

The Global Value Chain, the Enterprise-Based Operating Model, and Challenges to the Sovereign-Based Economic Measurement System

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We live in an age of unprecedented economic integration in trade, capital flows, and knowledge. However, as the recent financial crisis has demonstrated, several gaps in the existing system of economic measurement and related policymaking can present serious problems.

The existing economic measurement system, which includes national income and product accounts and related policy design in taxation and incentives, was established in the early 20th century when countries conducted trade and finance largely at arm's length. Since then, technology breakthroughs in transportation and communications, in combination with the development of the hub-and-spoke distribution system, have lifted economies of scale and dramatically increased "system speed." Standardization—a result of modern logistical design in the implementation of global supply and value chains—has greatly accelerated the pace of global convergence.

GLOBAL JUST-IN-TIME VALUE CHAINS AND INCREASING SOPHISTICATION OF THE ECONOMY

The mismatch between a sovereign-based measurement system and the globalized, enterprise- (or ownership-) based operating model currently prevails in both the real sector and the financial sector. This mismatch suggests the need for a new way of thinking about measuring economic activity to reflect 21st century realities and trends in order to facilitate access to opportunity, to highlight areas of risk, and to avoid unintended policy consequences.

Effects of increasing transportation speed and lowering costs

Starting in the early 1960s, the world shrank dramatically as the speed of jet air travel doubled from 300 miles per hour in 1950 to 600 miles per hour in 1960. A nonstop transatlantic airline flight fell to just six hours by 1960, a time that remains in effect today.¹ A decade later, in the early 1970s, Fred Smith founded Federal Express (now FedEx Express) and incorporated the concept of the hub-and-spoke network into the company as an indispensable operation strategy for air cargo delivery. With this system, packages are collected at various pick-up points, routed to a central distribution point for sorting, and rerouted to reach their final destinations. This system maximizes the number of attainable connections, which is crucial to lowering costs because it exploits economies of scale in an industry with large fixed costs. The hub-and-spoke system also enables the economics of flow, which refers to the way average costs fall as a consequence of increases in the number of types of products offered. As a result, air shipments grew from virtually nonexistent in the 1970s to where they are today: accounting for a third of global trade by value—approximately US\$3 trillion dollars worth—but only a little over 1 percent of global trade by weight.²

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Complementary modes of transportation in the global distribution system

In the post–World War II period, ocean shipping has seen considerable technological and institutional changes. Containerization, widespread adoption of open-registry shipping, and the economies of scale that result from increased volume have all helped to lower costs.³ However, these cost savings have been for the most part offset by rising fuel and port costs. The net effect is that, in the post-war period, real ocean shipping rates have not seen the remarkable decline in prices seen in airfreight.⁴ The fact that airfreight prices have fallen dramatically since 1945 (while ocean freight rates have not) strongly suggests that affordable, rapid distribution has been a key driver of globalization. Intercontinental airfreight and ocean shipping, along with cross-border trucking and rail shipping, are complements in the process of globalization. Together they provide distribution options that enable firms to map out their supply-chain portfolio in the most cost-effective way and to preserve system integrity.

The need for rapid transport is especially valid in the modern economy, in which time sensitivity has increased significantly as the composition of trade has shifted from commodities to increasingly complex manufacturing. Furthermore, consumers in the growing global middle class have increased their demand for products with highly varied characteristics. All else being equal, this would lend itself to economies of agglomeration in production, where firms locate near their customers (both final and intermediate) to adapt rapidly to service-changing customer preferences. However, efforts to lower cost have led to greater dispersion of the production process as firms separate the stages of production across countries according to comparative advantage.⁵ Rapid expansion and sophistication of the transportation network, along with the rising middle class in emerging countries, have also encouraged an increasing focus on local markets and the coining of the term *glocalization*.

System speed of distribution and customer-focused global value chains

The rapid increase in the system speed of transportation led by air cargo is the backbone of modern just-in-time supply chains. As a result of just-in-time and fast cycle logistics, inventory-to-sales ratios have declined steadily worldwide, reducing inventory carrying costs and increasing system-wide productivity. Today, the battle in most industries and markets is not between firms so much as it is between firms and their network of suppliers, which are often supplying multiple firms in the same industry. As the transportation guru John Kasarda explains, “Individual companies don’t compete. Supply chains compete. Networks and systems compete.”⁶

In fact, a new vertical integration—not by direct ownership within one nation state as was typical in the past, but by contract between firms anywhere in the world—has transformed yesterday’s supply chain into what Michael Porter, in his seminal work *Competitive*

Advantage, first described as a *value system* and is now referred to as a *value chain*.⁷ Supply chains focus on integrating supplier and producer processes, improving efficiency, and reducing waste; value chains focus on creating value for the customer. In a value chain the customer is the starting point of value, and value flows from the customer, in the form of demand, to the supplier. The demand flow is manifested in the flow of orders and money that parallel the flow of value, and flow in the opposite direction from the flow of supply.⁸ This evolution from single-point delivery to system flexibility, to supply chain, and then to value chain has led to an increasing desire to create business through each contact point, thus creating opportunities for new businesses and benefitting the communities in which those businesses form. It has also directly contributed to the ever-growing economic pie and to an increasing sophistication in the global economic structure. Based on Angus Madison’s estimates, global gross domestic product (GDP) doubled from the year 0 to the year 1500, doubled again from 1500 to 1800, doubled yet again from 1800 to 1900, and quadrupled from 1900 to 2000. This explosive growth in the 20th century in output and wealth was greatly supported by the emergence of modern supply chains and value chains.

Even as the value flowing to the customer becomes the focus of the distribution system, measuring that value creation does not fit with the current system of national income accounting. If regulation follows innovation, accounting also follows innovation. In this regard, we are facing new challenges and opportunities. Consider transfer pricing, in which intra-firm transnational trade allocates profits and value to different nations—often without the aid of true market prices. In another example of the need for innovation in national accounting, trade credit is created where profits are registered in financial centers that are often in countries other than the country in which the actual trade is taking place. Even the seasonality of goods flow is changing and challenging current statistical methods.

The rise in global value chains has enabled the rapid growth seen in emerging markets. This growth in turn has created a new scope for finance. Portfolio managers now diversify globally in increasingly sophisticated emerging equity and bond markets, all the result of the expansion of “system speed,” which has brought emerging economies into the global system.

The importance of transit time in system cost calculation

Shipping costs and tariff barriers are the two main costs of engaging in international trade. The reduction of tariff barriers, as a consequence of the General Agreement on Tariffs and Trade (GATT) and its successor the World Trade Organization (WTO), has sharply lowered the relative importance of tariff barriers. Consider that total transportation expenditures, which came to half as much as tariff duties for US imports in 1958, had climbed to three times the aggregate tariff duty paid by 2004.⁹ This increase highlights the relative importance in today’s economy of reducing transportation cost, and one of the

most important factors driving shipping cost—broadly defined—is transit time.

Extended shipping times impose inventory-holding costs—financing costs for the goods and the need to hold buffer stocks—as well as depreciation costs borne by shippers. *Depreciation*, broadly defined, includes any reason that a newly produced good is preferable to an older good. Examples include physical spoilage of fresh fruits or cut flowers and the degradation in value of magazines as the information in them becomes “old news.” When countries or regions specialize in stages of production and trade intermediate goods, these costs accrue throughout the duration of the production chain.¹⁰

The impact of time on trade is very important. Econometric studies estimate that each additional day spent in transport reduces the likelihood that the United States will source goods from that country by 1 to 1.5 percent, and that, for manufactured goods, a day of shipping time is worth 0.8 percent of the value of the good per day. The decline over the past several decades of airfreight costs has made this time-saving option more affordable, providing a compelling explanation for aggregate trade growth, compositional effects in trade growth, and the growth in time-intensive forms of integration such as vertical specialization.¹¹

CHARACTERIZING THE EXTENT OF GLOBALIZATION

Globalization is a concept that touches many areas, particularly trade, investment, and knowledge flows. Key aspects of the concept have evolved considerably over the past decades, and our understanding of the impact of these trends on economic measurement systems benefits from a clear characterization of the main channels of globalization.

Foreign direct investment and transnational corporations

Traditional foreign direct investment (FDI) statistics reveal the massive amount of globalization that has occurred over the past 20 years. Global FDI inflows stood at US\$207 billion in 1990; after riding the globalization tidal wave they peaked in 2007 at US\$1,971 billion. It is easy to see the impact that the internationalization of production has had on global FDI flows. Developing countries' share of FDI inflows rose from 16 percent in 2000 to 46 percent in 2010, with developing countries making up half of the top 20 receiving countries. By 2010 another important shift was evident. Developing countries were not only recipients of FDI, but also global investors themselves as their share in global outflows reached 29 percent in 2010, up from 16 percent in 2007.¹²

The number and presence of transnational corporations (TNCs) has increased considerably in recent times. Between 2001 and 2010, the number of TNCs increased 62 percent to 103,353, while the number of foreign affiliates jumped from 595,725 in 2001 to 886,143 in 2010.¹³ The United Nations Conference on Trade and Development (UNCTAD) estimates that TNCs' operations worldwide (at home and abroad) in 2010 generated value-added equivalent to more than a quarter

of global GDP.¹⁴ Foreign affiliates' production now accounts for about one-tenth of global GDP, while their exports account for about one-third of global exports of goods and services. TNCs in developed countries make up nearly 80 percent of the TNCs in the world. However, the number of TNCs based in developing countries has steadily increased, while at the same time new players—from both developing and developed countries—continue to emerge onto the scene.

In the early days of building global supply chains, TNC FDI was the preferred means of expanding production abroad. Foreign affiliates were owned and managed by the parent firm. As firms have sought to increase cost advantages and remain competitive, TNCs began to turn to non-equity modes (NEMs) of international expansion. Examples of NEMs include contract manufacturing, services outsourcing, and franchising and licensing, to name a few. These activities are not recorded in FDI statistics, so we must look beyond the traditional measures to understand the depth of global value chains. NEMs play a major role in economic development: they employ an estimated 14–16 million workers in developing countries, and they create value-added up to 15 percent of GDP in some countries.¹⁵

Rising intra-firm and intermediate goods trade

With the rise in globalization and the increasing complexity of global supply chains, intra-firm trade and trade in intermediate goods have become an important part of global trade flows. In 2009 US affiliates of foreign firms accounted for 21 percent of US exports of goods and 31 percent of US merchandise imports. Within these parameters, the intra-firm trade of US affiliates accounts for between 8 and 10 percent of US exports and between 20 and 25 percent of US imports.¹⁶ Lanz and Miroudot estimate that intra-firm exports represent 16 percent of total exports for nine countries in the Organisation for Economic Co-operation and Development (OECD) and intra-firm exports make up about half of affiliate exports, on average. Their broad estimate suggests global intra-firm trade makes up one-third of total world trade.¹⁷

Measuring intra-firm trade is fraught with difficulties and raises a number of complex issues. One of these is that the United States is the only country that has a detailed breakdown of trade flows between affiliates and non-affiliates. Even in the case of the US data, different ownership thresholds are applied to counting imports and exports of intra-firm activity. Intra-firm activities are also not at arm's length, giving rise to transfer pricing issues. This creates a trade measurement issue because firms seek to minimize the customs valuation to shift the burden of taxes to a lower-cost location. In addition, the accounting and tax rules applied to transfer pricing vary by country, creating further distortion of trade values.

Intra-firm trade takes place between two related parties. Looking only at intra-firm trade can provide only an incomplete picture, because trade in intermediate goods rises in step with an increase in contract manufacturing. Mirodout (2010) reports that 60 percent

of global trade consists of trade in intermediate goods.¹⁸ However, this proportion (of total trade to trade in intermediate goods) varies widely among countries. For Brazil, China, and India, for example, the share of intermediate goods in total flows in the manufacturing sector was about 70 percent in 2005.¹⁹ Asia is the second largest importer of intermediate goods behind Europe, but each geographic region tends to specialize in certain types of intermediate imports and exports.²⁰

Knowledge infusion: Underappreciated and unmeasured

An uncounted and often unappreciated type of foreign investment occurs in the form of knowledge transfers. The remarkable rise of China and other emerging markets over the past generation is the result, in large part, of an infusion of knowledge about products and services and management know-how from the West. A generation of young people in emerging markets has been exposed to the knowledge accumulated and tested as a result of 250 years of industrialization in the West. Intangible assets and knowledge transfer are occurring on a massive scale with an impact that dwarfs the monetary measure of FDI. Examples such as drivetrain platforms, sales and after-sales network design, chain store design and management, port community systems, automated teller machines (ATMs), credit cards, electronic ticketing, business proposals, consulting reports, due diligence studies, accounting tables, and so on have all largely been standardized across nations.

THE NEED FOR AN UP-TO-DATE MEASUREMENT SYSTEM

The power unleashed through the knowledge infusion and standardization is enormous—but it is not recorded in the current economic measurement system. It is also part of the reason that we tend to underestimate of level of global integration and speed of value creation in emerging markets.

Global linkages highlighted only after crises

The financial crisis of 2008–09 and the more recent European sovereign debt crisis both illustrate the extent of financial linkages in the global economy. They also reveal gaps in understanding and measurement of these linkages—gaps that continue to contribute to uncertainty in policy and planning today.

Looking back at the run-up to the financial crisis, a great number of policymakers and economists seemed confident that any fallout from stresses in the US subprime mortgage market would remain fairly localized. The thinking was that subprime was a small part of the overall mortgage market (it was 12 percent of US mortgage debt outstanding in 2007); even if 20 percent of mortgage holders ran into trouble, this would still affect only a small corner of the market. As the crisis made apparent, securitization and financial engineering had transmitted risk well beyond subprime and well beyond US borders. The bailout of the AIG Corporation, which had written insurance in the form of credit default swaps on many of these issues, was in turn transmitted

around the world, with some of the biggest single aid recipients being non-US banks.

In another example, consider the European sovereign debt crisis. Greece makes up roughly 2.25 percent of euro zone GDP with an economy that is now about the size of the economy of the US state of Indiana. Yet problems that began in Greece later transformed into fundamental questions over the future of the currency union itself as crisis engulfed the region. Indeed, not only are countries integrated by government bonds and financial transfers, but also by the fact that business enterprises, large and small, are increasingly dependent on the global market. The size of the GDP of many small economies, advanced or emerging, is smaller than the size of some of their TNCs. This poses an interesting challenge to policymaking because national, boundary-based thinking is no longer appropriate.

Accounting framework: Lagging behind the global operating model

One of the biggest challenges we face is the mismatch between a sovereign-based measurement system and a globalized, enterprise- (or ownership-) based operating model that encompasses both the real and the financial sectors. The measurement system needs to consider the way the global operating model works—the “invisible hand” or endogenous market dynamism. We have seen how crisis scenarios can overwhelm the capacity of a national government. Government bailouts in a globalized system can run the risk of socializing loss while allowing privatized profits, thus creating system-wide incentive distortions.

Technology revolution and innovation continue to change economic structure. The number of economic sectors has increased from 37 described in the original input/output table of the early 20th century to 1,176 in the latest North American Industrial Classification System (NAICS). New ideas and interdisciplinary efforts continue to create new segments, which—when proven to last—become new industries. This creates challenges and opportunities not only for portfolio managers, but also for policy development and priorities. Global value chains have significantly increased opportunities and new frontiers, with new industries emerging as a result.

Consider a nation's GDP. In the United States, the gap between gross national product (GNP) and GDP has increased by a factor of 10 since the late 1990s, and as of Q4 2011 stood at US\$267 billion (annual rate), about the size of Malaysia's entire economy—the difference between GDP and GNP driven by the increase of the net income generated in the rest of the world. This is one of the clearest signs that the ownership-based global operating model is increasingly prevailing. A similar trend is underway in Japan: in Q3 2011, the country's GNP was US\$193 billion (on an annual basis) larger than GDP. The year 2011 was also the first year since 1980 that Japan recorded a trade deficit.

To reflect the changing global economic structure, our system of measuring economic activity and our policy orientation, which are still sovereign based, must be expanded and adjusted. This requirement does not

contradict the need to build a domestic industrial base, but rather complements it. The world has become highly integrated by information technology, global supply chains, and trade and capital flow linkages—in large part because of the ownership-based operating model. To stick strictly to a model tailored to national boundaries is neither progressive nor realistic. How to adjust policy incentives to reflect ever-increasing GNP for maximum and sustainable growth in domestic labor markets is clearly a challenge.

Measuring trade in value-added: Complementing trade statistics and reducing bilateral distortions

The current system of trade and economic measurement is a product of the international system of the past century, when trade was largely conducted in finished goods at arms' length. Over the past 25 years, impressive increases in off-shoring, intra-firm trade, FDI, and outsourcing have led to expanded supply chains of greater complexity, in turn resulting in escalating trade in intermediate goods noted above, along with extensive linkages, both real and financial.

Trade data as they stand today are adequate for capturing the gross value of goods flow, but there is a significant degree of double-counting (or counting by higher multiples) because the same product crosses borders many times as it moves through the supply chain. This has been one of the forces behind trade deepening, where the volume of international trade has grown two to three times faster than the global economy over much of the past two decades. From the standpoint of a company such as FedEx, this has meant an expanding market for transportation services and trade facilitation. From the standpoint of economic research, this has meant less clarity about the implications of what used to be more clear-cut trade drivers, such as policy and exchange-rate movements.

By considering only gross goods flow at the aggregate level, we end up with a distorted picture of bilateral relationships and little reliable understanding of where value is being added beyond case studies at the product level and colorful anecdotes. The lack of a modern measurement framework is a probable contributor to the rapid proliferation of bilateral and regional free trade agreements in recent years. The pressing needs of commerce have essentially outpaced the ability to measure and coordinate trade policy on a global level.

Beyond value-added: The need for more explicit measurement of linkages

When considering a modern measurement framework, measuring trade in value-added would complement current trade statistics and better illustrate where nations have real advantages. The WTO and others are doing some important research along these lines. In addition, for both goods and services (especially finance) trade, more direct measurement of cross-border linkages would better reflect the complexity of our networked world. The tsunami that occurred in Japan in 2011 and the severe flooding in Thailand later that year both

rippled through auto and electronics supply chains around the world, exposing the extent of real linkages in production networks. The speed and intensity with which the financial crisis spread around the world in 2008–09 highlights the need for a better understanding of linkages from the standpoint of risk management. Knowledge infusion and intangibles trade are key factors that are underappreciated and currently unmeasured.

We are hopeful that we will see global convergence in economic measurement systems, much the same way we have witnessed global convergence in technology, innovation, and standardization; this standardization itself may help create a base for consistency in the treatment of the measurement of economic activity. Doing so would be an important step forward in understanding the world of the 21st century, and would help ensure that the upward trend in access and living standards we have witnessed over the past two decades is not constrained by an outdated way of looking at the world.

NOTES

- 1 Osterholm 1998.
- 2 Kasarda 2011.
- 3 Hummels 2007.
- 4 Hummels 2007.
- 5 Hummels 2007.
- 6 Kasarda 2011, p. 8.
- 7 Porter 1985.
- 8 Feller et al. 2006.
- 9 Hummels 2007.
- 10 Hummels 2001.
- 11 Hummels 2001.
- 12 UNCTAD 2011.
- 13 UNCTAD 2011.
- 14 UNCTAD 2011.
- 15 UNCTAD 2011.
- 16 Anderson 2011.
- 17 Lanz and Miroudot 2011.
- 18 Miroudot 2010.
- 19 WTO 2009.
- 20 Escaith 2010.

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