

Power relationships along the value chain: multinational firms, global buyers and performance of local suppliers

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There is a growing literature exploring the role of international trade channels on economic growth, looking at the mechanisms through which import and export flows might affect productivity, technology diffusion and output growth. However, most of this literature appears to neglect an important part of the story, which is the form and the organisation of the relationships (the governance) among the various actors involved in these activities and their implications for development. The recent literature on global value chains and their governance takes this element explicitly into account, and we explore it empirically with a new dataset on Thailand. To this aim, we study global and domestic value chains in Thailand, and develop a quantitative measure of their governance, which takes into account different levels and types of buyer involvement with supplier activities. We then use this measure to explore econometrically its relationship with performance of suppliers. An important finding is that in value chains led by a multinational corporation, the relationships that the leaders have with their suppliers is multifold and generally more intense than for domestic value chains. Our estimates suggest that more intense buyer involvement with local suppliers, not only in the definition of product characteristics, design and quality, but also in technology dissemination and R&D, is generally associated with higher supplier productivity. This is consistent with other sources of evidence. However, the governance of the value chain appears to affect the productivity of suppliers in domestic value chains to a greater extent than for firms supplying multinational corporations or for exporters. We suggest that this result may be explained by the different nature of the information and knowledge being exchanged, and by the larger gaps in knowledge and capabilities between the domestic leader and its suppliers.

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1. Introduction

The increasing globalisation of the world economy and of international relations, with the emergence of large international production and distribution networks, have reached industries and individual firms in the industrialised and in the developing world, forcing them to face global competition, either through direct integration into the global economy, or, indirectly, through penetration of their traditional home markets.

The international economics literature has had a lasting interest in the static and dynamic effects of this newly emerging market setting. Several streams of literature have done a remarkable job in outlining the various potential forms of competition and of international involvement, and the ensuing potential benefits and losses in this new economic setting.

Among these studies, an extensive strand of literature on international trade has addressed the question of whether trade is an important driver of economic growth, looking at the mechanism through which import and export flows might affect productivity, technology diffusion and output growth. While the role of trade in promoting growth in general, and productivity in particular, has been investigated empirically using aggregate data for a long time, recent theoretical developments have looked at the extent and causes of productivity differentials between exporters and domestic firms.¹

A common finding in these studies is that productivity at the firm level is positively correlated with exporting. However, even if this empirical result has been widely recognised, a recent debate has emerged on the direction of causality between firm productivity and export status. This issue is directly linked with the so-called ‘learning by exporting’ argument, according to which exporting may foster learning and improve technical efficiency for domestic exporters.

However, in spite of their clear merits, many branches of the international trade literature appear to disregard an important part of the story, which is the form and organisation of the relationships among the various actors involved in these global trade channels and their implications for development. We develop this analysis in this paper, and explore it empirically with data for Thailand. Indeed, following this approach, the forms and the patterns of coordination and the level of hierarchy in such relationships may indeed matter for growth and learning processes, especially in developing countries. This may influence the benefits and costs of the integration of developing countries into global markets, as ‘it is not only a matter of whether to participate into the global economy, but how to do so in a way which provides sustainable growth, especially for poor people and poor countries. . . . in recent years, we observed many countries and regions suffering from declining income shares while having experienced a growth of their participation in global trade’ (Kaplinski, 2000).

The relevance of coordination and *governance* of the relationships in international production and global trade has been highlighted by the recent global value chains (GVC)

¹ The first studies to have addressed this intricate issue, trying to make a clear empirical distinction between correlation and causality are Clerides *et al.* (1998), for manufacturing firms in Colombia, Mexico and Morocco, and Bernard and Jensen (1997, 1999) for manufacturing firms in the USA. Using different methodologies, they find evidence that good firms become exporters, since performance is higher ex ante for exporters. At the same time, they do not find evidence that exporting improves performance. Additional studies exploring the link between exporting and productivity in different countries include micro evidence for Chile (Pavcnik, 2002), for Taiwan and Korea (Aw *et al.*, 2000), for Japan (Head and Ries, 2003), for Spain (Delgado *et al.*, 2002), for Italy (Castellani, 2001), for the German state of Lower Saxony (Bernard and Wagner, 2001; Wagner, 2002), for Thailand, Indonesia, the Philippines and Korea (Hallward-Driemeier *et al.*, 2002), for Britain (Girma *et al.*, 2004), for China (Kraay, 1999) and for Sub-Saharan Africa (Bigsten *et al.*, 2002). For a review see Wagner (2006).

literature, which suggests that the governance and the actors of GVCs importantly affect the generation, transfer and diffusion of knowledge (Altenburg, 2006; Gereffi *et al.*, 2005; Humphrey and Schmitz, 2002B; Piorebelli and Rabellotti, 2007; Schmitz, 2004). The GVC literature has tackled these issues mostly with reference to developing countries, and debating on the opportunities and threats that GVCs may represent for LDCs. Among the various contributions, a critical view has emerged to argue that by adopting hierarchical forms of coordination, global buyers may operate to confine the competencies of manufacturers in developing countries simply to the assembly of imported material, making them potentially very vulnerable and subject to increasing competition and falling returns (Schmitz, 2004).

Drawing from some fundamental insights of the GVC and of the international trade literature, in this paper we attempt to investigate the patterns of governance arising in value chains led by global buyers, and the productivity differential of suppliers involved in different types of trade channels, with specific reference to the Thai manufacturing industry. We introduce three main novelties in the empirical analysis.

First, we look at the case of whether the global buyer is represented by a Multinational Company (MNC). The GVC literature has the foresight to include the *governance* of the relationships and the role played by global buyers into the study of the static and dynamic effects of openness. The concept of governance is central to this analysis. At any point in the chain some degree of governance and coordination is required. It is often preferable to write of governance rather than only coordination, as the proactive involvement and participation of all the actors within the value chain is crucial. The role of the characteristics of global buyers was initially analysed by Gereffi (1994) who introduced a categorisation of ‘buyer-driven’ and ‘producer-driven’ commodity chains, with their respective forms of governance, which has been widely employed ever since. Subsequently, the analysis of forms of governance for buyers was further developed, and Gereffi *et al.* (2005) introduced a useful typology that identifies five different patterns of GVC governance, and discusses under which conditions these types can be expected to arise. According to the authors, three factors determine the lead firm’s choice between one of the different patterns: (i) the complexity of information involved in the transactions, (ii) the possibility to codify information and (iii) the competence of suppliers along the chain.

We share their emphasis on GVC governance and follow up this approach here. Our line of argument is that heterogeneity in global buyers may significantly affect the way cross-border relationships are governed, the extent of the transmission of knowledge, and the ensuing learning promoted in firms in developing countries. More specifically, we distinguish between MNCs and other chain leaders, as MNCs are increasingly operating as global buyers, with their role not confined to production but progressively extending to planning and management of global networks of suppliers and firms—and eventually leaving manufacturing. Moreover, the literature has traditionally considered MNCs as possessing some technological lead and exploiting this proprietary advantage in international markets (Dunning, 1993), and thereby potentially creating opportunities for knowledge diffusion and learning for their local suppliers (Albio *et al.*, 1999; Hewitt-Dundas *et al.*, 2002; Turok, 1993).

A *second* original contribution of this study is to define a quantitative measure of the governance of value chains, which we use in our econometric tests. To the best of our knowledge, most existing studies are based on case studies and surveys, which offer the advantage of providing extremely detailed analyses of specific cases, capturing the complexity of the relationships involved in the chain and the role played by each actor.

In addition, our effort to build measures of governance and use them across a large sample of firms presents the advantage of allowing interesting generalisations and comparisons, which may usefully complement the rich evidence based on field studies.

Finally, we attempt a comparison between global and domestic value chains, and then between GVCs led by MNCs and those led by other global actors, in terms of governance patterns and the effects on the performance and learning of suppliers. We expect that the forms of governance may differ, and be more or less binding and severe for local suppliers in terms of enforcement of product specifications and standards, with the parameters set by the MNC—typically oriented to international markets and more subject to open competition—being more complex, requiring greater assistance and possibly creating opportunities for improving performance. At the same time, however, we are aware of ‘cherry picking’ by MNCs when they carefully select their suppliers: local suppliers would be performing better ex-ante and not as a result of the assistance offered by the chain leader.

For similar reasons the intensity and the extent of buyer influence on supplier performance is likely to vary between firms that are part of a MNC’s network, and firms in value chains led by national buyers. The former are likely to be exposed to a larger flow of knowledge and learning opportunities than the latter, usually operating on a smaller market. Consistently, we expect domestic firms, ex-ante less efficient than domestic firms working for MNCs, to heavily depend on the way the buyer assists them in improving product features and production processes. In other words, efficiency improvements are expected to be powerfully linked to the governance of the value chain.

Section 2 overviews the theoretical background of the GVC approach. Section 3 illustrates the data we use and our value chain governance measure, and Section 4 discusses the results of our empirical exercises. Section 5 concludes.

2. The global value chains approach

The concept of value chain describes the full range of activities that are required to bring a product from its conception, through the different phases of production, to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer.

The GVC approach focuses on the activities and the strategic role of the relationships with other firms and actors. Drawing from the transaction cost literature, Gereffi (1990) developed a framework that ties the concept of the value-added chain directly to the global organisation of industries. Later, he introduced the notion of ‘*governance*’ of the value chains, defined as ‘authority and power relationships that determine how financial, material, and human resources are allocated and flow within a chain’ (Gereffi, 1994). This concept is now central in the literature. By focusing explicitly on the governance of disintegrated chains, and contrasting them to the relationships within vertically integrated chains, the global commodity chains framework draws attention to the role of networks in driving the coevolution of cross-border forms of industrial organisation.¹

The literature highlights two critical parameters of the value chain governance: what is to be produced, and how it is to be produced. In each case, the level of detail at which the

¹ Altenburg, 2006; Gereffi *et al.*, 2005; Gereffi and Memodovic, 2003; Giuliani *et al.*, 2005; Humphrey and Schmitz, 2002A, 2002B; Kaplinsky, 2000; Pietrobelli and Rabellotti, 2007; Schmitz and Knorringa, 1999.

parameters are specified can vary. When the buyer plays this role, we refer to it as the 'lead firm' in the chain (Sturgeon, 2002).¹

In studies on the electronics sector, Sturgeon (2002) and Sturgeon and Lee (2001) emphasise the complexity of information exchanged between firms and the degree of asset specificity in production equipment. They highlight three types of supply relationships, based on the degree of standardisation of products and processes: (i) the 'commodity supplier' that provides standard products through arms length market relationships; (ii) the 'captive supplier' that makes non-standard products using machinery dedicated to the buyer's needs; and (iii) the 'turn-key supplier' that produces customised products for buyers, and uses flexible machinery to pool capacity for different customers. Along similar lines, but more explicitly stressing governance and power relationships, Humphrey and Schmitz (2002A, 2002B) distinguish between suppliers in quasi-hierarchical relationships tied in a 'captive' relationship, and 'network' relationships between firms that cooperate because they possess complementary competences.

Gereffi *et al.* (2005) acknowledge, as do most other frameworks that seek to explain industry organisation (such as transactions costs, global commodity chains, organisational theory) that market-based relationships among firms and vertically integrated firms (hierarchies) make up opposite ends of a spectrum of explicit coordination, and that network relationships comprise an intermediate mode of value chain governance. They identify three key determinants of value chain governance patterns: (i) the complexity of information and knowledge transfer required to sustain a particular transaction, especially with respect to product and process specifications; (ii) the extent to which this information and knowledge can be codified and, therefore, transmitted efficiently and without transaction-specific investment between the parties to the transaction; and (iii) the capabilities of actual and potential suppliers in relation to the requirements of the transaction.

The concept of governance in the GVC literature is mostly dynamic. Humphrey and Schmitz (2002B) underline three factors which may determine a governance change: (i) power relationships may evolve when existing producers, or their spin-offs, acquire new capabilities; (ii) establishing and maintaining quasi-hierarchical governance is costly for the lead firm and leads to inflexibility because of transaction specific investments; and (iii) firms and clusters often do not operate only in one chain but, rather, simultaneously in several types of chains, therefore they may apply competencies learned in one chain to supply other chains. Gereffi *et al.* (2005) also explore some possible patterns of evolution of governance, and relate them to the evolution of the complexity of transactions, of the codifiability of transactions, and of the competence of suppliers.

Although the final aim of most of these studies is to understand the reason and determinants of performance within value chains, the link between enterprise *upgrading* and GVC governance has been made explicit only recently. In a GVC context, upgrading is defined as innovating to increase value added (Giuliani *et al.*, 2005; Pietrobelli and Rabellotti, 2007). Enterprises may achieve this in various ways, as, for example, by entering

¹ In the case of product definition, the buyer can provide different levels of specification. The buyer can set a design problem for the producer, which the producer then solves by providing its own technology and design. The buyer might provide a particular design for the producer to work on, or the buyer might even provide detailed drawings for the producer. Buyers can also specify process parameters. Once again, these can be specified at different levels of detail. In some cases, the buyer may merely refer to the process standards to be attained. In other cases, the buyer will specify precisely how particular standards should be attained by requiring, and perhaps helping to introduce, particular production processes, monitoring procedures, etc. (Sturgeon, 2002).

higher unit value market niches, by entering new sectors, or by undertaking new productive (or service) functions, and always deepening technological capabilities.¹ In addition, within this context innovation is clearly not defined only as a breakthrough into a product or a process that is new to the world. It is rather a story of marginal, evolutionary improvements of products and processes that are new to the firm and that allow it to keep up with an international (moving) standard.

The GVC perspective is useful for various reasons: first because the focus moves from manufacturing only to the other activities involved in the supply of goods and services, including distribution and marketing. These activities account for an increasing share of gross domestic product (GDP) worldwide. A second new and merit worthy perspective is that GVC emphasises the nature of the relationships among the various actors involved in the chain and their implications for development. Moving beyond firm-specific analysis and concentrating on inter-firm linkages, it allows for an easy uncovering of the dynamic flow of economic and organisational activities between producers within different sectors even on a global scale. For example even informal sector scrap metal collectors in South Africa are inextricably linked to a global export trade. They bring scrap metal in old trolleys directly to shipping agents who pay them London spot prices and transfer the scrap immediately to ships for export to iron and steel furnaces across the globe (Kaplinsky and Morris, 2001). Furthermore the notion of organisational inter-linkages underpinning value chain analysis may make it easy to analyse the inter-relationship between formal and informal work, with workers, particularly in developing countries, moving often seamlessly from one to the other, rather than viewing them as disconnected spheres of activity. Finally, by focusing on all links and phases in the chain (not just on production) and on all activities in each link, it helps identify which activities are subject to increasing returns in markets characterised by imperfect competition and segmentation.

However, addressing these issues is not straightforward. From an analytical point of view, it implies a need for the study of activities taking place outside firms, and in particular to understand the strategic role of the relationships with key external actors. Most of this literature is still based on case-studies employing an increasingly systematic and rigorous empirical methodology. With this paper we try to integrate field-based studies with a methodology that may exploit existing databases and lends itself to comparisons and generalisations. This is explained in the following section.

3. Governance patterns of Thai firms

Asian countries offer some of the most interesting case studies for the analysis of value chains. Thailand represents an attractive case of study in this context, due to the significant increase in value chain networks, and the important challenges the country is presently facing. Several studies have provided evidence that Thailand is 'technologically challenged' (The World Bank, 2005) and therefore needs to move beyond its traditional role in GVCs as a low-cost manufacturing location. Furthermore, throughout the past decades, especially since 1986, Thailand has experienced a rapid increase in merchandise exports, growing from around one fifth of GDP in the early 1980s to almost two thirds today.

The rapid export growth has also been accompanied by rapid growth in private investment, both local and foreign. Indeed, Thailand has been one of the major foreign direct investment (FDI) recipients in South-East Asia over the past two decades (Brimble

¹ On the relationship between technological capability building and global value chains see Morrison *et al.* (2007).

and Sherman, 1999; Mephokee, 2002). In 2004, the Global Investment Prospects Assessment (GIPA) of UNCTAD (United Nations Conference on Trade and Development), designed to analyse ‘future patterns of FDI flows at global, regional, national, and industry levels’, ranked Thailand as one of the four ‘top hot spots for FDI’ in the world over the next 4 years, preceded only by China, India and the USA.

The data come from the Productivity and the Investment Climate Private Enterprise Survey (PICS), conducted by the World Bank on a representative (stratified) sample of 1,385 Thai firms from 2001 to 2003.¹ For each firm the information is plant-based. The survey focuses on manufacturing firms (sectors 15–36 in the International Industry Standard Classification, ISIC). The industries considered are: Food Processing, Textile and Clothing, Wooden Furniture and Product, Auto parts, Electronics, Rubber and Plastic, Machinery and Equipment. Finally, the database contains comparable qualitative and quantitative information on foreign ownership, sales, technology, value chains, workforce education, exports and productivity.

We define MNC value chains as those value chains where Thai firms sell most of their products to multinationals, but are not owned by them. Then, in order to exploit the information in the PICS database, we break down the sample distinguishing between Thai firms serving only the domestic market (DOM), Thai firms which are large suppliers of multinationals but are not foreign owned (MNS) and Thai firms that export more than a threshold value of 5% of their output abroad but are not suppliers of MNCs (EXP) and not foreign owned. To avoid ambiguity in the analysis, we do not consider firms with more than 50% of equity foreign-owned,² (13% of firms in the sample). Therefore, we use a reduced sample of 1,197 Thai firms in the analysis, of which about 49% meet the definition of MNS, 14% that of EXP and 35% DOM.

The distribution of firms is spread fairly equally across industries in our sample. The presence of EXP and MNS is concentrated in industries such as Food Processing and Textiles and Clothing, while domestic firms are mainly concentrated in Textiles and Clothing and Rubber and Plastics (Table 1).

A comparison of firm size (Table 2), computed in terms of total workers, shows that EXP and MNS are generally larger than domestic market-oriented firms. On the basis of the value of sales, domestic firms sell, on average, less than one fifth of the sales of MNS and EXP. Thus, EXP and MNS appear rather similar according to these statistics.

The next step in our analysis is to define a measure of value chain governance on the basis of selected and available variables. This takes into account different levels and types of buyer involvement in supplier specification of product and process standards, R&D activities and dissemination of technology. Following the literature, and considering some characteristics of the Thai economy, we choose the following variables:

- percentage of sales made exclusively to suit buyer’s unique specification (*Client spec.*);
- whether the buyer provided information on design/quality (product characteristics) (*Prod. inf. by client*) and imposed product quality standards (*Client enforcement*);

¹ We performed various tests to control for missing values, zero sales, zero employment and observations failing to satisfy other basic error checks.

² Organisation for Economic Cooperation and Development and UNCTAD use a benchmark of 10% as threshold ownership level. Other benchmarks used include Sjöholm (1997) who has a benchmark of 15% of equity owned by foreigners, Haddad and Harrison (1993), who consider foreign firms as those with at least 5% equity owned by foreigners, Djankov and Hoekman (1998), with a 20% benchmark, and Castellani and Zanfei (2002), who consider foreign firms as those with at least 50% equity owned by foreigners.

Table 1. *Distribution of groups of firms across industries*

	MNS		DOM		EXP	
	No	%	No	%	No	%
Textiles and clothing	171	28.64	127	29.95	46	26.14
Food processing	115	19.26	16	3.77	43	24.43
Machinery	79	13.23	58	13.68	10	5.68
Electronics	36	6.03	36	8.49	10	5.68
Wood	53	8.88	55	12.97	15	8.52
Rubber and plastics	81	13.57	96	22.64	44	25
Automotive parts	62	10.39	36	8.49	8	4.55
Total	597	100	424	100	176	100

Source: The World Bank—Private Sector Investment Climate (PICS) survey 2004.

Table 2. *Size and sales of firms in the sample*

	MNS	DOM	EXP
Permanent workers			
Median value	197	51	135
Mean	432	95	283
Total sales			
Average sales (current US\$)	\$11,898,767	\$1,657,910	\$10,478,366

Source: The World Bank—Private Sector Investment Climate (PICS) survey 2004

- whether the buyer engaged the firm in process or product R&D type of activities (*R&D activities*);
- whether the buyer sent employees (*Personnel exchange*) to disseminate and diffuse new technologies into the production facility (*Empl. for tech diff.*).

Table 3 documents some descriptive evidence about these dimensions. Overall, the degree of buyer involvement in product definition is high in the sample, but much smaller for R&D and technology dissemination. On average, a larger share of firms which are part of value chains led by MNCs receive specifications of products and design by buyers, and the MNC is also involved in R&D activities and in technology dissemination. DOM firms seem to receive the lowest requirements and product and technology info by clients, while EXP are in-between. However, in terms of sales made according to the client's unique specification, EXP reveal the highest value.

In order to capture different types of governance, we allow different combinations of the key variables above. It is important to remember that our index does not intend to reflect merely a growing involvement of buyers with their suppliers in *all* aspects of production, but rather focuses on crucial elements of the buyer–supplier relationship such as setting product standards and quality requirements and disseminating technology.

Our typology identifies five basic types of value chain governance (Table 4). G1 reflects a situation where less than 20% of total sales are made according to their client's unique

Table 3. *Thai firms' relationships with buyers*

	MNS	DOM	EXP
Client spec. (mean) ^a	44.40	43.31	51.53
Prod inf. by client ^b	78.97	68.87	75.15
Client enforcement ^c	83.3	72.6	77.05
R&D activities ^d	42.68	31.21	32.6
Empl. for tech diff. ^e	39.79	24.42	28.36

Source: Authors' own computation on The World Bank—PICS 2004 data.

^aPercentage of sales made exclusively to buyers' unique specification.

^bInformation on design/quality provided by the buyer.

^cProduct quality standards enforced by the buyer.

^dEngagement of the buyer in process or product R&D type of activities.

^eEmployees from the buyer to work with and disseminate and diffuse new technologies into suppliers' production facility.

Table 4. *Classification of value chains' governance*

Types of governance for value chains	Percentage of sales made according to buyers' unique specification	Design/quality and product quality standards	Technology dissemination and process and product R&D
G1—Low requirements	Less than 20%	No	No
G2—Higher requirements	More than 20%	No	No
G3—Higher requirements & DQ	More than 20%	Yes	No
G4—Higher requirements & Tech_RD	More than 20%	No	Yes
G5—Higher requirements & DQ & Tech_RD	More than 20%	Yes	Yes

specification, and suppliers do not receive substantial inputs from buyers. The cut off value of 20% for the level of buyer involvement in supplier sales activities, and, as a consequence, in the specification of product, seems to be reasonable to determine systematic and relevant buyer participation and/or coordination of the value chain. G2 type occurs when the percentage of sales made according to buyer's specification is higher, but still suppliers do not receive information or involvement from the buyer; G3 type reflects a situation where there is a relevant share of sales made according to the client's specification and buyers intervene to specify quality and design definition; in G4 a relevant share of sales are made according to the client's specification and buyers are involved in technology dissemination and R&D activities, but without intervening in product design and quality; finally with G5 all forms of buyer involvement occur.

Before proceeding to the econometric analysis, it is instructive to look at the distribution of governance among the three groups of firms and across different industries. We also computed Chi-squared distribution tests to assess whether differences between MNS, EXP and DOM and across industries were significantly different from zero.

All the governance types vary according to status of the firm in a statistically significant way (Table 5). Importantly, firms selling their products to MNCs are more likely to be

Table 5. *Distribution of governance across Thai firms and industries*

	G1	G2	G3	G4	G5
<i>Governance by firms</i>					
MNS	8.5	8.9	29.9	11.1	41.2
DOM	15.4	13.5	31.7	12.1	26.5
EXP	7.0	17.1	35.5	9.2	31.1
Pearson χ^2	45.058	32.408	6.810	3.799	66.862
Pr	0.000	0.000	0.033	0.15	0.000
<i>Governance by industries</i>					
Textile and clothing	9.0	9.0	39.6	8.5	33.9
Food processing	10.6	12.9	21.8	17.9	36.9
Machinery	11.3	13.0	27.1	13.0	35.0
Electronics	10.8	8.4	24.7	7.2	46.4
Wood	15.2	14.4	34.4	7.2	28.0
Rubber and plastics	9.6	20.1	21.8	12.1	35.6
Automotive parts	7.6	8.3	32.4	16.6	34.5
Pearson χ^2	16.2409	66.204	100.4292	59.1907	36.6493
Pr	0.000	0.000	0.000	0.000	0.000

Source: authors' own computation.

involved in governance type G5 than firms selling to other buyers, both global and domestic. As a first glance, our data allow us to document some descriptive evidence of the differences between MNCs and other buyers: MNCs seem to get engaged in the R&D of their suppliers and send their experts to work to disseminate and diffuse new technologies more often than do other buyers. In contrast, G3 is found more frequently in firms that sell only to the domestic market, and for those which export through other channels.¹

The distribution across industries mostly reflects this picture, with higher concentration in both types G3 and G5. However, some industrial specificities emerge, for example, with electronics, value chains mainly following a G5 governance, or Wood and Textiles/Clothing with less encompassing forms of governance. What is remarkable and perhaps unexpected is that value chains with forms of governance G1 and G2 do not occur frequently, and not even in firms selling only to the domestic market.

This appears to confirm the widespread and growing evidence of various sorts of networks and forms of intense coordination among firms, with stand-alone strategies hardly occurring. Firms are always embedded into multiple linkages, and these linkages appear to be taking forms of increasing complexity.

However, we need to go back to the main question of this paper: after showing, with quantitative evidence, that governance forms vary across GVCs, how does this matter for efficiency and performance of local firms?

4. Governance and productivity

We explore here the relationship between firm productivity and governance, focusing on the three groups of firms above, namely MNS, EXP and DOM. As a performance measure we employ total factor productivity (TFP). This measure is typically considered as

¹ This evidence is confirmed when we look at the variables used to build our measure of value chain governance separately (see Table 3)

a growth rate and consists of the wedge between the average growth of outputs and the corresponding average growth of inputs (Barba Navaretti *et al.*, 2003). Moreover, this estimation technique has become increasingly popular in recent studies on FDI (e.g. Javorcik-Smarzynska, 2004; Blalock and Gertler, 2004; Schoors and van der Tol, 2002) setting the standard for the current literature.¹

Our measure of TFP is defined as the residual of a Cobb–Douglas production function. In order to take into account the problem of potential correlation between input levels and the unobserved firm-specific productivity shocks in the estimation of production coefficients, we carry out a panel data analysis using a semi parametric technique to estimate TFP. The estimator used is that proposed by Levinsohn and Petrin (2003) with intermediate input use serving as a proxy for productivity shocks.² More specifically, we utilise the information on the amount of electricity consumed by each plant. As electricity cannot be stored, its consumption is likely to follow changes in production activity more closely than the use of materials.

The production function considered is the following:

$$Y_{it} = \delta_1 l_{it} + \delta_2 k_{it} + \delta_3 m_{it} + \omega_{it} + \epsilon_{it} \quad (1.1)$$

where m_{it} is the intermediate input (electricity). The error term has two components, the transmitted productivity component ω_{it} (or the state variable), and an error term which is uncorrelated with input choices, ϵ_{it} . The state variable is not observed by the econometrician and affects the choice of inputs by firms, potentially leading to the simultaneity problem in production function estimation, first mentioned by Marschak and Andrews (1944).

Thus, we construct our TFP measure as:

$$\hat{w} = \exp(y - \hat{\beta}l - \hat{\beta}k - \hat{\beta}m) \quad (1.2)$$

A comparison of our TFP estimates between the three groups reveals important exporter premia in terms of productivity (average value 5.4, not reported here); MNS show quite similar values (average value 5.2), while DOM firms have lower values (average value 4.6)

We then test the relationship between governance and firm efficiency through the following specification, and using G1 as baseline category:

$$TFP_i = \delta_0 + \delta_1 G2 + \delta_2 G3 + \delta_3 G4 + \delta_4 G5 + X + e_i \quad (1.3)$$

where X captures a firm’s specific characteristics, including size, region and industry. We estimate two different specifications of the above equation: first, with our entire sample, then with the three subsamples of firms.

As for similar research (e.g. ‘learning by exporting’ literature), however, we are aware of the difficulties in defining the direction of causality between buyer–supplier relationships and supplier performance. More precisely, are such relationships the cause of supplier performance improvements or, rather, do buyers select more efficient firms as their

¹ Other authors use ‘upgrading’ as a multidimensional measure of performance to encompass not only productivity improvements but also product improvements and growing involvement of firms in new functions and sectors (Giuliani *et al.*, 2005; Humphrey and Schmitz, 2002A; Kaplinsky, 2000). Regrettably, this was not possible with the presently available dataset.

² Olley and Pakes (1996) develop an estimator that uses investments as a proxy for unobservable shocks. Levinsohn and Petrin (2003) suggest that investments are subjects to adjustment costs, thus not smoothly responding to productivity shocks.

suppliers? Unfortunately, the limited number of years for which data are available cannot help us to establish the direction of causality with sufficient confidence in this paper.

Results for the whole sample suggest a significant and positive relationship between firm productivity and governance G3 and G5 (Table 6). Higher share of sales made to client's unique specification jointly with buyer involvement in design and quality and in technology is correlated to higher productivity levels than for type G1. This confirms the results obtained by other authors (Schmitz, 2004; Giuliani *et al.*, 2005), although the new and different econometric tests make comparisons difficult.

In a second specification of our model, documented in the last three columns of Table 6, we repeat the estimation separately for each group using interaction terms. Restricting our attention to these sub-samples enables us to investigate the role played by different buyers. The results for this specification are qualitatively dissimilar from the previous ones and deserve careful interpretation. The emerging picture reveals that the way the value chain is organised is very relevant for DOM firms, while it does not appear to matter for firms supplying multinational buyers (MNS) or for EXP. DOM firms with high customisation of products to buyer standards, that also receive assistance on design & quality definition and R&D and technology dissemination (G5) are more productive than the others. The mode of governance of their value chains is positively related to their productivity.

Can we interpret these results to suggest that firms participating in domestic value chains rely on a greater involvement of the chain leader to foster their process of learning and efficiency improvement? As seen above, EXP and MNS have relatively higher levels of TFP than DOM. Once again the problem of causality forces us to interpret these results very cautiously. On the one hand, MNCs may select their suppliers among the most efficient firms (i.e. 'cherry-picking')—indeed our data reveal that firms that supply multinationals are more efficient than DOM firms. We may, perhaps, explain this by observing that firms are often forced to improve their efficiency *before* starting the

Table 6. Firms' TFP and value chains' governance (dependent variable: log of TFP)

	All firms	MNS	DOM	EXP
G2	0.21 −1.54	−0.002 −0.01	0.32 (2.38)*	−0.126 −0.33
G3	0.343 (2.59)**	−0.139 −0.48	0.693 (3.79)**	0.007 −0.02
G4	0.101 −0.76	−0.264 −0.87	0.301 (2.04)*	0.194 −0.48
G5	0.389 (2.80)**	−0.07 −0.22	0.668 (3.18)**	0.52 −0.98
Size dummies	included	included	Included	included
Industry dummies	included	included	Included	included
Region dummies	included	included	Included	included
Year dummies	included	included	Included	included
Constant	4.578 (22.08)**	4.621 (11.54)**	4.367 (11.61)**	4.146 (9.69)**
Observations	4022	4022	4022	4022
R ²	0.17	0.11	0.15	0.12

Robust *t* statistics in parentheses: *significant at 5%; **significant at 1%. TFP, total factor productivity.

Source: authors' calculation on PICS 2004 data—The World Bank.

relationship with the MNCs in order to qualify as MNC suppliers. In this case, the form of governance of the value chain would not matter for them initially, and we would need longer time series to test for the existence of possible dynamic learning processes.

The same line of reasoning may apply to firms serving other foreign buyers (EXP), in agreement with the literature on ‘learning by exporting’: efficient and above average performing firms are likely to be the ones most able to cope with sunk costs, and exporters have most of the desirable performance characteristics several years before they enter the export market.

However, if the self-selection hypothesis were not confirmed, the test of the existence of a learning process would require longer (dynamic) observations. Another possible explanation of these results that may deserve future testing might be due to the different nature of the information and knowledge exchanged within global and within domestic chains. Insofar as the gap of competencies between multinationals and their suppliers is smaller in GVCs, we expect that it is easier to have cooperative relationships. In contrast, hierarchy is more likely to occur in national chains due to the poor level of skills of suppliers and competencies relative to the leader.

As a check of the robustness of the results, we used an alternative measure of firm performance: the net value added per worker. Value added is defined as sales minus intermediate input purchases. In Table 7 we report results from regressing the governance types on the log of net value added per worker. These findings are generally consistent with the picture we obtained from regressions based on TFP measure, except for G3. Looking at the whole sample, we find that only G5 matters for performance of firms, meaning that only firms receiving assistance on design & quality definition and R&D and technology dissemination are more productive than the others.

Results for the three sub samples reveal again that governance seems to be very relevant for DOM firms, but not for MNS and EXP, in accordance with the results obtained with TFP.

Table 7. Firm value added and value chain governance (dependent variable: log of value added per worker)

	All firms	MNS	DOM	EXP
G2	-0.04 -0.43	-0.26 -1.45	0.28 (2.27)*	0.35 1.47
G3	-0.02 -0.22	-0.08 -0.59	0.25 (2.35)**	-0.13 -0.56
G4	0.04 0.43	0.10 0.61	0.08 (0.55)*	-0.45 -1.22
G5	0.19 (2.38)**	0.14 1.09	0.42 (3.82)**	-0.07 -0.28
Size dummies	Included	included	included	included
Industry dummies	Included	included	included	included
Region dummies	Included	included	included	included
Year dummies	Included	included	included	included
Constant	4.578 (22.08)**	4.621 (11.54)**	4.367 (11.61)**	4.146 (9.69)**
Observations	4022	4022	4022	4022
R ²	0.55	0.43	0.48	0.54

Robust *t* statistics in parentheses: *significant at 5%; **significant at 1%.

Source: authors’ calculation on PICS 2004 data—The World Bank.

5. Conclusions

In this paper we have explored the patterns of governance arising in value chains led by global buyers and their impact on supplier performance with specific reference to the Thai manufacturing industry.

In order to address this issue, we have developed a quantitative measure of GVC governance, which takes into account different levels and types of buyer involvement in the supplier specification of product and process standards, R&D activities and dissemination of technology. Our typology identifies five basic types of value chain governance. We applied this typology to Thailand and compared the governance patterns and supplier performance of GVCs led by MNCs, of domestic value chains, and of firms exporting through other channels.

An important descriptive evidence is that the relationships MNCs have with their suppliers is multi-fold, and as they seem to get engaged in the process or product R&D of their suppliers and send their experts to work to disseminate and diffuse new technologies more often than other buyers. In contrast, firms that are part of domestic value chains and those that sell to other global buyers prove to follow modes of governance that imply only involvement in defining design and product characteristics.

How do these different modes of governance impact on efficiency and performance of local firms? Our estimates show that more intense buyer involvement with local suppliers, not only in the definition of product characteristics, design and quality, but also in technology dissemination and R&D, is associated with higher productivity. This appears to support evidence from different sources, obtained via different methodologies (e.g. Giuliani *et al.*, 2005; Pietrobelli and Rabellotti, 2007; Schmitz, 2004).

As we further focus our attention on the three sub-samples of firms, we find that the way the value chain is organised is very relevant for domestic-led value chains, and affects the productivity of these firm. In turn, the mode of governance does not appear to matter for firms supplying MNCs or for exporters. High customisation of products to national buyer standards, coupled with assistance on design and quality definition and technology dissemination is associated with higher productivity of local firms. In order to explain this apparent paradox, contrary to the other sources of evidence quoted above, we suggest that it may be explained as a consequence of the different nature of the information and knowledge being exchanged, and of the larger gaps in knowledge and capabilities between the domestic leader and its suppliers. Future research will draw further light on this.

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