, because not all researchers can access confidential micro-data, and because the painstaking work of cleaning and matching raw micro-data files can be very difficult for other researchers to understand and replicate.

Furthermore, administrative data sets are often non-standard, available only for individual countries, and for limited time periods as when data collected in support of specific

policy initiatives are phased out after the programs they were intended to support come to an end. Historic micro-data is regularly lost, either through purposeful destruction for reasons of confidentiality or more commonly through lack of maintenance and proper archiving, especially as IT systems storing and delivering data, change over time. As a result, studies based on micro-data can have limited scope with regard to analyses of multiple countries and longer-term trends.

The question, then, is how to make better use of valuable micro-data resources. Some micro-data sets have also been assembled by data agencies, cleaned, and made available for approved research with confidential information removed.⁴⁰ However, this is rare. Here are few steps that can help:

- *Initiate programs to archive and maintain key micro-data resources.*
- *Develop a system to identify and link enterprises across the different datasets. This will require a unique identification numbering system managed by the business registers and used by each of the statistics included in micro-data linking programs.*
- *Move to a consistent use of statistical units (most typically, the enterprise).*
- *Coordinate sampling across various surveys to ensure that a representative sample of enterprises is included in all samples. Currently, the opposite is normally practiced. In an effort to reduce response burden, specific enterprises are excluded from multiple or successive surveys.*
- *Upgrade systems of administration for statistical purposes. Tax and statistics legislation in EU member states can be combined in a mandatory request for business accounting information on one system, obliging enterprises to submit electronic information monthly using software provided by member states with design input from Eurostat.*
- *Do not ignore the need to include information on fully domestic enterprises in micro-datasets. To state it again, the EGR needs to be expanded to include more enterprises in Europe — MNEs and larger domestic enterprises — and linked to the European System of Business Registers (ESBRs).*

Part IV: THE VISION AND THE PRIORITIES

Clearly, the assumptions behind current data regimes have changed and statistical systems are struggling to catch up. While it will be exceedingly difficult to fill data gaps without new data, and progress that relies only on existing data resources will always be limited, the most efficient approach will be to develop systematic links between key existing data, supplemented with a few additional variables, with data on enterprise characteristics drawn from administrative sources, all tied together by enterprise identifiers that make ownership clear, even when it extends across borders.

THE NEED FOR AN INTERNATIONALLY HARMONIZED MEASUREMENT FRAMEWORK

Economic globalization has heightened the need to develop an internationally harmonized measurement framework for international trade and economic globalization.

⁴⁰ For example, in the U.S., Jarmin and Miranda (2002) have assembled the Business Register into a time-series for 1976-2002, referred to as the Longitudinal Business Database (LBD). The Synthetic LBD has confidential information removed (see: <http://www.census.gov/ces/dataproducts/synlbd/index.html>).

An internationally harmonized framework needs to be created, based on common concepts and definitions and use of compatible compilation methods.⁴¹ Harmonization can both increase coherence in national economic statistics and facilitate international comparability. On the compilation side, practices can, and should, always evolve and be improved, so a conceptual framework and related roadmap are the most important elements. The hope is that this report can contribute to this framework.

By necessity, Europe is a leader in the shift from nation-based statistics to international of statistics. However, Eurostat should work closely with multilateral agencies such as the OECD and UNSD and key NSIs outside of Europe to develop a globally accepted and harmonized framework for economic globalization. Because it has a legislative mandate to harmonize statistics within Europe, Eurostat can provide an ideal test-bed for such efforts, and provide leadership through example and mentorship for NSIs outside the ESS. At the very least, Eurostat should have an active program to share best practices and materials with trading partners.

The need for outreach to less developed countries is especially acute. Developing countries tend to have few resources for economic statistics and under-developed statistical systems. On the other hand, such countries may not be weighed down by the legacy of outdated conceptual models and data collection regimes. Systematic programs are needed to bring more countries into the global statistical system, and Eurostat can be a leader in this regard. The motives are both altruistic and self-serving: the more countries that can contribute compatible data to the global statistical regime, the more data resources Europe will have to develop comprehensive statistics and indicators.

For example, the UNSD, IDE-JETRO, and researchers from Duke University's Center on Globalization, Governance, and Competitiveness (CGGC) are currently engaged in a project with the NSI of Costa Rica. This project is especially innovative because it combines qualitative field research with improvements in official statistics. By working with the Costa Rican NSI, UNSD and IDE-JETRO personnel have been able to link almost 100% of the exporting companies to Costa Rica's full business register. This means that detailed statistics on exports of commodities by country of destination are now linked to industries, to export intensity, to company size class, and to location, including to export processing zones in Costa Rica. Work is ongoing to measure the imports (and import share) of exporting enterprises. At the same time, a team of researchers from CGGC is engaged in several rounds of qualitative field research at local and foreign-owned enterprises in Costa Rica. Each element of the project, qualitative and quantitative, is being used to put the other in context, creating a broader picture of Costa Rica's current position, and prospects, in regard to economic globalization. Importantly, this work has helped Costa-Rica's statistical system take huge and rapid strides toward adopting the statistical standards of OECD countries.

⁴¹ Again, to the extent possible, all definitions and methods should be made compatible with the System of National Accounts (SNA) framework, the international statistical standard for the national accounts adopted by the United Nations Statistical Commission (UNSC). For the latest version (2008) see <http://unstats.un.org/unsd/nationalaccount/sna2008.asp> . The European System of Accounts (ESA) can also be used, but it has not been updated since 1995 (see: <http://stats.oecd.org/glossary/detail.asp?ID=869>).

Progress is being made to address the measurement problems associated with economic globalization. There are ongoing efforts to ensure that international trade statistics — for both goods and services — are collected and published at the appropriate levels of quality and detail. There are important efforts underway to improve the sample frame for business surveys and identify the ownership structure of enterprises accurately, to link business registers, and to develop indicators based on enterprise characteristics. Global sourcing surveys have undergone several rounds of field-testing, and are already producing useful data.

While it is possible to envision a statistical system that a) incrementally improves data resources related to internationalization (trade and FDI), b) adds new measures of international sourcing, c) devises ways to determine the location of value added and d) reveals ownership and the characteristics of enterprises that trade, it seems reasonable to worry about creating a system so cumbersome and fragmented that the research and policy-setting goals of all the stakeholders involved will be compromised. This, in fact, describes the current situation. Cost and respondent burden, perennial concerns, both tend to be ratcheted upward when improvements are incremental. Historically, micro-data resources are only available to a few intrepid researchers with adequate time, funding, motivation, expertise, and security clearance. The difficult work of linking and cleaning administrative and other micro-data can produce important research results, but it does not generally create official, public-use data resources that can be re-used and upgraded systematically and over time. It is time to take a hard look at the statistical system and develop a vision for improvements that are fundamental rather than incremental. The recommendation here is to create an integrated international data platform (IIDP).

An integrated international data platform (IIDP) would include, among other things, full datasets on trade and FDI, including information from new related party flags on all international transactions; full, accurate, and up-to-date enterprise ownership information, internationally linked enterprise IDs; administrative data sets adapted for statistical use; and new survey information on international sourcing and other critical topics, such as the internationalization of R&D and innovation.

While a trusted party (for example Eurostat) could be designated to house confidential information from EU member states, and eventually trading partners outside the EU, a more feasible approach is for countries to maintain their own micro-level databases, and for international protocols for be developed for access and data sharing. As long as the IIDP can provide access to the relevant information and proper enterprise identifiers, and work according to agreed data definitions and access protocols, confidential data can remain protected behind NSI “firewalls.” While it may be necessary for countries to share detailed data on a bilateral basis concerning enterprises that operate within the same enterprise group in both countries, the responsibility for country-level micro-data could stay at the national level. So, in the end, an IIDP might more accurately take on the form of a “virtual IIDP.” Countries could then make richer data sets available at international level, including much more information regarding intra-group trade and FATS, for example.

Ideally, however, analysis of information from the IIDP should include more flexible and dynamic access to international data. With all the needed data in one place, or centrally

accessible, “big data” analytic concepts and software could then be used to produce disclosable (i.e., non-confidential) statistics and sets of flexible indicators to characterize the role of national economies, industries, and groups of workers in the global economy. While pre-defined indicators are useful and desirable, advanced analytic software could even provide flexible on-the-fly responses to user queries by providing disclosable tables on products, industries, and enterprise types in both predetermined and user-determined formats.

The IIDP would need to contain several key elements:

- A full and accurate sample frame
- Links to full and consistently defined administrative data
- Links to improved statistics on international trade and FDI
- Links to improved business surveys that collect data on domestic and international sourcing by business function
- Links to business demographics covering enterprise dynamics (births and deaths)
- Unique enterprise identifiers or crosswalks to tie all of the data sources together

The vision for an IIDP is as follows. A trusted party (for example Eurostat) would collect, or perhaps only connect, confidential statistics from a variety of sources. The system would be housed in a secure “data space” where data could be analyzed. Since some aspects of the data would be confidential, and governed by different disclosure rules, analytic software would be needed to produce only disclosable statistics. Important technical steps would include data normalization and the creation of structural meta-data to enable the application of analytic tools that can output descriptive metadata (i.e., meta-content) and ensure that only disclosable statistics are provided to users.

While the political and organizational barriers to data sharing may be non-trivial, there is no insurmountable technical barrier.

The good news is that an institutional framework for the IIDP already exists in the program on the Modernisation of European Enterprise and Trade Statistics (MEETS).⁴² A Framework Partnership Agreement recently established the ESSnet on Micro Data Linking and Data Warehousing in Statistical Production.⁴³ While the primary aim of MEETS is to identify and implement more efficient ways of collecting economic data, the broader objective is to provide Member State NSIs with the assistance needed to develop more integrated databases and data production systems for business statistics. In the first phase the ESSnet on Micro Data Linking and Data Warehousing took stock of current best practices in building integrated business data systems and identified a set of opportunities and benefits that a statistical data warehouse (S-DWH) could provide. In its second and last phase the ESSnet has concentrated on developing recommendations and guidelines for creating relevant metadata for a statistical data warehouse (S-DWH) and on specifying the methodological and architectural requirements for a S-DWH. The ESSnet is currently producing a Handbook on setting up a S-DWH.

Because the European Statistical System is guided by the “subsidiarity principle,” (i.e. only goals that cannot be achieved at national level should be undertaken at the EU-level), it is likely that national data sets will continue to be created, maintained, and stored nationally with summary tables created and analyzed centrally. The goal, then,

⁴² See http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/MEETS_programme

⁴³ See <http://www.cros-portal.eu/content/data-warehouse>

should be to create a “virtual” International Statistical Data Warehouse (IS-DWH) as a key element of a “virtual” IIDP.

If it proves successful, the IIDP could begin to bring in data from more sources, including trading partners and private sources. For example, non-confidential information from enterprise computing systems (e.g., Enterprise Research Planning, Logistics, Shipping, and Inventory Management systems) could be combined with survey data and administrative information. (For an example of the detail contained in such private enterprise systems see Appendix C.) The technical aspects of an IIDP are challenging, to be sure, but the bigger challenge would be to get the relevant parties to agree to establish data links. An important point is that the collection of administrative and private data is largely budget-neutral: most of the data already exists.

THE PRIORITIES

The main tasks identified by this report, in order of priority are:

1. Develop of a vision for a (virtual) integrated international data platform (IIDP) that fully responds to the challenges of economic globalization.
2. Establish R&D capacity at Eurostat to keep the European Statistical System up to date, develop analytic tools and indicators that can respond to the needs of policy-makers, and cooperate with international data agencies on modernizing the global statistical system.
3. Because duplication and excessive respondent burden should be avoided at all costs, new statistical resources related to economic globalization should be designed with micro-data linking in mind, as should future iterations of existing surveys.
4. Improve the unique enterprise identifier system for Europe, including a matrix for linking country enterprise IDs.
5. Accelerate efforts to fill in the EuroGroup Register and link it to a fully interoperable European System of Business Registers (ESBRs).
6. Develop new information about intra-group trade by including a related party flag on all customs forms and international transactions records.
7. Develop systematic information on international sourcing through new business surveys.
8. Continue to improve information on trade in services, and include related-party trade.
9. Work with international agencies and NSIs outside of Europe to disseminate the best practice and related surveys to Europe’s trading partners.
10. Explore the feasibility of leveraging data from private companies in the official statistical system.

CONCLUDING REMARKS

The activities of the vast majority of enterprises continue to be domestic. Most enterprises conduct all of their activities domestically, purchase inputs domestically, and sell domestically. But this does not mean we can be complacent or that economic globalization is insignificant from a quantitative perspective. Globally engaged enterprises tend to be largest and most technologically advanced (Slaughter, 2009). On top of this, the barriers to global engagement are falling quickly. For example:

- The business models for global engagement have matured. They are well theorized, well documented and well known.
- Markets and supply-base capabilities have also matured around the world, providing a broad set of potential customers and business partners.
- The largest third party service providers including finance, consulting, and logistics all have global reach, and routinely help other enterprises globalize.
- Trade and market liberalization continue to rise, however unevenly.
- Trade infrastructure has improved dramatically in many locations. Each continent and many countries now have state of the art container and airfreight port facilities.
- Finally, the technology to weave all of these pieces together has taken huge leaps forward. Efficiency in spatially distributed economic activities is being driven by computerization, low cost digital communications, and other advanced technologies, most centrally embodied by the Internet, but also in less general technologies such as enterprise resource planning software, database management software, computer design software, logistics tracking, and radio frequency identification (RFID) and other remote sensing methods.

With the pieces of the economic globalization puzzle falling into place, in terms of business practices, one might ask why global engagement is not more pervasive than it is. For many enterprises, it is mainly a lack of information and motivation. Conducting business “as usual” exerts a powerful path-dependent force. If doing business at home is acceptable, enterprises may not be interested in the risks of global engagement, both real and perceived. While some enterprises begin exporting shortly after their founding (Moen and Servais, 2002), and technology-based enterprises are sometimes “born global” (Knight and Cavusgil, 2004), exporting, external international sourcing, and establishing foreign affiliates through FDI make no sense for many, if not most enterprises. If customers are specific and local, if supply-chains are domestic and not tolerant of distance, or if labor markets are unique, internationalization can be the farthest thing from the minds of busy managers. Food service, retail, government services, personal services, specialized equipment, the production of luxury goods, and military hardware and other government purchases are all large and important economic sectors that have been resistant to globalization so far.

But in sector after sector there have been surprises. In financial services, call center-based services, back office functions, and even legal research and corporate R&D, the largest enterprises have found ways to both export and source internationally in a search to lower costs (Dossani and Kenney, 2003, 2005). A few supermarkets, and even coffee shops, once the realm of local and at best regional companies, have become global-scale MNEs and huge buyers in international sourcing networks (Reardon et al, 2003; Daviron and Ponte, 2005). Economic globalization has come with increasing scale and concentration, especially in the retail sector, with “big box” stores selling globally sourced household goods, home improvement products, furniture, and food (Hamilton *et*

al, 2012), driving smaller retailers into specialty niches or entirely out of business, especially when they are located nearby and operate in the same line of business (Haltiwanger et al, 2010). As a result the pressure on fully local enterprises has grown in sector after sector. Some survive nicely, and some remain immune from the pressures of economic globalization, but many have seen their customers drift away to larger, more “trendy” or lower-cost alternatives offered by competitors with global reach.

As a result the perception of globalization’s pervasiveness has outrun the reality, but only to a degree. There is a feeling of inevitability about the process, of the creeping dominance of global brands, increasingly delivered through big box and Internet retailers. In this environment many workers, justifiably or not, feel the pressure: on wages, on job quality, and on job tenure. The consequences of economic globalization can be negative, not only in perception but in reality, for example when anecdotes about the offshoring of work or a neighbor’s job loss cause real physiological stress, decrease job mobility, and undermine demands for better pay and working conditions.

But the consequences of economic globalization can also be positive. Global integration can lower costs, increasing product variety, and improving service for consumers. While companies can engage in international wage arbitrage, skilled workers have the opportunity do the same. The rapid expansion of MNEs and external international sourcing networks have brought developing and transition economies into the global trading system with unprecedented speed, driving industrial upgrading, technological learning, and wage and employment growth.

About ten years ago, the cover of a special issue of Business Week magazine on international sourcing of services read, “Is your job next?” (Engardio, 2003). Such feelings of uncertainty and anxiety have political expression. Politicians and bureaucrats react, and sometimes set policies in response to public sentiment. Indeed, the notion that trade barriers inevitably harm countries that erect them, enforced by the WTO and the “Washington Consensus”, is being complicated by a new round of industrial policy and even protectionist actions. When the statistical resources are not available to support measured responses, responses that sometimes need to cut against the grain of public perception, policies can become counter-productive. The solution is clear, but very difficult: to modernize and internationalize the statistical system to provide appropriate and timely information that can support agile, evidence-based policy-making.

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Appendix A. Project Advisory Committee

The project had an advisory committee, whose members have generously made time to vet ideas and review various drafts of the report. These individuals represent a range of data producers and users in the field of economic globalization. Since the broad statistical community is at an early stage of developing durable solutions the statistical challenges posed by economic globalization the goal is to contribute to an emergent consensus view across data agencies and user communities on how to proceed. However, the responsibility for the reports' contents rests fully with the author.

Note: the committee has not yet systematically vetted the current draft.

- Koen De Backer, Senior Economist in the Directorate of Science, Technology and Industry, Organisation for Economic Cooperation and Development (OECD)
- Hubert Escaith, Chief Statistician, World Trade Organization (WTO)
- Gary Gereffi, Professor and Director of the Center on Globalization, Governance, and Competitiveness, Duke University
- Ronald Jansen, Chief, Trade Statistics Branch, United Nations Statistics Division (UNSD)
- J. Bradford Jensen, Professor of International Business and Economics at the McDonough School of Business at Georgetown University
- Peter Bøegh Nielsen, Head, Business Statistics, Danmarks Statistik
- William Powers, International Economist, United States International Trade Commission (USITC)

Appendix B. Definitions of Seven Business Functions and Correspondence with Central Product Classification (CPC, ver. 2)

(Source: Nielsen, 2011.)

1. Core business function

Definition: This function is the primary activity of the enterprise and will in most cases equate with the main activity of the enterprise. It includes production of final goods or services intended for the market/for third parties carried out by the enterprise and yielding income. The core business function equals in most cases the primary activity of the enterprise. It may also include other (secondary) activities if the enterprise considers these to comprise part of their core functions.

CPC correspondence:

- 88 Manufacturing services on physical inputs owned by others**
- 854 Packaging services**
- 87 Maintenance, repair and installation (except construction) services**
- 89 Other manufacturing services; publishing, printing and reproduction services; materials recovery services**

Support business functions

Definition: Support business functions (ancillary activities) are carried out in order to permit or facilitate production of goods or services intended for the market or third parties by the enterprise. The outputs of the support business functions are not themselves intended directly for the market or third parties. The support business functions are in the survey divided into:

2. Distribution and logistics

Definition: This support function consists of transportation activities, warehousing and order processing functions.

CPC correspondence:

- 61 Wholesale trade services**
- 62 Retail trade services**
- 65 Freight transport services**
- 671 Cargo handling services**
- 672 Storage and warehousing services**
- 6791 Freight transport agency services and other freight transport services**
- 68 Postal and courier services**

3. Marketing, sales and after sales services including help desks and call centers

Definition: This support function consists of market research, advertising, direct marketing services (telemarketing), exhibitions, fairs and other marketing or sales services. Also including call-centre services and after sales services such as help-desks and other customer supports services.

CPC correspondence:

- 83114 Marketing management consulting services**
- 836 Advertising services and provision of advertising space or time**

- 837 Market research and public opinion polling services**
- 83812 Advertising and related photography services**
- 85931 Telephone call centre services**
- 85962 Trade show assistance and organization services**

4. ICT services

Definition: This support function includes IT-services and telecommunication. IT services consist of hardware and software consultancy, customized software data processing and database services, maintenance and repair, web-hosting, other computer related and information services. Packaged software and hardware are excluded.

CPC correspondence:

- 8313 Information technology (IT) consulting and support services**
- 8314 Information technology (IT) design and development services**
- 8315 Hosting and information technology (IT) infrastructure provisioning services**
- 8316 IT infrastructure and network management services**
- 841 Telephony and other telecommunications services**
- 842 Internet telecommunications services**

5. Administrative and management functions

Definition: This support function includes legal services, accounting, book-keeping and auditing, business management and consultancy, HR management (e.g. training and education, staff recruitment, provision of temporary personnel, payroll management, health and medical services), corporate financial and insurance services. Procurement functions are included as well.

CPC correspondence:

- 82 Legal and accounting services**
- 8311 Management consulting and management services (excl 83114)**
- 8312 Business consulting services**
- 8319 Other management services, except construction project management services**
- 8592 Collection agency services**
- 8594 Combined office administrative services**
- 8595 Specialized office support services**

6. Engineering and related technical services

Definition: This support function includes engineering and related technical consultancy, technical testing, analysis and certification. Design services are included as well.

CPC correspondence:

- 833 Engineering services**
- 8391 Specialty design services**

7. Research & Development

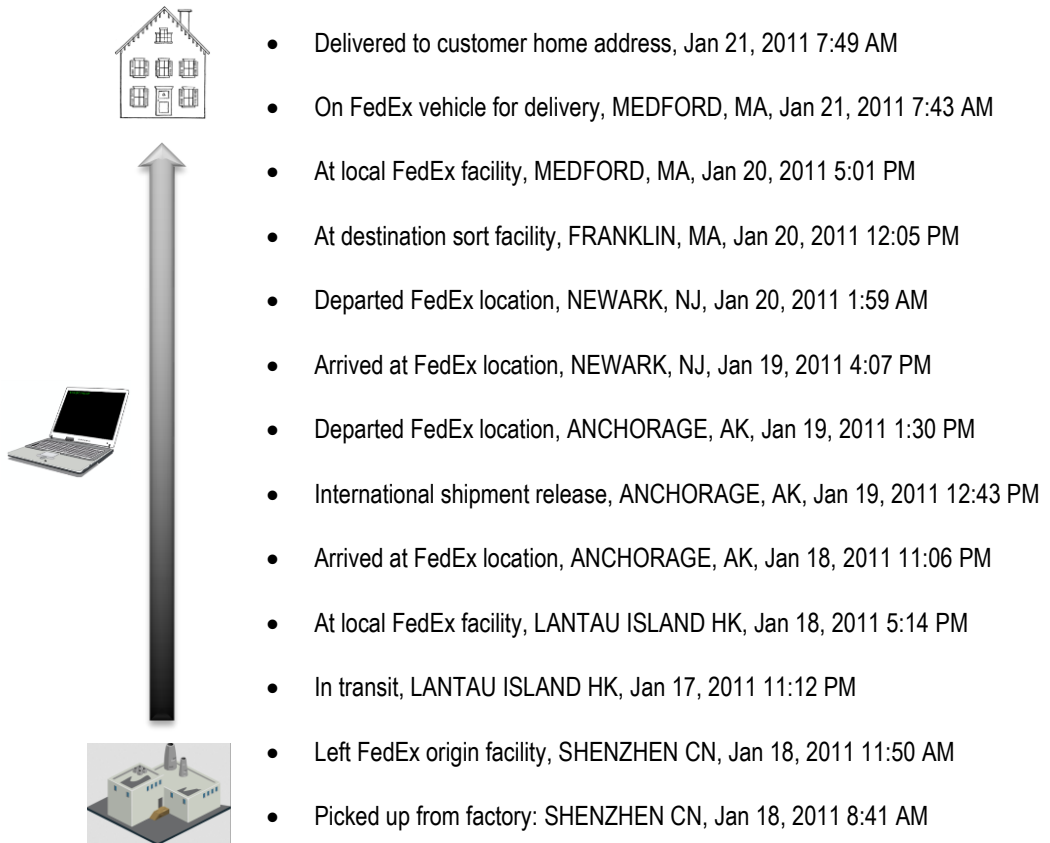
Definition: This support function includes intramural research and experimental development.

CPC correspondence:

- 81 Research and development services**

Appendix C. Detail in private enterprise systems, an example

Actual tracking records for a notebook computer making its way from a factory in China to the home of its ultimate customer in Medford, Massachusetts; Shipped by FedEx, January 18-21, 2011



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