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Value chains in Europe and Asia: Which countries participate?

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ABSTRACT

The paper starts by reviewing the evolution and current status of value chains, and by assessing alternative measures of their significance. The value chains centred on North America, the European Union and East Asia are contrasted. North American value chains tend to be limited to the three NAFTA members under negotiated rules. In the European Union and East Asia value-chain formation has been largely a bottom-up process with free entry supported by low trade costs. To identify which countries have joined value chains, we calculate two measures of value-chain participation by European and Asian emerging market economies. The measures highlight (1) the rapid growth of value-chain activity in the twenty-first century, (2) the greater value-chain participation by East Asian emerging market economies than by EU emerging market economies, and (3) the cross-country variation in participation, with value- chain participation dominated by a handful of countries in both continents. The final section draws conclusions about the nature of international value chains and the policy implications.

1. Introduction

Fragmentation of production across borders has become a salient feature of the global economy. The phenomenon, generally referred to as global value chains (GVCs), has been extensively documented for specific products and sectors, especially in the electronics and automotive industries. Another branch of the literature uses international trade data to identify which countries participate in GVCs and to assess changes in the scale and geographical scope of the phenomenon. A recurring finding is that links are strongest within regions, and that three main sets of regional value chains center on Europe, East Asia, and North America. In each region, high-income country firms tend to focus on design, marketing and similar tasks, while middle- and low-income countries take on less-skilled tasks. In North America the latter tasks are located in Mexico, but within East Asia and Europe participation of emerging economies varies. This paper analyzes the extent to which individual emerging Asian and European economies participate in GVCs. The main result is that in each region participation is heavily concentrated in a handful of countries, while in other countries GVC participation is uncommon or absent.

The next section reviews alternative measures of GVC participation, and the main findings from this quantitative literature. The third section contrasts the historical evolution and current nature of value chains centred on North America, the European Union (EU) and East Asia. Section 4 presents measures of value-chain participation by European and Asian emerging market economies that highlight (1) the rapid growth of value-chain activity in the twenty-first century, (2) the greater value-chain participation by East Asian emerging market economies than by EU emerging market economies, and (3) the cross-country variation in participation, with value-chain participation dominated by a handful of countries in both continents. The final section draws conclusions, and suggests some policy implications.

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2. Origins and measurement of international value chains

International supply chains are not a new phenomenon. The eighteenth century industrial revolution drew on a triangular trade as labor was shipped from Africa to the Americas to work on cotton plantations that supplied inputs to British factories that produced textiles for the global market. Nevertheless, in nineteenth century globalization, international trade could largely be represented as trade in final goods, such as Ricardo's example of British cloth for Portuguese wine. The 2×2×2 (two goods/two factors/two countries) trade model still captured the essence of international trade until the early 2000s, although some trade theorists tried to model fragmentation (Jones and Kierzkowski, 1990; Jones, 2000; Arndt and Kierzkowski, 2001).[1] Until the late 1980s participation in international supply chains was restricted to a handful of locations and did not account for a large part of global trade.[2]

The nature of cross-border value chains varies across sectors, products and firms. The textiles, clothing and footwear sectors were among the first to develop complex supply chains, with many different coordinators (buying houses, department stores, brand-name producers, etc.).[3] Cross-border specialization in the car industry can be traced back to the 1965 Canada-US Auto Pact, and in Asia large-scale Japanese offshoring after 1985 was led by relocation of car assembly to Thailand; today, every major carmaker scans the globe for competitive input suppliers. Cross-border value chains are pervasive in the electrical and electronics industry, but cost structures are jealously guarded proprietary knowledge. The two universal features of GVCs are that the label "Made in –" is close to meaningless and that more of the value-added accrues to service providers than to actual manufacturers (e.g. Apple is primarily a design and marketing company even though it is famous for its range of manufactured products, and it receives the largest share of the value-added in those products).[4]

Recognition of subcontracting and other types of international supply chains has been largely based on product-specific evidence – semiconductors in the 1970s, Barbie dolls in the 1990s, electrical and electronic goods in the 2000s – although these are often poorly documented because data are commercially sensitive. More systematic evidence emerged first from the intra-industry literature, especially as computing facilities improved and larger datasets became available. More disaggregated trade data allowed researchers to make finer distinctions among traded goods, and to better identify intermediates and finished goods. Most recently, researchers have linked input-output tables to compute trade in value-added rather than in gross values. None of these empirical approaches is ideal, but each sheds light on the phenomenon of supply chains and their importance (Pomfret, 2014).

Grubel and Lloyd (1975) highlighted the importance of intra-industry trade (IIT), a phenomenon inconsistent with predictions of the basic 2×2x2 trade model in which a good is either exported or imported but not both. Their explanations in terms of border trade, seasonal trade and economies of scale combined with product differentiation all focused on trade in finished goods. Critics pointed to aggregation issues (Pomfret, 1985), which were hard to resolve with the data and computing facilities of the time, but perhaps reflected finished-good and intermediate-good trade within the same "industry", i.e. production fragmentation.[5] The growth of IIT and its characteristics are consistent with an increasingly fine-tuned division of labor, which can be interpreted as evidence of the growth of GVCs, but attempts to draw more specific causality from the intra-industry trade literature are hindered by the difficulty of distinguishing between the vertical IIT of GVCs and horizontal IIT associated with differentiated products.

An alternative advocated by Alexander Yeats, Francis Ng and others (Yeats, 2001; Ng and Yeats, 1999; Kimura, 2006; Lee et al., 2011; Fung et al., 2013; Athukorala, 2014) is to identify categories in the trade databases that contain keywords "parts" or "components" or reflect trade in inputs.[6] In Section 4, we follow this approach to calculate indicators of the extent to which emerging market economies participate in GVCs.

Measuring trade by value-added, as we measure sectors' contribution to GDP, rather than by gross flows provides an aggregative view of the importance of global supply chains. A detailed global input-output (IO) table would allow us to estimate each country's direct and indirect contribution to final goods and services (Hummels et al., 2001). Several sets of value-added trade data have been

[1] Feenstra (2004, 99–134) reviews this disparate literature. Terminology was a source of confusion as authors addressed subcontracting and outsourcing as separate phenomena, while others analyzed vertical specialization, intra-product specialization, multistage production, internationalization or disintegration. Deardorff (2001) emphasized that fragmentation inevitably involves greater input of services, if only to coordinate the fragments. Grossman and Rossi-Hansberg (2008) popularized the term "trading tasks".

[2] Baldwin (2012) dates the "revolutionary transformation of industry and trade" from 1985. Running a gravity model with annual data from 1967 to 2008 for bilateral trade among six "Factory Asia" countries (Indonesia, Japan, South Korea, Malaysia, Taiwan and Thailand), Baldwin and Taglioni (2011) found sharp drops in the GDP elasticities in 1985, and again in 1998, and they interpreted these results as evidence of increased GVC trade, for which partner country GDP is a less direct determinant of trade flows. After 1985 rapid appreciation of the yen led Japanese automobile, electronics and other firms to offshore labor-intensive processes. Completion of the EU Single Market and negotiation of NAFTA encouraged similar responses in Europe and North America. For developing countries, the 1982 debt crisis highlighted the failure of import-substituting industrialization, and recognition of the new industrializing economies' success encouraged countries to open themselves to the global economy. The outcome was finer international specialization as different stages of production were separated by trade.

[3] Gereffi et al. (2011) provide evidence on GVCs in fruit and vegetables, tourism, and offshore services, as well as apparel.

[4] Rassweiler (2012) estimated that, of an iPhone5 retailing for $649 in the USA, $207 was manufacturing costs and the remainder accrued to Apple for design, packaging, marketing, and other services. Moretti (2012) points out that, if a US customer orders an iPhone online, the only US worker with physical contact to the product is the UPS deliveryman.

[5] IIT studies in the 1970s and early 1980s relied on SITC 3-digit groups of which there were about 250, some very heterogeneous (e.g. computers and pencil sharpeners were included in "office equipment" and kayaks and supertankers in "ships and boats"). In the 1990s and 2000s IIT studies made use of HS 6-digit data with 5000 categories (Brülhart, 2009), and sometimes HS 8-digit data (Ito and Okubo, 2012), which were more homogeneous "industries".

[6] Ferrarini (2013) and Brooks and Ferrarini (2012) adopt a similar approach to construct global production networks among 75 countries, and for each country a Network Trade Index measures the degree of GVC participation. Orefice and Rocha (2011) use the same measure to analyze the two-way relationship between deep integration and production networks.