

# Supply Chain Perspectives and Issues

## A Literature Review



Albert Park  
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Patrick Low

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## Foreward

Global value chains (GVCs) have been a feature of the international economic architecture for many years, but scholarly interest in the phenomenon is more recent. Today that interest is intense, emanating from an array of academic disciplines as well as from the policy world. This volume, jointly produced by the Fung Global Institute and the World Trade Organization, is an attempt to capture the core features and themes of the exploding literature on GVCs. Our review of the literature demonstrates the eclectic nature of existing work on GVCs, which in turn is a reflection of the complex character of these international production arrangements. Apart from seeking to capture the different strands of the literature, it is our hope that the volume may contribute to a deeper mutual understanding among different disciplinary perspectives, including economic, political economy, business and management, development, social, and public policy analyses.

At its simplest, the GVC story is about the symbiotic relationship between imports and exports, and the key role of foreign investment in internationalised production. The political economy of trade policy is very important in a world of GVCs, since the preponderance of intermediate products in total trade is testimony to the invalidity of the old mercantilist notion that exports are virtuous and imports much less so. The interdependency between imports and exports along supply chains leads to the conclusion that if we really want to understand trade and production linkages among nations, we need to look at how much value is added in different production locations instead of merely measuring trade in gross terms. Governments and international agencies are only just beginning to get to grips with the challenges of measuring trade in value-added terms.

Beyond the basic trade and investment relationships, however, there exists a rich, multi-faceted reality that calls for deeper study. International supply chains only became a viable means of organising production when advances in information and transport technology, backed by supportive policies, made it possible to extend production processes across countries and around the globe. Producers and buyers were able to pursue low-cost and other market-related advantages through optimal locational decisions. The resulting structures have led to complex inter-linkages among numerous goods and services markets and the creation of networks that can only be understood in their entirety. This is why a multi-disciplinary approach to the study of GVCs is indispensable. It is also why both endogenous and exogenous change can be sudden and have far-reaching effects, and why the interface of GVCs with policy needs to be analysed holistically.

We would argue that the difference between GVCs and the traditional international trade and investment linkages of four or five decades ago are more than a matter of degree. They reflect a fundamental shift in economic, political and social relationships among nations. GVCs are networks that link intricately with other networks, such as finance, logistics, government services and knowledge and people that form a complex adaptive global system which transcends geography and legal jurisdictions. They raise unprecedented challenges for policymakers, academics and businessmen alike.

If we fail to appreciate the complexities of this constantly changing world, or choose to ignore them, it will be to our cost. It is our hope that this volume will lessen the likelihood of neglect by raising awareness and deepening understanding.



**Andrew Sheng**

President  
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Hong Kong

# Introduction



## *Preliminaries*

A comprehensive review of the literature on global value chains (GVCs) is an ambitious undertaking for at least three reasons. First, the literature is voluminous and the risk of omitting key references is high. Second, the proper study of GVCs requires a multi-disciplinary approach, with literature originating from a wide variety of disciplines. This requires an understanding of different intellectual and conceptual approaches. Third, with such a high level of interest in GVCs, the field is a moving target, and new work in the next months and years will warrant an update.

We have done our best to address the first two of these challenges. Readers are welcome to inform us of any work they feel is missing from the review and this will be rectified, as appropriate, in subsequent revisions.

Internationally dispersed production networks have grown in prominence over recent decades. In some measure, they could be said to reflect an intensification of long-established trade and investment links among nations. However, we would argue that they are qualitatively different from traditional exchange relationships because they represent much more than the old model of trade, where countries typically exchanged finished products that were mostly produced within their own territories.

Production sharing entails a different kind of linkage, where successive stages of the production process are located in different countries. These international production chains are complex. They combine capital, labour, goods, and services through logistics, finance, technology, management structures and government policy in a continuum that produces output for consumers.

But the story does not always end there. Even after the sale of a product to the consumer, the production chain may continue in different forms. For some products, it may be a matter of after-sales service and upgrading. For others, it could be the addition of new applications on an electronic device. The characteristics of a production chain also vary depending on how far back we go in tracing inputs, how far forward we go in tracing consumption, and how far sideways we go in tracing inputs into the selected supply chain.

These production arrangements are referred to by different names. Relevant terminology includes production sharing, fragmented production, vertical specialisation, trade in tasks, (global) supply chains, (global) value chains, global production networks, offshoring, and outsourcing. At a general level, some of these terms might be used interchangeably, but many authors have distinguished among them to focus on particular features of joined up production structures. In this review we have not taken a strong position in adopting a specific designation because a prevailing consensus on meanings has not emerged in the literature.

Our literature review has been organised into two main parts. The first part (Chapters 1 and 2) is of a general nature and seeks to identify the defining features of GVCs through two prisms – those of economics and of business. The economics perspective

attempts to understand GVCs through trade theory, along with the motivations for specialisation and production location decisions. Economic analysis is also concerned with measurement issues, the distributional implications of GVCs and the role of policy. The focus in the business literature is more concerned with a firm-level perspective. The body of literature that has emerged under the rubric of supply chain management looks at varied, operationally relevant subject matter, such as logistics, management practices and marketing. The two putatively different disciplinary focuses may emphasise different aspects of GVCs and the world in which they operate, but they also have a good deal in common.

Although we have not addressed the point explicitly in our review, we have found that often the economics and business literatures refer to similar concepts or ideas using a different idiom. When the business literature refers to commoditisation and customisation, for example, economists are thinking of market segmentation and barriers to entry and exit. When business management refers to modularisation, economists are thinking about bundling, complementarity among markets and joint production. Seeking out synergies between these two strands of literature will enrich the analysis of supply chains.

The second part of our literature review (Chapters 3 to 12) takes up specific issues that have received particular attention in writings on GVCs. Our treatment of these issues is eclectic from a disciplinary perspective. The topics covered individually in each of our chapters include offshoring and outsourcing, upgrading and development, risk, small- and medium-sized enterprises, services, trade in value-added, business models, sustainability, trade policy, and trade finance.

We had to exercise our own judgment in how best to slice up the literature for our review and other choices could have been made. Our selection reflects not only the flow of the literature, but also in some measure the priority research areas for the Fung Global Institute in this field.

The review cites almost 400 sources. This is obviously not exhaustive, but we would claim that our search covers most of the important contributions to the GVC literature in the areas of most interest to us. We organised the citations by the year of publication, and an interesting pattern emerged. The GVC literature did not take off until the year 2000. Only around 15 per cent of our citations appeared before 2000, with over half that number appearing between 1995 and 2000 (nine per cent). The bulk of the citations used for our review – 85 per cent – were published between 2000 and the present. We can confidently say that based on our research, interest in the GVC phenomenon did not take off until 1995, and has picked up pace ever since.

The weight of written contributions from the authors is not equal and this is reflected in the order in which our names appear. Albert Park was responsible for a large share of the product. He wrote Chapters 2, 4, 5, 6, 9, 10 and 12. Gaurav Nayyar wrote Chapters 1, 8 and 11. Albert Park and Gaurav Nayyar jointly wrote Chapter 3, and Patrick Low wrote Chapter 7 and this Introduction.

### *Economic perspectives on supply chains (Chapter 1)*

The economics literature on GVCs emphasises the contribution made by advances in transport and information technology to the process of globalisation. Business model innovation and generally supportive government policies towards trade and investment have also played an important part in enabling and shaping the internationalisation

of production. Economic analysis typically looks at the sources of gains from trade in explaining the configuration of production across the globe.

Comparative advantage – whether driven by technological differences or by different factor endowments – remains as relevant today in explaining the gains from trade as it was before GVCs became a dominant feature of the trade landscape. The same can be said of intra-industry trade and economies of scale. Economic geography and the agglomeration effects associated with external economies of scale are clearly relevant to the configuration of GVCs. Some also point to the more recent heterogeneous firm trade theory as an additional explanation of the benefits from trade. The fact that economists reach back to existing theory as the basic explanation for GVCs suggests that they see no need for a new theoretical framework.

Established trade theory only takes us so far, however, in understanding the multi-dimensional aspects of contemporary GVCs. While increasing international fragmentation of production, larger shares of intermediate goods in total trade, and intensified reliance on services in production and trade – all prominent features of GVC-based production – may be explained in a general sense by traditional theory, we need to go beyond this to tease out a complete picture and adequate appreciation of the relevance of policy. Moreover, it is impossible to ignore the close nexus between trade and investment in supply chain production, or the fact that products are frequently bundled into single offerings (sometimes referred to as “tasks”), or that markets are typically complementary and highly interdependent.

A full appreciation of the GVC phenomenon clearly calls for a multi-disciplinary framework, which this literature review argues is still very much in the making. It is impossible to avoid the conclusion that GVCs display network characteristics that weave a web of complex interactions around production, consumption, multi-tiered input structures, business processes, support functions, finance, management and policy. This raises many challenges. Perhaps the most important is to recall that when analysis needs to focus on particular aspects of GVCs, as it inevitably does, we should not forget the broader causal relationships that also weigh on outcomes and their consequences.

Some of the economics literature on GVCs is also concerned with distributional questions – both within and across countries – regarding the attribution of value-added along value chains. Certain activities are more skill-intensive and technology-dependent, implying higher returns per unit of production. This is reflected in wage levels. The issue is important in a geographical as well as an occupational sense, and has spawned considerable literature on upgrading and ways of acquiring larger shares of value-added, as will be seen in later chapters of this review. Many factors are in play here, including the nature of the supply chain in question, and where it begins and ends. Policy choices are a crucial element in this discussion.

### *Insights from the business literature (Chapter 2)*

The firm-level orientation of the business literature pushes the focus of analysis in a more operationally relevant direction, where definitional issues that capture the contrasting characteristics of supply chains are important. In thinking about the organisational and functional characteristics of joined-up production structures, distinctions are made between supply chains, value chains, filière, commodity chains and global production networks.

As this genre of literature has progressed, a field of study called supply chain management (SCM) has emerged. The origins of SCM are eclectic and it is therefore difficult to pin down precisely an intellectual parentage for this body of analysis. The SCM framework builds on the distinction between function-orientated and organisation-orientated directions. The functional orientation is concerned with such matters as purchases and supply, logistics, transport, marketing and business management. The organisational orientation is about industrial organisation, supply chain configuration, transactions costs and system dynamics. This focus emphasises the networked nature of supply chains and the processes that shape them.

As with much of the analytical work on GVCs in both economics and business analysis, conceptualisation and theorising has tended to follow business developments and practices. Theories are more likely to be formed to explain rather than guide business practice. On the other hand, the formalised nature of conceptual structures can discipline thinking and offer insights that are not intuitively obvious at first glance. A survey of articles on supply chains published in 2000 suggests that more than four-fifths of them were empirical, and that one-third of these were prescriptive in nature. The SCM literature is still in a formative phase and is continually subject to refinement and consolidation.

### *Offshoring and outsourcing (Chapter 3)*

The fragmentation at the heart of GVC production is a source of contentious debate, as well as economic gain. Offshoring is an intra-firm process. It refers to the relocation of part of the production process by the lead firm to a foreign country that does not involve external contracting or purchasing, although the establishment of a joint venture might also qualify as offshoring. Outsourcing, on the other hand, occurs when parts of the production process are no longer undertaken by the lead firm. While offshoring, by definition, means relocating an activity to a foreign country, outsourcing may occur either in the country of the lead firm or abroad.

The essential motivation for both offshoring and outsourcing is cost reduction. Cost structures and other factors affecting the balance of benefits and disadvantages from offshoring and outsourcing arrangements change over time. Offshored activities may be on-shored again if the cost calculus goes against foreign-based production. The same can occur in the case of outsourcing.

On the cost front, a number of factors could change the productivity/wage ratio and provoke a reassessment of a location decision. Wages may rise as result of a tightening labour market or from social pressures on wage levels. If productivity improvements occur and maintain the previously prevailing productivity/wage ratio, the original location decision may not be affected.

Other issues that could affect an offshoring or outsourcing decision include a reassessment of the risks associated with a particular location or contractual arrangement, a reconsideration of what constitutes a critical process for a lead firm, and a specification of requirements for adequate managerial control. Performance shortcomings, sensitivities over the protection of intellectual property, or risks to the lead firm's reputation in the context of social or environmental issues could also affect offshoring or outsourcing decisions. From a policy perspective, many things could change the calculus. Competing locations could become more or less attractive as a consequence of changes in laws and regulations that affect operating conditions.



The trade-jobs-wages issues linked to offshoring and outsourcing in foreign locations is a source of considerable contention and political debate. Much empirical work has been undertaken to assess the impact of internationally fragmented production on jobs and wages in both the home and receiving countries. The results have gone in different directions, influenced by differences in scenario design, data sets and methodologies. Firm conclusions are therefore difficult to draw with great confidence. It might be argued, however, that some studies have exaggerated job losses in the home country, although offshoring and outsourcing can lead to rapid job turnover. The skill composition of the work force may also be affected, rewarding relatively high-skilled workers in industrial countries and aggravating income inequality. This is an argument for government support through the provision of safety nets and adequate training and education systems.

A point to note, however, is that some firms are repatriating parts of the supply chain to home countries or undertaking new investments domestically that might previously have been offshored or outsourced. Apart from the possibility that political pressure could have played some part, changes in relative costs (including wages and transport) among locations are important, as well as concerns about the impact of separating production processes from R&D on the longer-term ability of firms to innovate.

#### *Supply chains, upgrading and development (Chapter 4)*

The developmental aspect of participation in GVCs goes back to fundamental and long-standing questions about the processes through which developing countries progress in terms of economic diversification, growth and development. Industrialisation has long been given pride of place in this debate. Policymakers, in particular, are interested in finding ways for their countries to participate in GVCs that will provide well-paid jobs, ensure effective skills acquisition and transfer, and greater involvement in higher value-added activities – in short, a process of upgrading that contributes to an economic transformation. Simply being the source of extraction at the start of a commodity supply chain or providing a modest participation in low-skilled tasks somewhere along a supply chain does not build a road to longer-term development.

The literature on upgrading focuses on a range of potential opportunities, such as increasing skill levels in the workforce in association with higher value-added activities, increasing efficiency levels, and finding ways of modularising or packaging offers so as to differentiate products.

The key to success identified in much of this literature is enhanced competitiveness. A well-known categorisation applied in the literature distinguishes between four categories of upgrading, involving change in processes, change in products, functional (intra-chain) upgrading and inter-sectoral upgrading. Process upgrading is about achieving greater efficiency in existing activities. Product upgrading implies qualitative improvements in output. Functional upgrading refers to assuming new tasks along a given supply chain. Inter-sectoral upgrading means moving across chains, usually applying an established capacity or skill set to a related supply chain. A progressive upgrading path is implied by the order in which these four categories are presented.

The political economy of supply chain participation is also a strong theme in the upgrading and development literature on GVCs, and is often referred to as governance. The word “governance” used in this context has much to do with control and power asymmetries

which can be exercised through different channels, including political influence, market power, ownership relationships, informational advantages, and skill sets.

A hierarchy of relationships has been developed in the literature that is built, essentially, on the degree to which a lead firm controls and owns a GVC. In each of these categories (market, modular, relational, captive, hierarchical), relationships between a lead firm and its suppliers will depend, among other things, on the specificities in information requirements, the capacity for product differentiation, the intrinsic complexity of the activity or product, the degree of longevity required in a relationship, and market power.

We have already made reference to less than fully developed definitional distinctions between supply chains and value chains, with the former being more narrowly drawn for analysis from a business or firm perspective and the latter encompassing a broader context, including developmental considerations and the role of policy. The even more broadly drawn notion of global production networks has emerged relatively recently. As with the upgrading literature, emphasis is placed on the socioeconomic and political environment in which production relationships operate. Three dimensions underlie the conceptual framework – value, power and embeddedness.

Value derives from processes of creation, enhancement and capture. Power resides in corporations, national governments, international institutions and (collectively) in non-governmental organisations and trade unions. Embeddedness defines relationships driven by spatial and sectoral factors.

Each of these three dimensions is then considered at the organisational level of firms, sectors, networks and institutions. While this framework is appealing as a comprehensive means of trying to understand and explain international production relationships, the reach and multi-faceted character of its present formulation makes it hard to apply to policy analysis from which normative conclusions might be derived.

While we have not covered the material in this review, a growing body of literature deserving attention is on the role of industrial policy. As governments seek to develop and diversify their economies, various approaches have been adopted to create incentives for local production. Many of these policies are predicated on the notion that firms need breathing space in order to establish themselves and gain competitiveness. Governments should therefore provide protection and support to such firms for a certain period of time.

The debate on industrial policy is an old one and both competing and complementary policies have been tried with varying degrees of success, ranging from import substitution to export-led growth models, with a number of variants in between. Domestic market size is a key determinant of options available to individual countries. Supply chain production offers some interesting options not available in a simple import substitution framework.

A key distinction in this literature is between narrow- and broad-based policies. Narrowly-drawn policies target particular industries and seek to change the incentive structures they face. Broad-based policies are generally enabling in nature and focus on the key ingredients of competitive success, such as establishing adequate infrastructure, improving training and education, establishing sound macro-economic fundamentals, facilitating trade and removing unnecessary and costly regulatory impediments to business. While these two options are not necessarily mutually exclusive, and both need good underlying governance structures to succeed, narrowly-directed policy incentives are more demanding, in terms of design and the quality of government.

Another branch of literature in this area has focused on rural development, with particular reference to food production. The focus is both upon the production and the consumption side. Work in this area has led to the idea of alternative food networks (AFNs) that seek to replace mass production driven by economies of scale, with realigned food production, distribution and consumption frameworks that focus on an integrated approach to economic, social and environmental objectives. A derivative of AFN analysis is manifested as short food supply chains (SFSCs) that are concerned with connecting producers and consumers through adequate information flows along the entire supply chain.

These approaches to rural development and food production are contrasted and, in some senses, are set against industrialised food production, which is often highly mechanised and geared to capturing economies of scale. While the AFN-type models may well contribute to rural development and better income for farmers in many regions of the world, it is less clear whether this is a viable, across-the-board substitute for large-scale, high-technology farming in a world with an ever-growing number of mouths to feed and a growing middle class.

### *Supply chains and risk (Chapter 5)*

Significant episodes of severe disruption arising both from natural disasters and conflict since the turn of the century have shone new light on risk, and have focused analysis on how it can be avoided, mitigated and managed. The issue is particularly pronounced where vulnerabilities emanate from multiple sources, as they do in the case of complex international production structures, and where options exist for managing exposure. Supply chain risk management (SCRM) is a burgeoning field that offers new insights. While not offering the only analytical approach in the literature, it appears to have gained certain traction.

The SCRM framework is basically a taxonomy, or an aid to systematic thought and analysis. The sources of risk and the circumstances in which they exert an impact on supply chain operations are so numerous as to preclude the preparation of an instruction manual that prescribes *ex ante* preventive and remedial actions. The framework is useful, however, in that it covers multiple contingencies and defines likely sets of appropriate actions. It can also be an aid to learning through experience. The SCRM framework distinguishes between the identification, assessment and mitigation phases of risk analysis.

At the identification stage, a further distinction is made between risks arising directly from a focal firm, supply risks emerging upstream and demand risks occurring downstream. These distinctions may not always be helpful in terms of identifying the numerous possible sources of risk. This arises in part because of the challenge of defining the boundaries of a supply chain. A common problem, for example, is to decide how many tiers supplying a lead or focal firm should be included in the analysis. Moreover, some unforeseen events may be of a magnitude that affects the whole supply chain, as well as aspects of its external operating environment.

A further distinction that may sometimes help to narrow down the exercise of defining the source of risk is between what the literature refers to as "environmental risks" and "enterprise risks". The former emanate from factors outside the purview of the supply chain. Enterprise risks emerge from within the supply chain itself. Economists would probably refer to these as exogenous and endogenous risk. Environmental and enterprise risks may cut across the earlier distinction among risks sourced at

the lead/focal firm level and those of upstream or downstream provenance. While the taxonomical distinctions made so far have all been spatial in the sense of identifying where risks originate, other approaches have focused both on the source of risk and its effects, and on the extent of the impact of risks. Effects and impacts may be more or less severe, and more or less enduring. Risk assessment is the second step in the SCRM Framework. The objective is to assign a degree of significance to identified risks. The assignment value, which may be implicit rather than quantified as a probability in this kind of analysis, depends both on the likelihood of an event and on an assessment of its impact. Once again, reliable assessment is often made difficult by a combination of complexity and uncertainty. This is true even where firms have actually gone through an analytical exercise of the kind proposed by the SCRM framework. Adequate information may not be available, and even if it is, such information will tend to be treated with a degree of subjectivity. Although risk assessment involves stochastic uncertainty, methods exist for assigning a probability distribution to an outcome, but we are still left with an approximation that some may argue is only little better than a random guess.

Once risk has been identified and assessed, the operational part of the SCRM framework involves risk mitigation. Risk mitigation strategies have been widely studied and surveyed. One classification focuses on avoidance, mitigation and acceptance strategies for risk management. Another distinguishes between product management, supply management, demand management and information management. These two approaches to categorising risk management strategies can be combined to produce answers to questions of both where action can be taken and what the action should be. Numerous approaches may be relevant, including disinvestment, auditing, vertical integration, multiple sourcing, stockpiling, joint inventory management with vendors, and many others.

### ***Small- and medium-sized enterprises and supply chain participation (Chapter 6)***

Small- and medium-sized enterprises (SMEs) play a significant role in many economies through their contribution to employment, development, diversification of output, and acquisition of knowledge. Some authors refer to SMEs as the backbone of many national economies. Data does not always reveal the true role of SMEs. In the case of gross trade data, for example, the input of SMEs into the production of large exporting firms will not be identified as SME exports, but rather as exports of the final producer. The only way this result can be remedied is through measuring trade in value-added terms through an input-output matrix, or by going straight to firm-level data (which are often simply not available).

The existence of GVCs offers both challenges and opportunities for SMEs. On the side of challenge, an economy that embraces GVC participation will generally be more open and impose fewer trade barriers. This can reduce domestic market opportunities for SMEs. Secondly, GVC participation may shift the technological frontier domestically and put a premium on innovation. Thirdly, numerous constraints on GVC participation may include a lack of skilled resources (manpower, accumulated knowledge), poor and costly access to finance, and relatively elevated costs in dealing with government policy both in terms of how it is designed and how it is implemented. SMEs seeking to participate in supply chains generally have to deal with a more powerful lead firm capable of extracting concessions. This can raise costs to the SME and preclude participation.

But on the positive side, GVCs present an entry point for participation. An SME does not have to wait until it can produce every part of a product before it enters the market. It can specialise in components and build specialisation, capacity and competitiveness as a basis for its expansion and growth. Much will depend on the type of GVC involved and how far it is vertically integrated, with tight limitations on outsourcing and contracting. SMEs also possess advantages less available to large firms. These include flexibility, an ability to make and act upon quick decisions, seize opportunities for innovation (particularly of the organisational variety), and adapt.

The literature on SMEs and their participation in GVCs is relatively sparse, but what there is suggests that the picture is mixed, with some SMEs prospering and others atrophying. More research is undoubtedly required, but successful SMEs clearly see the presence of GVCs as an opportunity rather than an imposition.

### *Supply chains and services (Chapter 7)*

The emergence of GVC production has almost certainly made production more services-intensive, although it is difficult to disentangle the different sources of services growth, as this trend was already apparent in many national economies. Perceptions are further clouded by the fact that we have consistently underestimated services output. This is particularly true in trade where, with a shift from measuring trade as a gross flow to a value-added flow, the estimated share of services in total world trade has doubled to almost half of the total flow. Even this share remains understated at the aggregate level because many services supplied within manufacturing firms without any change in ownership are also counted as part of manufactured output.

The only real distinction between goods and services turns on tangibility. Other differences, such as the greater heterogeneity intrinsic to services output, challenges of measurability, differences in the means of delivering standards as well as in storability, and approaches to regulation, are essentially a matter of degree. Because of the growing prominence of services and their role in economies, the question arises whether we should continue to preserve distinctions as strong as those we have now between goods and services, especially at the level of international rule making.

As far as GVCs are concerned, services are ubiquitous. Not only do most aspects of GVC operations rely critically on producer services such as finance, transport, electronic communications, distribution and business services, but dozens of other services are implicated in different ways along supply chains. Moreover, supply chain production involves the interaction of multiple markets at any point in the supply chain, and these markets are often composite, multi-product offerings that include both goods and services. They are part of complex networks that cooperate in the production of final output. From a developmental perspective, these multi-product clusters can offer entry into supply chain production through modularisation and product differentiation.

The implications of such structures of complementary, interdependent markets are profound for policy. A policy aimed at one market will inevitably affect many others, and policies will have a multiplicative impact, as the output of one market becomes input incorporated into subsequent markets along the chain. This certainly argues for coordinated approaches to policy making.

There is clearly much more we need to know about services and their contribution to individual supply chains, even at the disaggregated level. This, however, will require

a much stronger data-gathering effort as well as a willingness among governments to think differently about the true nature of services in national economies, as well as the global economy.

### ***Supply chains and trade in value-added (Chapter 8)***

As economies have become more integrated through international exchange, trade dependency has also intensified. This is easily detectable from measuring the trade to GDP ratios of countries over time. But such a ratio is not a useful measure because GDP is measured in terms of returns to factors, and therefore in net or value-added terms, while trade is typically measured in gross terms. This sometimes results in countries having trade/GDP ratios greater than unity, which of course is nonsense in conceptual terms. The correct approach is to measure trade in value-added, in other words to establish what each country actually contributes to the value of products in international trade.

When we do this, bilateral trade balances change (although not the aggregate trade balance), the technology content of the trade of individual countries looks different, the nature of interdependency among nations via trade is more faithfully reflected, and the double-counting intrinsic to gross trade estimates is eliminated. The data requirements for estimating trade flows are far more demanding, but the resulting picture is a lot more reflective of reality. The emergence of GVCs, reflected in the growth of the share of intermediate products in total merchandise trade, has made it more important to use a value-added measure.

The respective contributions of countries along supply chains can be measured in four different ways – using firm surveys, special customs regimes that allow restitution or exemption of duties on imports used in exports, gross trade statistics divided between intermediate and final goods, and value-added estimates built up from input-output tables of the entire economy. All of these methods have their difficulties, but the last of them is by far the best. Not only are the data more complete, but they also allow services to be taken into account. Recent efforts such as the EU-funded World Input-Output Database (WIOD) and the OECD-WTO Trade in Value-Added (TiVA) database, have compiled world input-output databases, from which many revealing statistics will be derived. A good deal of work remains to be done in this area.

### ***Supply chains and business models (Chapter 9)***

Modern usage of the term “business model” began in the 1990s with the ICT revolution. The link is explained by what the ICT made possible: Reduced transaction and coordination costs, new products and services, new channels for reaching consumers and new pricing and revenue mechanisms.

Markets and organisations were seen more as information processors than as vehicles to drive profits, and innovations became more promising in an organisational as well as a technical, product-oriented sense. A challenge for business models is in moving from their typically descriptive constructs that attempt to order thinking about business processes towards more prescriptive approaches for the business practitioner.

Business models sometimes lack a conceptual foundation that would permit a sufficient degree of abstraction to derive a framework that offers systematic insights. Where theories do develop, competing analytical frameworks will emerge. These are usually fewer in number and claim (or aspire to) predictive, prescriptive or explanatory power.

In the business context, it would only be a moderate exaggeration to suggest that there are almost as many business models as there are writers who have made an effort to construct them. This plethora of models needs to be consolidated even if there never will (or should) be a unique model structure. But at the other end of the scale, the word "model" is over-used to characterise a descriptive structure or a *sui generis* strategy. Indeed, the range of definitions encountered in the literature of business models is extraordinarily wide.

Lest one were to get the impression that these observations are motivated by inter-disciplinary rivalry, let it be observed that the over-formalisation and excessive abstractions of many economic models also limit their utility. We should be looking for something in the middle, and we should not gainsay the challenges of contributing to systematic thinking in respect of a formidably complex set of interactions in the global economy.

Building conceptual frameworks is a process and the business models are becoming more sophisticated as explanatory tools and useful as guides to practitioners. Seven of these models are presented in Chapter 8, in part to demonstrate how different approaches are from one another, but also to point to the emergence of conceptualisations and structures that respond more directly to organisational and process choices facing business.

If the ICT revolution gave rise to modern business models it was also significantly responsible for the development of GVCs. Business models and GVCs are therefore inseparable. Early efforts to build business model design tools for supply chains tended to be largely quantitative, building on operations research. But, as with over-formalised models in economics, too much was left out, and the literature has increasingly strived to incorporate qualitative elements of analysis. Once again, our review has taken specific examples to illustrate the kinds of components put forward for system design, and to capture the essence of interdependent processes along supply chains. For example, one of these cross-references design principles, resources and capabilities with the market, the offering, operations and management in order to identify the key components of the business model. Another tabulates a series of questions that derives decisions along different organisational and temporal axes.

Finally, another more dynamic and objective-driven framework is the agile supply chain. Agile supply chains build the capacity to respond rapidly and at low cost to change. Rapid information flows both within and outside GVCs are essential to this model, which is also linked to the notion of lean manufacturing. These approaches place an efficiency imperative front and centre. Real-time response is the focus of attention rather than forecasts. The four essential requirements for this model are world-class IT infrastructure, trust relationship, product/process redesign capacity, and risk management.

Future research in the business model field faces a strong challenge in terms of consolidation. Fewer dominant frameworks will render the genre more relevant and useful to practitioners.

### ***Supply chains and sustainability (Chapter 10)***

Considerable progress has been made in recent years in thinking about sustainability as an embedded objective within production and consumption systems. A widely cited starting point for this work is the Bruntland Commission's 1987 report entitled "Our Common Future". Sustainability was defined as meeting today's needs without compromising

the needs of future generations. The economics literature contains various asset-based definitions of the capital stock of the planet, usually defined broadly. This stock must not be depleted, and should preferably be enhanced, in every generation. The manner in which the stock must be measured varies in rigour among formulations. No generally accepted technical definition of sustainability has been developed at the global level.

Other metrics of sustainability have sprung up alongside environmental concerns. These relate in particular to child labour, corporate social responsibility (CSR), the triple bottom line, sustainable supply chain management (SSCM) and a range of other measures/policies associated with GVCs that are linked to SSCM.

CSR is a somewhat amorphous appeal to business to maintain an ethical stance in its operations and to support sound environmental and social objectives. This framework has been criticised on a number of grounds, including the absence of systematic pre-commitment on the part of business, and the suggestion that corporations contribute to social and other objectives through their fiscal contributions and their respect for the regulatory environment in which they operate. The argument has also been made that the job of corporations is to make profits for their shareholders, not to fill in for states that fail to meet their public policy obligations. A good number of corporations have nevertheless pursued CSR objectives.

The triple bottom line construct has been more successful, with its emphasis on economic performance (profits) alongside appropriate environmental and social performance. The triple bottom line approach has been built upon the SSCM framework. Four elements were attached to the triple bottom line, comprising a strategy for sustainability, an appropriate organisational culture, transparency and risk management. These were intended to provide a guide to business as they shape overall corporate policy.

A further contribution of SSCM has been to bring together the disparate initiatives that used to inform sustainability commitments, such as diversity, environment, safety and human rights. SSCM has also spawned a number of more specific frameworks for approaching sustainability along GVCs, which are spelled out in chapter 10. While much progress has been made in teasing out the meaning of sustainability in the world of GVCs, most of this is focused on the environment and not on other social or public policy objectives. More work is also needed in operationalising the sustainability constructs that have been developed.

### ***Supply chains and trade policy (Chapter 11)***

Trade opening and the emergence of GVCs were to some extent parallel processes in Asia, and elsewhere. This is unsurprising, given the role that open markets played in facilitating the development of GVCs. Opening to foreign direct investment (FDI) was also a crucial element in preparing the way for GVCs. Despite progress, some problems still remain in terms of market access, including in relation to non-tariff-measures (NTMS). While NTMs are putatively designed to serve public policy objectives, they can become non-tariff barriers (NTBs) when they are deployed for protectionist ends, either in design or in execution.

Under supply chain production, upstream barriers and other unnecessary additional trade costs have a magnification effect on all subsequent transactions. This is particularly the case when components change hands several times, including across borders, before they reach the final product of which they are part. Since GVC production processes



involve not just goods, but services and FDI as well, magnification effects spill over into these other markets, even if the measures concerned were imposed on a good in the first place. These arguments speak strongly in favour of continued efforts in the WTO to facilitate trade further.

Because of the continued existence of impediments to trade and their magnified impact in joined up production structures, GVCs create demand for deeper integration and the complete removal of remaining trade barriers. For a variety of reasons, the WTO has not been effective in supplying new trade opening to a significant degree for more than a decade. This is one factor that has encouraged the establishment of so many preferential trade agreements (PTAs) – a process to which Asia came relatively late in relation to other regions across the globe. While PTAs may achieve a degree of deep integration beyond what has been attainable in the WTO, they still carry potential risks and costs. PTAs can exclude non-signatories in discriminatory ways. They may lead to regulatory divergence that erects barriers to trade among regions. They can raise costs through rules of origin regimes.

For these reasons, PTAs carry risks that the WTO is better at guarding against, but only if it can deliver on its agenda more effectively than it has for over a decade. A challenge for the WTO is to pursue deeper integration without sacrificing the non-discrimination principle.

### ***Supply chains and trade finance (Chapter 12)***

The financial aspects of GVCs have received considerably less attention than even the services components of international production arrangements. Most of the focus in the literature has been on supply chains for goods. Trade finance became a central policy issue, however, following the Great Recession in 2008-9. Trade finance is used in the vast bulk of international trade transactions either as trade credit, insurance or guarantees. Trade finance may be used to secure transactions or to provide collateral for other credit.

Trade credit is a subset of trade finance, and it is an alternative source of credit for suppliers who face difficulties in acquiring bank finance. In the aftermath of the 2008-9 financial crisis, many businesses found access to bank credit difficult. While the problem eased in the more advanced economies as banking liquidity returned, problems in securing trade finance or of meeting the elevated cost of funds have persisted for some developing country traders. International agencies such as the World Bank have helped to ease the problem. Available evidence suggests that trade credit extended to SMEs has been a crucial source of liquidity for SMEs, who have also used trade credit for collateral to secure bank credits.

A particularly interesting feature of GVCs on the financial side has been the development of credit chains. They arise where suppliers feel obliged for a variety of reasons to extend credit to buyers. Since these suppliers are unlikely to have ready access to other sources of finance for working capital, they also seek credit from their own suppliers. This behaviour provokes an upstream chain reaction, thus giving rise to credit chains that operate in parallel with GVCs – that create the commercial relationships in the first place. Chapter 12 discusses a range of reasons why credit chains may come about and the purposes they serve. These financial links potentially constitute an additional source of risk along supply chains and the phenomenon deserves deeper study.

In addition to research on the role of trade finance in the post-crisis period, which is reviewed in Chapter 12, reference is made to work emanating from operations research relevant to trade finance, as well as the development aspects of trade finance. As mentioned above, securing trade finance and paying an affordable price for it have both proved to be challenges for some traders in developing countries over recent years.

An overall impression from the review of literature presented in Chapter 12 is that considerable scope exists for deeper analysis of the financial aspects of supply chain operations. The integration into mainstream supply chain analysis of work from the financial side would contribute to completeness. Incorporating trade finance in risk management along supply chains, for example, would fill a gap.

### *Concluding comments*

As this introduction shows, the literature review ranges over a wide array of key issues facing GVCs. This introduction is no substitute, however, for the detailed reviews contained in the volume. Three overarching observations are in order here.

First, by looking briefly at the range of content in the review, it is clear that even though issues are treated separately, synergies abound. One of the most obvious areas where this is apparent is in relation to risk analysis and management. But there are many others, such as the supply chain for trade finance.

Second, theory and conceptualisation have lagged behind practice in many instances. This seems to be an increasingly common feature in areas that are too complex for easy conceptual abstraction. It means that those seeking to develop generally applicable propositions in the literature need to be particularly attentive to what is actually happening on the ground.

Finally, it is useful to be reminded how young this field of study is and therefore how much more work needs to be done in order to understand the true nature of the GVC phenomenon, and also to stay abreast of how rapidly it is changing in many dimensions.