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Volume VI

Redesigning Canadian Trade Policies for New Global Realities



Edited by Stephen Tapp, Ari Van Assche and Robert Wolfe

About this chapter

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Redesigning Canadian Trade Policies for New Global Realities, edited by Stephen Tapp, Ari Van Assche and Robert Wolfe, will be the sixth volume of *The Art of the State*. Thirty leading academics, government researchers, practitioners and stakeholders, from Canada and abroad, analyze how changes in global commerce, technology, and economic and geopolitical power are affecting Canada and its policy.

Chapter summary

Governments need to redesign their trade policies to better reflect the changing realities of global commerce. In recent decades, production processes have become more globalized as tasks are separated and performed in different locations – often spread across countries as part of global value chains (GVCs). Most international trade no longer involves exchanging finished goods but rather intermediate inputs, which countries increasingly use to produce their own exports.

In this chapter Ari Van Assche (IRPP research fellow and associate professor in international business at HEC Montréal) examines how being integrated in GVCs has changed the way firms engage in international business and the implications of this for trade policy. Whereas firms have traditionally viewed international trade as a vehicle to expand their sales into foreign markets, companies in GVCs have developed a “supply chain mindset.” For these firms exporting is about not only the destination but also the journey. They see international expansion as a way to reduce production costs, access foreign technology and diversify their exposure to supply chain shocks. At the same time, they are concerned about the complexities of moving goods, people and information across borders in multistage production systems. The supply chain mindset is leading to growing demands for trade policies that will grease the wheels of GVCs by reducing trade and information barriers at and behind the border.

Policy-makers should heed these concerns. Van Assche presents empirical evidence that GVCs are generally good for growth; in particular, countries that integrate more rapidly into GVCs tend to have faster output and employment growth. Increased GVC integration would therefore likely provide broader economic benefits for Canada, which has not kept pace with other countries. He estimates that if Canada had simply maintained its GVC trade as share of its economy over 1995 to 2009 (rather than falling by 1.5 percentage points), its real GDP per capita growth would have been nearly 0.2 percentage points higher per year over this period, other things equal.

Van Assche emphasizes that getting the basic framework policies right is more important than ever, as this will foster a business environment that is conducive to performing high-value-added tasks onshore. Moreover, the federal government should focus on creating an environment where firms can link rapidly, safely and reliably with other value chain nodes; liberalize trade on both the export and import sides; and improve transportation infrastructure, communications networks and customs procedures. Implementing these policies will require greater policy coordination across government departments and better communicating to the public the economic benefits of GVCs in order to garner support for these policies.

Résumé de chapitre

Les gouvernements doivent repenser leurs politiques commerciales en fonction des nouvelles réalités du commerce international. Au cours des dernières décennies, les processus de production se sont mondialisés au gré d'une séparation et d'une délocalisation des tâches, effectuées dans différents lieux et souvent dans différents pays, dans le cadre de chaînes de valeur mondiale (CVM). Désormais, l'essentiel du commerce international ne repose plus sur l'échange de produits finis mais d'intrants intermédiaires que les pays utilisent de plus en plus pour assurer leurs propres exportations.

Dans ce chapitre, Ari Van Assche (chercheur associé de l'IRPP et professeur agrégé en affaires internationales à HEC Montréal) examine comment l'intégration des entreprises aux CVM a modifié leur participation aux échanges mondiaux, et les répercussions de ce phénomène sur les politiques commerciales. Traditionnellement, le commerce international constituait pour les entreprises un moyen de pénétrer des marchés étrangers. Mais les sociétés intégrées aux CVM ont plutôt développé une « mentalité de chaîne d'approvisionnement », selon laquelle les exportations sont un parcours en soi qui importe autant que la destination. Elles voient leur expansion mondiale comme un moyen de réduire leurs coûts de production, d'accéder aux technologies étrangères et de diversifier leur exposition aux risques des chaînes d'approvisionnement. Parallèlement, elles sont confrontées à la complexité des déplacements transfrontaliers de biens, de personnes et d'informations au sein de systèmes de production multiphasés. La mentalité de chaîne d'approvisionnement accroît ainsi la demande pour des politiques commerciales qui faciliteront les CVM en levant les barrières au commerce et à l'information, à la frontière comme au-delà.

Les décideurs doivent tenir compte de ces préoccupations. L'auteur s'appuie sur des données empiriques pour démontrer que les CVM favorisent généralement la croissance, notamment dans les pays qui s'y intègrent plus rapidement, où la progression de la production et de l'emploi tend à s'accélérer. Ainsi, une meilleure intégration des entreprises canadiennes aux CVM générerait sans doute d'importants avantages économiques, étant donné que le Canada n'a pas suivi le rythme d'autres pays. Si le Canada avait simplement maintenu sa part d'échanges au sein des CVM de 1995 à 2009 (alors qu'elle a reculé de 1,5 point de pourcentage), son PIB réel par habitant aurait augmenté de près de 0,2 point par année durant cette période (toutes choses égales par ailleurs), estime l'auteur.

D'où l'importance clé d'adopter de solides politiques-cadres, car elles créeront un environnement commercial propice à l'exécution de tâches à forte valeur ajoutée sur le marché intérieur. Ottawa devrait en outre agir sur trois plans : établir un environnement qui permet aux entreprises de s'intégrer de façon rapide et sûre à d'autres maillons des CVM ; libéraliser les échanges, à l'importation comme à l'exportation ; améliorer les infrastructures de transport, les réseaux de communication et les procédures douanières. Pour mettre en œuvre de telles politiques, il faudra renforcer la coordination interministérielle et améliorer la communication sur les avantages économiques des CVM en vue de gagner l'appui de la population.

Global Value Chains and the Rise of a Supply Chain Mindset

Ari Van Assche

GLOBAL VALUE CHAINS (GVCs) HAVE CREATED A NEW TRADE REALITY FOR BUSINESSES, policy-makers and scholars. In the past, international trade primarily involved the exchange of final products, but now trade in intermediate inputs accounts for roughly two-thirds of all international trade (Johnson and Noguera 2012). Furthermore, countries increasingly rely on imported inputs to produce their exports. Johnson (2014) estimates that the import content embedded in gross world exports rose by about 10 percentage points between 1970 and 2008. This growth accelerated over time, with the import content of exports increasing roughly three times faster after 1990 than in the 1970s and 1980s. For Canada, the import content of gross exports rose 11 percentage points between 1970 and 2008, even though it declined slightly after 1995.¹

To explain this new trade reality, international trade economists have developed a new theoretical framework — the “task approach to trade” — that introduces concepts prevalent in supply chain management into traditional trade models. In doing so, they have opened up the black box of production by modeling the production process as a sequence of stages, or tasks, that are combined to produce a final good. As these tasks become more geographically separable, companies have the incentive to slice up their value chain and relocate certain tasks to lower-cost locations, leading to the emergence of GVCs.

In hindsight, the “task approach to trade” seems like a natural extension of traditional trade models, but it is actually a radical departure from the way economists have conventionally viewed trade. Traditionally, in envisioning the production process of a good, the natural idea that immediately jumped to mind was that everything was done in-house — in one factory located in one country — and afterwards the item could be exported to other countries. Today’s production

processes are different: increasingly, they are being conducted by a team of firms spread across different countries — that is, in GVCs.

In terms of intellectual influence, the “task approach to trade” has been highly successful and ultimately has led to a paradigm shift in the way that both academics and policy-makers interpret trade data (Van Assche 2012). In particular, there is now a growing awareness that the most commonly reported gross exports data do not capture accurately the value added that is created in a country. This matters, because it can lead to a significant misunderstanding of how value added is exchanged between countries. Prompted by these insights, several leading international organizations have developed new value-added measures of trade by constructing global input-output tables that combine national input-output tables with bilateral trade data. One such measure is the Trade in Value Added (TiVA) database created by the Organisation for Economic Co-operation and Development (OECD) and the World Trade Organization (WTO).²

The “task approach to trade” relates to a second, equally important paradigm shift in the way that companies think about international trade and trade policy. Whereas firms traditionally viewed international trade as a vehicle to expand their sales into foreign markets, companies that are part of GVCs now have developed a supply chain mindset when thinking about international business. For these firms, it is not only about the destination of their exports, but also about their journey. They view international expansion as a potent tool to reduce production costs, access foreign technology and diversify their exposure to supply chain shocks. At the same time, they are concerned about the daunting complexities of moving goods, people and information rapidly, safely and reliably across borders in a multistage production system. They want policy-makers to take steps to grease the wheels of GVCs by reducing trade and information barriers both at the border and behind the border.

The Canadian government should take these trade policy demands seriously. Empirical evidence from a wide variety of developed and developing countries shows that GVCs are good for growth — in particular, countries that integrate more rapidly into GVCs also tend to have faster output and employment growth. Increased GVC integration could, therefore, provide broader economic benefits for Canada.

Policy-makers can adopt a number of strategies to grease the wheels of global value chains, including focusing on import liberalization, facilitating

goods trade both at and behind the border and aiding information flows. In what follows, I discuss these strategies as well as some stumbling blocks that might emerge in the implementation of these policies.

The Task Approach to Trade

TRADITIONAL INTERNATIONAL TRADE MODELS ARE POORLY EQUIPPED TO EXPLAIN THE rise of GVCs. A key simplifying assumption implicit in such models is that products have clear national identities — that is, their entire production process is concentrated in a single factory in the home country. This national view of production has shaped traditional thinking about international trade. A Canadian export is often treated as entirely “made in Canada,” and a Chinese export is generally considered “made in China.” In this traditional view, international trade is about reaching foreign consumers. Canadian firms export to access foreign markets, while imports reflect foreign firms’ efforts to reach Canadian consumers.

This view has also shaped the main tenets of trade policy. On the one hand, policy-makers seek improved market access in foreign countries for Canadian firms because increased export opportunities are thought to strengthen Canadian production and employment. On the other hand, Canada imposes certain restrictions on foreign access to Canadian markets because imports are believed to threaten Canadian firms and jobs. In trade negotiations, policy-makers are often willing to reduce import restrictions only if they get increased foreign market access in return.

This national view of production, however, has never been so disconnected from reality as it is today. Thanks to reduced communication and transportation costs, many companies have long abandoned the practice of producing goods in a single country. Through offshoring, they have sliced up their supply chains and dispersed their production activities across many countries, leading to GVCs. Bombardier’s C Series of jet aircraft is a case in point. The airplane’s supply chain spans from Canada (design, assembly and testing) to China (fuselage), the United Kingdom (wing structures and winglets), Italy (tailplanes), Germany (landing gear) and the United States (engine parts and other components). De Backer and Miroudot (in this volume) estimate that, in 2009, more than 20 percent of the value of Canada’s gross exports reflected the value of imported components. Koldyk, Quinn and Evans (also in this volume) find that, in the same year, foreign

affiliate sales of Canadian companies exceeded Canada's goods and services exports combined.

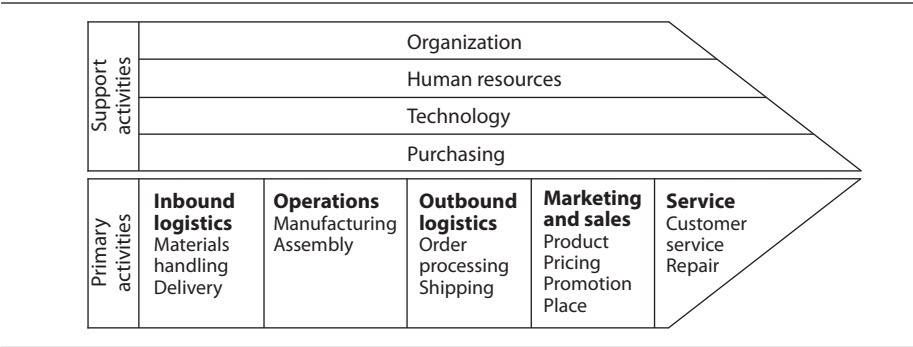
To explain the rise of GVCs, economists have begun opening up the black box of production in a literature referred to as the "task approach to trade" (Baldwin and Robert-Nicoud 2014; Grossman and Rossi-Hansberg 2008). Instead of assuming that the entire production process is concentrated at a single location, they have started to model it as a sequence of stages, or tasks, that are combined to produce a final good. A task might be performed at a distance from other tasks, but the constant exchange of information and materials that is required between tasks implies that there are costs to offshore a task. A company's core challenge is to decide how to allocate tasks to workers located in different countries and employed by different companies.

The notion of production as a sequence of stages is not new. Indeed, it is the foundation of Porter's (1985) "value chain," Gereffi's (1999) "global commodity chain" and the field of supply chain management (Stadtler 2005), to name just a few descriptions. What is new about the task approach to trade is that it formally demonstrates the powerful benefits for firms and countries of expanding supply chains internationally. It also illustrates the amplified complexities that firms face in managing the movement of goods, people and information across borders in GVCs. As a consequence, supply chain issues have now become a front-and-centre element of firms' international strategy — what I refer to as the emergence of the supply chain mindset.

To analyze the factors that affect how a firm organizes its GVC and where it locates value chain tasks, it is instructive to start with Porter's (1985) concept of the value chain. The value chain of a product is the sequence of activities and tasks that a company performs to design, produce, sell, deliver and support its products (see figure 1). These tasks consist of not only the physical transformation processes (so-called primary activities) but also support functions such as research and development (R&D), procurement, human resource management and many other tasks regarded as higher-value-added activities.

A quick glance at the various activities of a value chain suggests they are highly heterogeneous. Tasks such as R&D are more knowledge intensive and relationship specific than, say, manufacturing assembly. Some tasks are more easily separable than others, since they require few tacit knowledge exchanges and face low trade costs. These heterogeneous characteristics of tasks play a key role in a firm's decision about where to locate a task and how to integrate it into the GVC.

Figure 1
Porter's value chain



Source: Porter (1985).

Four characteristics of a task are particularly important: input requirements, switching costs, information linkages and material linkages. The first two determine the benefits of dispersing tasks across countries; the last two identify the direct and indirect costs of dealing with value chain nodes that are located at a distance.

Input requirements

One characteristic of a task that affects where to locate the task is its input requirements. The production of a task requires a mix of labour inputs, technology, fixed assets, working capital and various types of information, and this mix can differ greatly for tasks along the value chain. R&D and marketing, for example, are generally capital- and knowledge-intensive tasks that require significant investments of inputs that cannot be contracted out. In contrast, manufacturing assembly is generally a standardized, repetitive and labour-intensive task. In line with the traditional theory of comparative advantage, firms have an incentive to move tasks that use certain inputs intensively to countries that are abundant in these inputs.

Jones and Kierzkowski (1990) were among the first to illustrate the logic of task-level comparative advantage. Suppose production consists of a capital-intensive block and a labour-intensive production block that are geographically separable. As long as trade and communication costs are sufficiently low, firms in a capital-abundant developed country have an incentive to relocate their labour-intensive tasks to a labour-abundant developing country to improve their

productivity, while keeping capital-intensive tasks at home. In that case, comparative advantage leads to trade in tasks, where the labour-abundant country exports labour-intensive tasks and the capital-abundant country exports capital-intensive tasks. This task trade mechanism is now a foundational element in models that use the task approach to trade (Grossman and Rossi-Hansberg 2008).

Described in this way, the task trade approach does not sound new but simply rehashes the standard theory of comparative advantage — although at the task level, rather than at the goods level (Van Assche 2012). The novelty of this approach, however, is how it demonstrates formally why firms find it so beneficial to expand their supply chain internationally. By offshoring tasks to countries with a comparative advantage in their production, companies can reduce input costs and increase their overall productivity (Grossman and Rossi-Hansberg 2008). There is ample supporting evidence to back this up: Amiti and Konings (2007), for example, show that a 10 percentage point drop in input tariffs leads to a 12 percent productivity gain for Indonesian firms that import their inputs.³ As a result of such findings, a growing number of companies now actively think much more than before about comparative advantage when developing their international strategy.

Recent trade studies illustrate that many other factors besides relative endowments affect a country's comparative advantage in tasks. One factor that has received a large amount of attention is the quality of contracting institutions (Nunn and Treffer 2014). To see why this might create a comparative advantage for certain tasks, consider once again the two tasks of R&D and manufacturing assembly. R&D requires a significant amount of relationship-specific, noncontractible inputs, while manufacturing assembly is a repetitive, standardized task that requires few relationship-specific inputs. Other things being equal, a company will locate R&D in a country with better contracting institutions, since it leads to significantly lower transaction costs. In contrast, it might locate assembly in a country with less-developed contracting institutions, since the resulting transaction costs remain limited. Contracting institutions, therefore, can be a source of comparative advantage. There is ample empirical evidence of this, too: Levchenko (2007) and Nunn (2007) find that countries with a better legal system export relatively more in contract-intensive sectors.

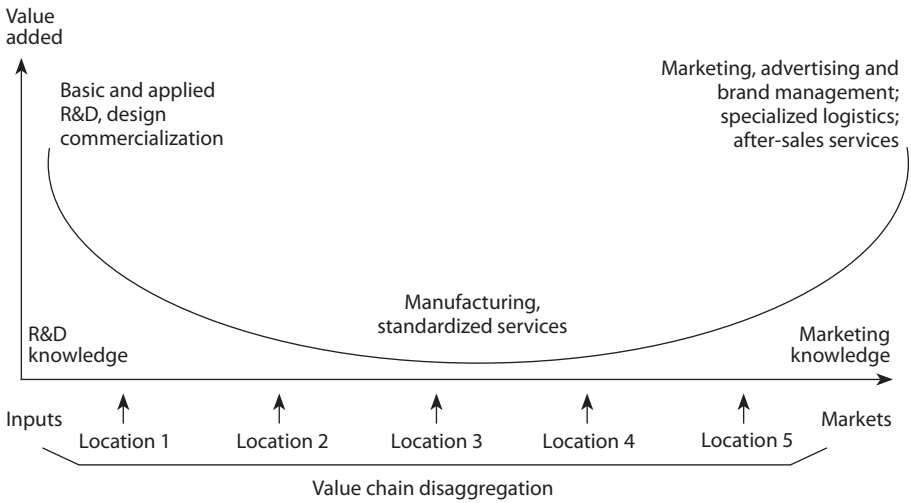
Other institutions and regulations also shape comparative advantage. Multinational firms have an incentive to locate innovative tasks in countries with stronger intellectual property rights protection, especially in sectors with

relatively long product life cycles (Bilir 2014).⁴ Companies are better off locating tasks that require large fixed costs relative to sales in countries with institutions — for example, bankruptcy law, securities law and corporate law — that promote financial development, since they reduce the cost of external finance (Nunn and Trefler 2014). Firms are also spurred to locate time-sensitive products in countries that are able to export faster (Gamberoni, Lanz and Piermartini 2010).

The concept of institutional or regulatory comparative advantage is not without controversy, however, since some institutional features might create comparative advantages that are ethically debatable. A country with accommodating labour regulations might develop a comparative advantage in tasks with extreme fluctuations in labour demand and volatile hours (Lessard 2013), which might come at a cost for local workers. A country with weak environmental standards might generate a comparative advantage in pollution-intensive tasks (Eskeland and Harrison 2003), turning it into a pollution haven. Some analysts (for example, Davies and Vadlamannati 2013) argue that this could lead to a race to the bottom in labour and environmental standards, even though evidence of this is scarce. It is fair to say that, in a GVC world, the question of whether minimum labour and environmental standards should be adopted to level the playing field between countries will play a growing role in bilateral and multilateral trade negotiations.

There is also the open question of which tasks allow countries to capture more value in GVCs. Recent studies suggest that the highest-value-added tasks tend to be located at the two extremes of the value chain: upstream (R&D and the production of core inputs) and downstream (marketing and sales); see Mudambi (2008). These tasks tend to be more relationship specific and knowledge intensive, and therefore are generally performed in developed countries such as Canada and the United States. The lower-value-added tasks, in contrast, tend to be middle-of-the-chain activities such as component manufacturing and final assembly. These tasks are generally more standardized, repetitive and labour intensive, and are concentrated in developing countries such as Mexico, China and Vietnam. This specialization pattern gives rise to the “smile of value creation” shown in figure 2. For developed countries such as Canada, a key policy concern is how to maintain their specialization in high-value-added activities. For developing countries, a bigger concern is how to shift from being a final assembly platform for GVCs to upgrade into higher-value-added activities (Taglioni and Winkler 2014).

Figure 2
The smile of value creation



Source: Mudambi (2008).

Operating flexibility

In the short run, cost differences between countries are driven not only by comparative advantage forces but also by short-term shocks. For example, a sudden exchange-rate appreciation might significantly increase the relative cost of performing a task in a particular location. A natural disaster such as an earthquake or tsunami might make it prohibitively expensive to carry out or acquire a task locally for a certain period of time. In that case, a firm's ability to circumvent the shock depends on its ability to obtain the task rapidly elsewhere. The following example describes how the trading company Li & Fung scrambled to restructure its GVC in response to an unexpected trade policy shock:

On a Friday in early September 2006, the South African government announced that it would be imposing strict quotas on Chinese imports in two weeks. Li & Fung had orders already in production for South African retailers that would be affected by these changes. Managers began to look at contingency plans to move production to factories in different countries and even to move the last stage of existing orders to different end countries to satisfy non-China country-of-origin rules. (Fung, Fung and Wind 2007, 58-9)

A company's ability to relocate production rapidly depends on the cost of switching production locations within GVCs. Switching costs depend, in turn, on the characteristics of the task. When a task is highly standardized and can be performed by multiple firms or subsidiaries in different countries, the cost of switching the production location is low. When a task is highly differentiated, relocating it can require substantial search and development costs, and might be difficult to do quickly or cheaply.

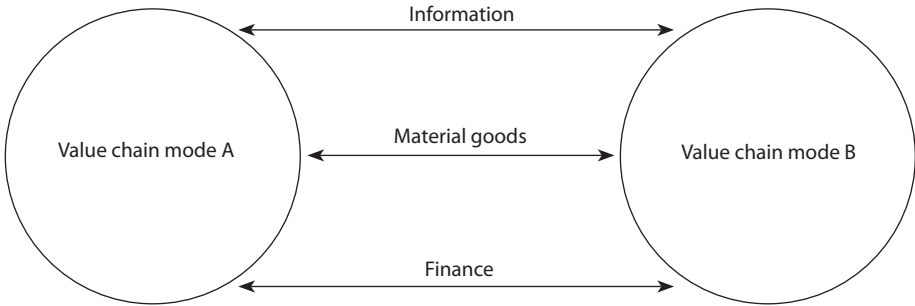
Companies can develop sophisticated supply chain strategies to lower switching costs and build resilience. As Kogut and Kulatilaka (1994) illustrate, companies can build resilience and operating flexibility into their value chain by carrying out similar tasks in different foreign subsidiaries. If a shock hits one subsidiary, production can then be relocated to another subsidiary. Belderbos and Zou (2007) find that Japanese multinational firms use the flexibility created by their multinational plant network to adjust affiliate employment in response to changes in labour costs. Chung et al. (2010) find that Japanese multinational firms make similar adjustments to employment in their multinational plant network in reaction to country-specific fluctuations in the business cycle.

Supply switching thus helps companies reduce their vulnerability to supply chain shocks, but perhaps at the cost of higher production volatility for "footloose" GVC tasks (Lessard 2013). If a company can react swiftly to a shock by switching its production elsewhere, this increases the vulnerability of production in the plants that undertake the task. Since developing countries are more likely to specialize in footloose tasks with low switching costs, production volatility might have been offshored to these countries with the emergence of GVCs. In line with this, Ma and Van Assche (2014) find that Chinese exports within GVCs are significantly more sensitive to anti-dumping shocks than are regular exports, while Bergin, Feenstra and Hanson (2011) show that employment and output in Mexico's export assembly industry are twice as volatile as their counterparts in the United States.

Information linkages

The location decision of a task depends not only on the cost of production in a country but also on the inherent links that exist between the task and other value chain nodes. To execute a task, a firm generally requires information, materials and capital that have been generated and transferred from other value

Figure 3
The power of linkages



Source: Author.

chain activities (figure 3). A US subsidiary in Canada, for example, might rely on financing from its headquarters in the United States, inputs made in Mexico and information from its R&D centre in, say, Ireland. The cost of obtaining these goods, capital, people and know-how tends to increase with distance, which acts as a countervailing force against the geographic dispersion of GVC tasks.

The ability to transfer data cheaply, freely and safely across borders is critical for setting up a smooth and well-functioning GVC (Meltzer 2014). This is because information linkages act to coordinate GVC activities and transfer knowledge between GVC partners. A growing body of literature is investigating the type of information that is most easily transferred from a distance with little loss of productivity. Routine tasks, such as performing simple calculations, are more easily sent offshore since they can be specified into simple instructions and taught to foreign workers with little misunderstanding (Autor, Levy and Murnane 2003; Levy and Murnane 2004; Liu, Feils and Scholnick 2011). Nonroutine tasks, such as customer care, require complex thinking, judgment and human interaction, and are more difficult to transfer. Seminal papers in the task approach to trade, such as that of Grossman and Rossi-Hansberg (2008), integrate this concept into their theoretical task trade models.

Blinder (2006) counters, however, that it is not that the task needs to be routinizable, but that the information linkage needs to be codifiable — that is, expressed digitally — and thus easily transferred over the Internet. Tasks such as

computer programming that rely intensively on codifiable information from other value chain activities therefore can be performed more easily at a distance. In contrast, tasks such as hairdressing and legal advice that rely intensively on tacit information, which cannot be conveyed in symbols, require frequent face-to-face contact, making it difficult to offshore them.

The Internet revolution has reduced the cost of transferring codified information across borders dramatically. Today, people and companies around the world are using digital connections to share information. Between 2005 and 2012, cross-border Internet traffic grew by more than 50 percent per year (McKinsey Global Institute 2014). These technological changes have made it easier for firms to codify production designs and processes into an electronic format. As a result, many companies now rely on sophisticated computer-aided design (CAD) technologies and business-to-business systems to share codified information between tasks.⁵ This, in turn, has made it easier to disperse value chain activities geographically. Fort (2014), for example, finds that the adoption of CAD software facilitates fragmentation by lowering the costs of communicating design specifications across locations.

Information linkages also act as a key channel to diffuse technology among value chain players. Companies that are integrated into GVCs are in repeated contact with other parties in the value chain to coordinate activities. These repeated interactions can stimulate the diffusion of complex tacit information — especially advanced technological knowledge. For firms that want to acquire new technology and competences, participating in GVCs can be a powerful channel to acquire new knowledge. For the owners of intellectual property, in contrast, GVCs entail risks for the international exposure of a firm's knowledge and capital, particularly in countries with weak intellectual property rights protection.

The policy environment plays a key role in the ability of firms to transfer information cheaply, reliably and safely. The degree of competition in the telecommunications sector, for example, affects the cost of Internet access; the quality of the wireless network infrastructure shapes the speed with which firms can connect with other value chain nodes; the intellectual property framework determines the safety with which information can be transmitted; and the financial system influences e-business payment options. For firms integrated in GVCs, a key policy demand is thus to improve and streamline communications linkages across borders.

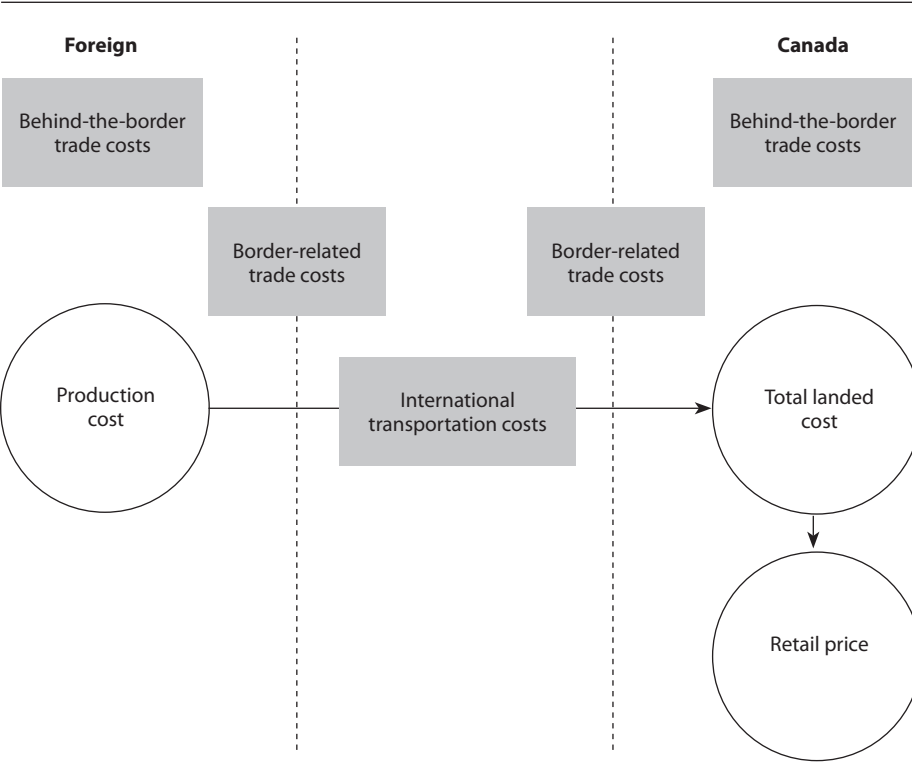
Material linkages

Material linkages also have a significant impact on task location. Moving goods internationally involves longer and more costly processes that are harder to manage than domestic trade. Multistage production magnifies this effect in two ways (Yi 2003).

First, in GVCs, components cross borders multiple times, therefore incurring trade costs multiple times. Trade costs essentially are the difference between the total landed cost of a good (the price of a product once it has arrived at the retailer’s door) and its production cost. As figure 4 shows, these costs can be divided broadly into three categories: international transportation costs, border-related costs and behind-the-border costs.

Second, import tariffs are applied to gross imports, even though domestic value added might be only a fraction of this amount. A firm pays tariffs on its

Figure 4
Trade costs



Source: Author.

imported inputs, then faces tariffs again on the full value of its exports, including on those same inputs.

International transportation costs

The most obvious obstacle to the movement of physical goods across borders is the more expensive freight cost it entails. Hummels (2007) estimates that, for the median individual shipment of US imports in 2004, exporters paid US\$9 in transportation costs for every dollar they paid in tariff duties. Indeed, transportation costs continue to be a key barrier to international trade (Clark, Dollar and Micco 2004), especially for heavier products with a high weight-to-value ratio that are more expensive to transport (Hummels 2007).

The cost of international transportation is a function not only of economic forces such as transportation technology and oil prices but also of regulatory and market structure forces. For example, Fink, Mattoo and Neagu (2002) reveal anticompetitive pricing in maritime shipping due to price fixing agreements. Hummels, Lugovskyy and Skiba (2009) have established that maritime transport prices are higher if there is a low elasticity of import demand, and that having more shippers lowers the price and the impact of the elasticity. Similarly, there is evidence of anticompetitive behaviour in air transport: Micco and Serebrisky (2006) find that import-related air transport costs fell by 9 percent in the five years after the signing of an open skies agreement. For GVC firms, a key trade policy demand is thus to enhance international competitiveness in the transportation sector.

Besides freight costs, time is another impediment that can increase international transportation costs significantly. If components are shipped over long distances, this can greatly increase the lead time of a product and its predictability of arrival. In time-sensitive industries, such as electronics and apparel, delays can prevent companies from reacting quickly to unexpected changes in market trends, thus undermining their competitiveness. In line with this, Harrigan and Venables (2006) show that the adoption of just-in-time production techniques pressures firms to relocate their production of time-sensitive components closer to home; Evans and Harrigan (2005) find that US retailers source time-sensitive textile products closer to home; and Hummels and Schaur (2010) find that firms in time-sensitive industries rely more on air transport.

Border-related trade costs

Border-related costs are a second type of trade costs that hinder the movement of goods along GVCs. These include direct costs that occur at the border, such as tariffs, quotas and other expenses related to supplying information and documents to the relevant authorities. But they also include indirect costs and delays related to dealing with differences in national currencies, languages, regulations and so on.

A significant contributor to high at-the-border trade costs is the explosion of overlapping preferential trade agreements (PTAs). To date, Canada has 12 PTAs (already in force or concluded) and is negotiating 9 others. Such deals entail complicated regulations and rules of origin that impose substantial costs of labelling and certification on firms (Augier, Gasiorek and Tong 2005). Bhagwati (1995) calls this the “spaghetti bowl” problem, with trade preferences criss-crossing like noodles all over the place.

Often vastly different regulations among countries on the movement of capital, foreign ownership, intellectual property rights and competition policy add to the difficulty of operating GVCs smoothly across borders. Companies thus need an in-depth understanding of international regulations to avoid fines, penalties, delays and even exclusions when setting up their GVCs (see Nott, in this volume). Furthermore, conforming to foreign regulations might require costly changes in the production process.

To deal with these daunting complexities of cross-border trade, many companies rely on intermediaries such as wholesalers, trading companies and third-party logistics providers. For example, the share of total exports handled by intermediaries amounts to 22 percent in China, 17 percent in Turkey and 11 percent in India (Abel-Koch 2013; Ahn, Khandelwal and Wei 2011; Bernard, Grazi and Tomasi 2011). It is smaller firms with limited resources that are prone to use trade intermediaries for their exports; larger firms prefer to sell their goods abroad directly (Ahn, Khandelwal and Wei 2011). Harmonizing international regulations and standards would help reduce at-the-border barriers and promote the trade of goods involved in GVCs (Maur and Shepherd 2011).

Behind-the-border trade costs

A final deterrent to the international trade of goods and services is “behind-the-border” trade costs such as domestic regulatory hurdles and a weak logistics

infrastructure that negatively affects a firm's ability to trade goods rapidly with value chain nodes abroad. There is growing evidence that the quality of a location's transportation infrastructure acts as a driver of the location's competitiveness, especially within GVCs. A location with a better transportation infrastructure is able to link more rapidly and efficiently with other value chain stages, thus making it especially attractive for companies that are integrated in global value chains. For example, Hoekman and Nicita (2011) find that superior logistics performance is closely associated with bilateral trade growth.⁶ Saslavsky and Shepherd (2013) show that trade within GVCs is more sensitive to a country's logistics performance than is final goods trade. Gamberoni, Lanz and Piermartini (2010) find evidence that a location's ability to export on time is at least as important a source of comparative advantage as the costs of labour, capital and other inputs in the export of intermediate goods. These studies reinforce the point that good domestic logistics performance is a necessary condition for setting up well-functioning GVCs.

Should Policy-Makers Adopt a Supply Chain Mindset?

SINCE REGULATORY IMPEDIMENTS AND OTHER POLICY INTERVENTIONS CONTRIBUTE A significant portion of linkage costs, there is growing demand from the Canadian business community for policy-makers to facilitate the international trade of goods and information within value chains (see Nott, in this volume). Should policy-makers heed this demand? In other words, should they adopt a supply chain mindset when formulating trade policy? The answer is complex, with arguments raised on both sides.

Nongovernmental organizations, trade unions and labour advocates, among others, argue that Canadian corporate interests should not be conflated with those of society as a whole, especially when companies are heavily integrated in GVCs (Reich 1990). According to this view, if a Canadian firm's value chain is spread across multiple countries, its trade policy interests might well conflict with those of Canadian workers and the Canadian economy. To maximize its profits, for example, such a company might have an incentive to lobby for import liberalization, even if that would disproportionately help foreign workers to the detriment of Canadian workers. Thus, adopting a supply chain mindset could be detrimental to the Canadian economy.

Trade economists are skeptical about this argument, however, for two reasons. First, there is little evidence that firms integrated in GVCs take actions

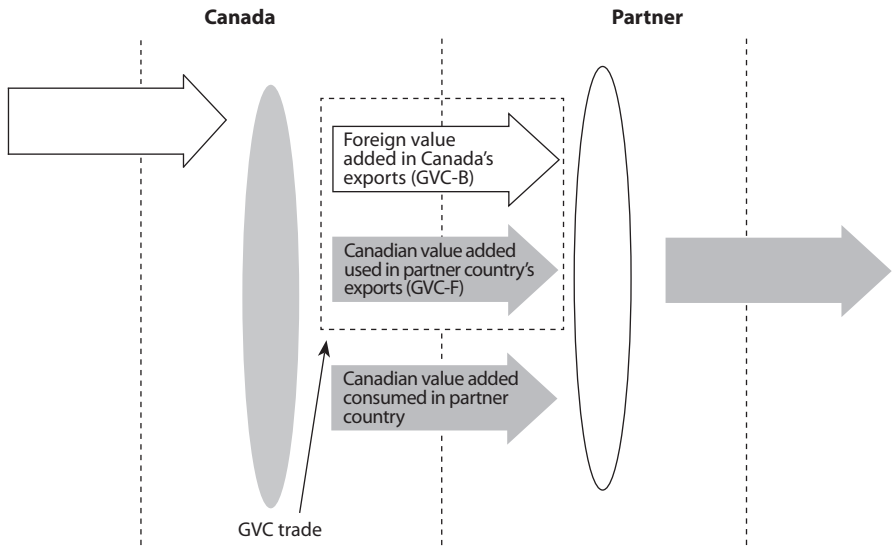
that are detrimental to domestic workers. Harrison and McMillan (2011) find, for example, that offshoring by US-based multinationals is associated with only a small decline in manufacturing employment, while Ottaviano, Peri and Wright (2013) find that offshoring by US multinationals has no impact on domestic employment whatsoever. Second, there are good theoretical reasons why integrating in GVCs can be good for a country's economic performance. GVCs can promote economic efficiency by allowing a country to specialize in specific segments of the value chain in which it has a comparative advantage, rather than having to build the entire value chain locally (Grossman and Rossi-Hansberg 2008). Furthermore, integrating into GVCs stimulates technological and knowledge spillovers from abroad by giving domestic companies access to inputs, technologies and knowledge that are not available locally. Keller (2004) shows that international trade and foreign direct investment are major channels for international technology diffusion, and there are good reasons to believe that GVCs are an important part of this diffusion process. Moreover, companies that are part of a GVC are exposed to the foreign technology and knowledge embodied in imported intermediate goods, and are in repeated contact and exchanges with other value chain parties to coordinate activities. These interactions can stimulate the diffusion of complex tacit information, especially advanced technological knowledge.

In the end, whether integration into GVCs is a good thing for a country's output and employment is an empirical issue. One way to assess whether countries that are more integrated into manufacturing GVCs perform better economically is to use the recently developed OECD-WTO TiVA database, which measures a country's GVC integration.⁷ Figure 5 shows how this data set allows one to decompose a country's gross exports into three parts:

- > foreign value added that is used to produce exports (labelled GVC-B in the figure, to denote "backward" GVC linkages);
- > domestic value added that is exported and, in turn, subsequently used by the partner country to produce its own exports (labelled GVC-F, to denote "forward" GVC linkages); and
- > domestic value added that is directly consumed in the partner country.

The first two parts are categorized as GVC trade and reflect the two distinct ways that a country's trade can integrate into GVCs. The third part is a country's regular value-added trade that is not part of GVCs.

Figure 5

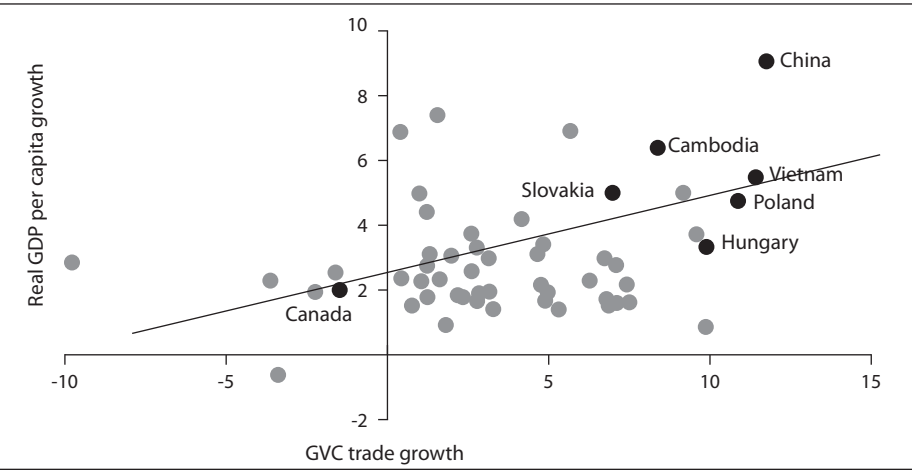
The decomposition of gross exports into GVC trade and regular trade

Source: Author.

Figure 6 depicts the correlation between countries' GVC trade growth and their per capita growth in gross domestic product (GDP). It shows that countries with faster growth in the share of GVC trade to GDP between 1995 and 2008 tended to have higher economic growth rates. It is worth noting that Canada is one of a handful of countries that reduced their GVC intensity over this period, as its GVC trade share of the economy fell by 1.5 percentage points. De Backer and Miroudot (in this volume) attribute this, in part, to the fact that Canada's exports have shifted to more resource-intensive sectors. Also notice that the countries that increased their GVC share the most, and even more than their GDP growth, over this period — those farthest to the right in figure 6 — were generally developing countries located in Asia (such as China, Vietnam and Cambodia) and eastern Europe (such as Poland, Hungary and Slovakia).

This positive relationship between GVC trade growth and GDP per capita growth also holds in an econometric analysis, as table 1 shows. The first column measures annualized growth in real GDP per capita between 1995 and 2009 as a function of growth in GVC trade. The regression controls for differences

Figure 6
Growth in GVC participation versus growth in real GDP per capita, 1995-2008



Source: Author's calculations based on data from the OECD-WTO TiVA database.

in growth rates for each combination of economy and year. That is, it accounts for China's very fast growth during this period, while Canada had much slower growth, and then asks whether relatively fast growth corresponds to periods of relatively fast growth in GVC trade. The table shows that economies in which GVC trade growth increased by 1 percentage point also enjoyed a 0.12 percent increase in real per capita GDP growth. To put these results in perspective, if Canada's GVC trade as share of the economy had remained steady over this period (rather than falling by 1.5 percentage points as it did), then these estimates imply that its real GDP per capita growth would have been nearly 0.2 percentage points higher per year, all other things being equal. Column 2 of table 1 shows that growth in forward linkages trade is more strongly correlated with economic growth. In other words, countries that became more important suppliers of intermediate goods used by other countries' exports saw stronger economic growth. Growth in backward linkages also has a positive relationship with real GDP per capita growth, but the effect is not statistically significant.

To investigate concerns of negative employment effects of increased GVC integration, columns 3 through 6 of table 1 disaggregate the analysis to the industry level. The results show that GVC trade growth is positively correlated

Table 1

Relationship between GVC trade growth, employment growth and economic growth, 1995-2009

Dependent variable	Annualized real GDP per capita growth		Annualized industry-level employment growth		Annualized industry-level output growth	
	(1)	(2)	(3)	(4)	(5)	(6)
GVC trade (growth)	0.12*** (0.037)		0.10*** (0.016)		0.19*** (0.042)	
Backward GVC trade (growth)		0.03 (0.029)		0.08*** (0.016)		0.13*** (0.035)
Forward GVC trade (growth)		0.09** (0.039)		0.03** (0.015)		0.10*** (0.030)
Year fixed effect	yes	yes	yes	yes	yes	yes
Country fixed effect	yes	yes	yes	yes	yes	yes
Industry fixed effect	no	no	yes	yes	yes	yes
R^2	0.65	0.66	0.41	0.41	0.65	0.65
N	221	221	1,236	1,232	1,248	1,244

Source: Author's calculations based on value-added trade data from the OECD-WTO TiVA database and employment data from the World Input-Output database.

Note: The dependent variable is annualized growth between periods (1995, 2000, 2005, 2008 and 2009). Columns 1 and 2 conduct the analysis at the aggregate level; columns 3 through 6 disaggregate the analysis to the industry level. A constant term is included in all specifications but is not reported.

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

with both industry-specific employment and output growth. Columns 3 and 5 show that a 1 percentage point increase in an industry's GVC trade growth is related to a 0.10 percentage point rise in employment growth and a 0.19 percentage point rise in gross output growth, respectively (controlling here for country-specific characteristics, time effects and industry-specific effects). Columns 4 and 6 show that growth in both forward and backward linkages has a positive relationship with employment and gross output growth.⁸

In sum, the empirical evidence suggests that countries that increase their speed of integrating into GVCs also have faster output and employment growth. Further research is needed to assess the direction of causality — for example, does integrating into GVCs faster increase growth, or does faster growth facilitate faster integration into GVCs? Nonetheless, this evidence suggests that Canadian policy-makers should consider carefully the implications of GVCs for trade policy.

Policy Implications

THE TRADITIONAL VIEW OF INTERNATIONAL TRADE AS A VEHICLE TO EXPAND SALES internationally has become antiquated. Companies still use international trade to reach foreign consumers, but a growing number of Canadian firms increasingly are applying a supply chain mindset in their approaches to international trade. They are using international expansion to organize their production processes more efficiently by reducing costs, accessing foreign technology and potentially diversifying their sourcing of inputs to respond to unexpected shocks. This expanding GVC business model, however, increasingly requires addressing the complexities of moving goods, people and information across international borders. Information linkages remain far from free and safe, and substantive international transportation costs, border-related trade costs and behind-the-border trade costs continue to create headaches for firms that are integrated in GVCs. Such firms now want policy-makers to grease the wheels of GVCs by facilitating trade and information flows.

Canadian policy-makers would do well to take these new trade policy demands seriously and adopt a supply chain mindset. It is important to emphasize, however, that traditional policies still matter. Getting the basics right in policy terms will help to ensure that a country can specialize in higher-value-added activities at the two ends of the value chain (shown in figure 2). This involves creating and maintaining a business environment that is conducive to the production of high-value-added GVC tasks. For Canada, this means

- > adopting a strong competition policy;
- > developing a high-quality contracting environment that encourages collaboration and protects intellectual property rights;
- > maintaining a stable financial system;
- > fostering a healthy innovation environment featuring significant investments in higher education and human capital development; and
- > adopting immigration policies targeted to attract skilled individuals who can work in high-value-added industries.

By adding a supply chain mindset to these traditional policy recommendations, policy-makers should be able to create an environment in which firms can link rapidly, efficiently and reliably with other value chain nodes, both domestically and abroad. Canadian governments can adopt a number of policy approaches to achieve this objective.

First, the federal government should liberalize trade, on both the export and the import sides. Canada's ability to attract and retain high-value-added activities depends not only on the ability of its firms to send its products rapidly to foreign consumers but also on their capacity to receive inputs swiftly from their suppliers. In this respect, the federal government has been a global front-runner in committing to eliminate unilaterally all remaining tariffs on manufacturing inputs.

Second, the federal government should facilitate the transmission of goods across borders. The Trade Facilitation Agreement worked out at the WTO's Bali Ministerial Conference in December 2013 is a good example of this. It focuses on improvements in customs procedures, such as pre-arrival, transparency regarding regulations and procedures, and advance rulings and guarantees to permit the rapid release of goods from customs control. As Nott (in this volume) highlights, numerous bottlenecks nonetheless remain at the border.

Third, both the federal and provincial governments should improve Canada's transportation infrastructure. Competitive trade requires a well-functioning domestic transportation infrastructure. In this respect, the federal government's Asia-Pacific Gateway and Corridor Initiative and British Columbia's Pacific Gateway project are important steps in the right direction. There is, however, still vast room for improvement (see Roy in this volume).

Fourth, the federal government should facilitate not only goods flows, but also information flows. GVC trade depends on seamless and secure information flows both within and across borders. An improved communications network within Canada could reduce the cost and improve the security of transmitting vast quantities of information across value chain nodes. As well, enhanced cooperation across countries is necessary to ensure that differing regulatory regimes do not hinder cross-border data flows.

In implementing these new policy approaches, Canadian policy-makers need to take into account some new issues and dangers.

First, there is a need for heightened collaboration among Canadian agencies and governments. Trade policy-makers cannot tackle behind-the-border trade barriers alone, but require close collaboration among, for example, the federal Department of Foreign Affairs, Trade and Development, Industry Canada, Transport Canada, Agriculture and Agri-Food Canada, the Canada Border Services Agency and the Canada-United States Regulatory Cooperation Council. Furthermore, since trade negotiations increasingly extend into areas of provincial

jurisdiction, there is a growing need for close collaboration between the federal and provincial governments (Fafard and Leblond 2013).

Second, in forming unilateral, bilateral or plurilateral trade objectives, Canadian policy-makers must be careful not to undermine the WTO. As Blanchard (in this volume) forcefully argues, countries that are integrated in mutual GVCs are more likely to push for trade facilitation through preferential trade agreements instead of through multilateral agreements, with the resulting “spaghetti bowl” of free trade agreements becoming a threat to the WTO (see also Wolfe, in this volume).

Third, there is a need for better and more disaggregated data. Despite new data sets on trade in value added (for example, the OECD-WTO TiVA), analysts still do not have a complete picture of how Canada’s trade fits into GVCs. In what type of GVC activities is Canada specialized? Who are Canada’s main GVC partners? Are there variations by provinces?

Fourth, policy-makers need to do a better job of explaining to the public why GVCs can be good for growth, while also explaining how they intend to use policy to allay concerns about the effects of GVCs. Many Canadians have the perception that GVCs are a vehicle for multinational firms to trawl the world for the cheapest labour, the lowest taxes and the fewest health, safety and environmental regulations. With the exception perhaps of tax avoidance, there is little evidence that companies act this way on a large scale.

The growth of global value chains is changing global business practices, leading to new trade policy demands and challenges. Policy-makers now need to alter their thinking on international trade matters and adopt policies that better reflect these new global realities.

Notes

1. De Backer and Miroudot (in this volume) explain the recent decline of the import content in Canadian exports.
2. See De Backer and Miroudot (in this volume) for further details about TiVA data. Other such work includes the World Input-Output Database, the Asian Input-Output tables of the Institute of Developing Economies and recent extensions to the data of the Global Trade Analysis Project.
3. Similar large gains have been made by Chile and India. See Goldberg et al. (2010); Kasahara and Lapham (2013); Kasahara and Rodrigue (2008); and Topalova and Khandelwal (2011).
4. Innovative tasks with relatively short life cycle technologies are insensitive to strong patent law because offshore imitation is less likely to succeed before obsolescence.
5. Three-dimensional printing is an example of such a system: a designer can use specialized software to generate data that can be sent over the Internet to a 3-D printer anywhere in the world. Over the longer term, such developments could dramatically alter manufacturing and distribution processes.
6. See Roy (in this volume) for a discussion of Canada's ranking in the Global Logistics Performance Index.
7. See De Backer and Miroudot (in this volume) for a discussion of the data and data limitations.
8. The United Nations Conference on Trade and Development finds a similar correlation between growth in GVC participation and GDP per capita growth, and that the correlation holds for both developed and developing countries (UNCTAD 2013).

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