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Global Value Chains:
The Case of Tuscan Firms

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Working Paper N. 14/2016

DISEI, Università degli Studi di Firenze
Via delle Pandette 9, 50127 Firenze, Italia
www.disei.unifi.it

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Positioning and Internalization in Global Value Chains: The Case of Tuscan Firms

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October 31, 2016.

Abstract

The recent trade literature has shown how incomplete contracts can shape firms' boundary and the decision of whether to outsource or integrate vertically. Related evidence and conceptualizations from the business literature show that buyer-supplier relations in global value chains can take several governance structures, depending on the degree of vertical coordination and power relations between firms. Building upon these two non-competing strands of the literature, we construct a taxonomy of firms that considers their positioning (upstream or downstream), their belonging to domestic or global value chains and the type of relations they entertain with other firms. We apply our taxonomy to the 2011 census of firms operating in Tuscany. We first describe regional characteristics and then study how positioning and governance affect firms' decisions and performance.

JEL codes: F14, F23.

Keywords: Global value chains; Buyer-supplier relations; Heterogeneous firms; International trade.

Acknowledgments: We would like to thank Gary Gereffi, Elena Gennari, Elizabeth J. Casabianca and Annalisa Caloffi for useful comments on previous drafts and the participants to: the Centro Rossi-Doria workshop "Italy in the GVCs", Rome, April 2016; the XXI DEGIT conference, Nottingham, September 2016; the 7th "Economics of Global Interactions" conference, Bari, September 2016; the 18th European Trade Study Group conference, Helsinki, September 2016; the 57th Italian Economic Association conference, Milano, September 2016.

Contents

Abstract	1
1 Introduction	3
2 Positioning and Governance in Global Value Chains	4
3 The Dataset.....	7
4 Methodology: The Positioning-Governance Taxonomy of Firms	8
5 Descriptive Statistics	10
6 Econometric Analysis.....	14
7 Conclusion.....	16
References	17
Appendix	19

Figures

Figure 1 - Five GVC governance types.....	5
Figure 2 - Sorting into organizational mode.....	6
Figure 3 - Employment by VC participation.....	10
Figure 4 - Sales by VC participation.....	11
Figure 5 - Export by VC participation.....	11
Figure 6 - Sales per employee by internationalization mode.....	12
Figure 7 - Sales per employee by VC participation.....	12
Figure 8 - Sales per employee by VC and integration.....	12
Figure 9 – Median sales per employee by positioning and governance.....	13
Figure 10 - GVC productivity premium.....	13
Figure 11 - Innovation.....	13
Figure 12 - Skilled labor.....	14
Figure 13 – Median sales by VC participation (2008=100).....	14

Tables

Table 1 – Firms’ distribution by positioning and governance, in percentage.....	9
Table 2 – Firms’ distribution for DVC and GVC.....	10
Table 3 - Number of GVC firms by positioning and governance relative to total.....	10
Table 4 - Baseline regressions: DVC and GVC.....	15
Table 5 - Positioning and governance coefficients, pooled regression.....	16
Table 6 - Positioning and governance coefficients, regressions by governance type.....	16

1 Introduction

The recent trade literature has shown how incomplete contracts can shape firms' boundaries and the decision of whether to outsource or integrate vertically. The literature on global value chains (GVC), on the other hand, has stressed how input-output relations among countries influence current trade patterns, highlighting the fact that countries are increasingly interconnected but are likely to have different roles in the network resulting from the fragmentation of production, some being more central than others. We try to reconcile these two strands of the literature, assessing how their joint consideration allows us to better explain the performances of internationalized firms.

From a theoretical point of view, existing (new new) trade models, even if they explicitly consider firm heterogeneity, rely on several simplifying assumptions that, by their nature, trade accuracy with precision. The consequence is that some aspects of the complex relations between firms are likely to be oversimplified or even overlooked.

The concurrent business literature, on the other hand, shows that buyer-supplier relations in GVC can take several governance structures, depending on the degree of vertical coordination and power relations between firms. This literature, focusing on specific case studies, has produced some conceptualizations of such complex relations between firms in terms of governance structure, decisional power, coordination etc. While these conceptualizations represent useful analytical frameworks and provide many interesting insights, they tend to be either case-specific or too general. In the first case - i.e. case specific studies - generalizing the framework can be difficult and/or misleading. In the second case - i.e. very general frameworks - the issue comes from falsifiability, because it is often impossible to formally reject a given framework unless one is willing to add more structure to it, thus making it less general, which supposedly was one of its strength.

The available empirical studies do not help solving these problems and much remains to be investigated. Multi-country input-output tables, used to assess a country or sector position in the international fragmentation of production, are useful statistical tools and represent the basis of a growing applied trade literature. However, they provide only an aggregate picture of trade among firms located in different countries, at most allowing to study whether in a specific sector a country exports have more domestic or foreign value added. Traditional trade statistics allow us to describe the flows of goods when they cross a border but, to our knowledge, do not to track flows across firm boundaries. The best way to test the "new new" trade theory and to study GVC is to use firm level data. Ideally, a comprehensive dataset to track down the flow of goods within value chains across borders and organizational forms is needed. But, as put forward by Alfaro *et al.* (2015): "*once a good leaves a country, it is virtually impossible with available data sources to trace the subsequent locations (beyond its first immediate destination) in which the good will be combined with other components and services*" (p. 3). Hence, measurement and data availability issues are obstacles for sound firm-level empirical evidence on GVC. Even with these limitation, empirical analyses at the disaggregated level, though still scant, are expanding, often thanks to *ad hoc* proprietary surveys and/or imperfect proxies for GVC participations (for instance, for Italy, see Giovannetti & Marvasi, 2016, Agostino *et al.*, 2015, Giovannetti *et al.*, 2015, etc.). Major problems in disaggregated applied works concern the definition of GVC, the positioning of the firms (upstream or downstream) and the inter-firm and intra-firm relations.

In this paper, we bridge those two non-competing strands of the literature – the "new new" trade theory and the international business literature - that are related by their common subject (i.e. international trade, multinational firms and GVC), but that use very different analytical approaches. In particular, we relate the works by Gereffi and coauthors about GVC and governance structure (see for instance Gereffi, 2014, Gereffi *et al.*, 2005) with the work of Antràs and coauthors about trade and multinational firms boundaries in a property-rights setup (see for instance Antràs, 2015, Antràs & Yeaple, 2015, Alfaro *et al.*, 2015, Antràs & Chor, 2013). Building on the available evidence and theoretical insights, we construct a taxonomy of firms that takes simultaneously into account their positioning (upstream or downstream), their belonging to Domestic Value Chains (DVC) or a Global Value Chain (GVC) and the type of relations they entertain with other firms. As an empiric exercise, we then apply the resulting taxonomy to a sample of about 16 thousand Italian firms included in the 2011 census of firms operating in Tuscany. We first describe regional characteristics and then study how positioning and governance affect firms' decisions and performance.

This paper contributes to the literature in three ways. The first contribution is to create a link between two strands of the literature that are usually thought as taking two independent approaches. We believe that there is much to be learned from cross-fertilization efforts. To our knowledge we are the first to explicitly exploit this link. The second contribution is to enrich both the frameworks. On the one hand, we provide empirical evidence for the conceptual models of governance in GVC. On the other hand, we introduce the GVC governance factor into the multinational firms' boundaries theoretical models. The third contribution of the paper is empirical: using a firm-level dataset and an econometric analysis, we shed light and add to the (scant) existing evidence on how different types of GVC and positioning within GVC affect firms' decisions, organization and performance.

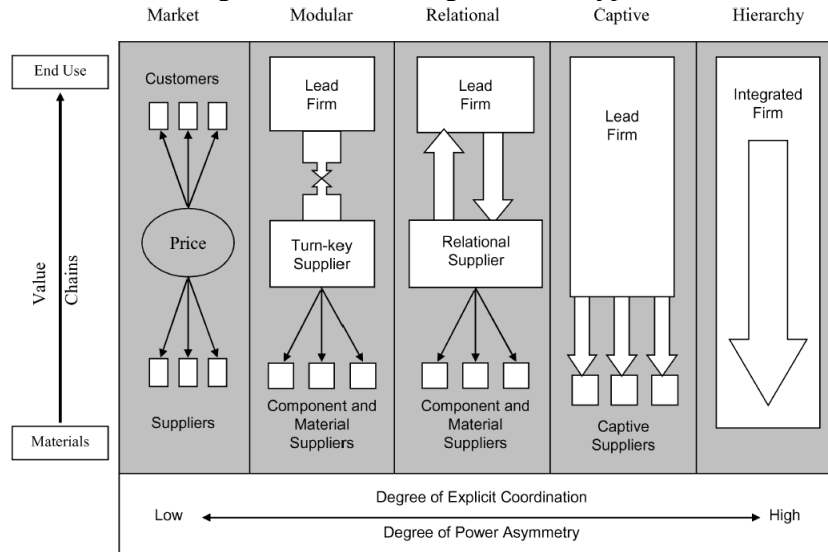
Our analysis shows that, on average, firms involved in value chains outperform other firms, with firms in Global Value Chains outperforming those in Domestic Value Chains, according to a number of indicators. Within the value chain, furthermore, "suppliers" (i.e. producers of intermediate products for other firms) are outperformed by intermediate firms (i.e. firms that are buyers and suppliers of intermediate products) which in turn are outperformed by buyers (i.e. firms that buy from other firms and produce final consumption goods). Most firms operate in "market" value chains, thus performing arm's length operations, while firms with stable relations with other independent firms (i.e. "relational" value chains) or firms explicitly organized into a hierarchy with parent-affiliate relations (i.e. "hierarchical" value chains) are less numerous groups. Despite being few, hierarchical" value chain firms are among the top performers, followed by "relational" value chain firms.

2 Positioning and Governance in Global Value Chains

Both the international trade literature and the international business literature agree in identifying two main dimensions determining the structure of GVC: i) the position of the firm, that is whether the firm mainly operates upstream as a supplier or producer of inputs and intermediate goods for other firms or downstream as a buyer or producer of more processed or even final goods; ii) the governance structure or the level of vertical coordination among firms along the value chain, which can go from arm's length market operations to a fully integrated hierarchical structure of firms belonging to the same business group.

The link between positioning and governance in value chains was first conceptualized in the notion of buyer-driven and producer-driven value chains, introduced in the mid-1990s. The notion clearly refers to the position along the chain of the main actor holding the decisional power, i.e. the lead firm. As later evidence showed, a dichotomous categorization of value chains was too restrictive to capture the observed complexity of governance structures. More recently, scholars have made wide use of the governance types elaborated by Gereffi *et al.* (2005) and illustrated in Figure 1. From the figure, it should be clear that positioning and governance are two independent, though closely related, dimensions. The main issues arising in GVC concern how firms should position themselves along the chain and how they should organize and coordinate the different activities. As Gereffi *et al.* (2005) write: "*The key issues in this literature are which activities and technologies a firm keeps in-house and which should be outsourced to other firms, and where the various activities should be located*" (p. 79).

Figure 1 - Five GVC governance types.



Source: Gereffi *et al.* (2005).

The emergence of different organizational forms stemming from firms' decisions about positioning and governance has been theoretically explained by the existence of transaction costs, building on the pioneering insights from Coase (1937) and Williamson (1971, 1975, 1985), which also proposed an operational solution. Buyer-supplier transactions are more efficiently performed by independent firms through the market or at arm's length when they involve standardized products, for which investment specificity and contractual uncertainty are both likely to be low. Conversely, when there is a need for customization and tight coordination, specific investments are required, and contractual incompleteness is a significant issue, then transactions are more efficiently performed within the boundary of the firm or by hierarchically organized firms related by an ownership structure.

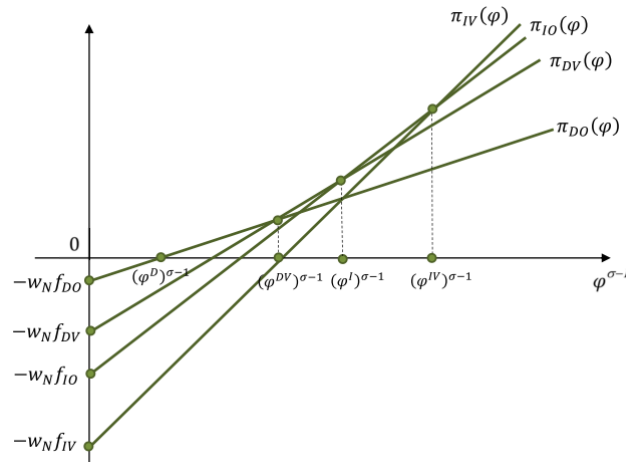
The transaction-costs theory is extremely insightful in explaining why transactions may be more efficiently performed within the firm rather than through the price mechanism. However, one of its main problems comes from the observation that, in the absence of transaction costs or when comprehensive contracts can be devised, the boundary of the firm are indeterminate. The existence of transaction costs provides an explanation to why firms may want to integrate, but does not help to assess why they may *not* want to integrate. This observation is of course not new. Typically, rationalizations to why some activities may be more efficiently performed outside of the firm were rooted on the idea that there exists also some "governance costs" that arise within organizations, so that the boundaries of the firms are shaped by the interaction of these two forces. Another explanation is to recognize that the contractual frictions that arise between unrelated parties are also present, at least to some degree, when the parties are integrated. In this context, firm's boundaries are determined by the optimal solution to contract incompleteness and the efficient allocation of property rights.

The property-rights theory of firm's boundaries, firstly introduced by Grossman & Hart (1986), has been particularly insightful in providing a complete theory of *both* the benefits and the costs of integration. The incompleteness of contracts provides self-interested buyers and suppliers with the opportunity to reap the gains from a transaction, whether it is performed within or outside the boundaries of the firm. Ownership does not solve contract incompleteness, but implies the purchase of residual rights of control. By holding the decisional power, the risk of opportunistic behavior is reduced, but at the cost of distorting the incentives of the owned actor, since the owner will also control the surplus from the outcome of the transaction. "In particular, a firm that purchases its supplier, thereby removing residual rights of control from the manager of the supplying company, can distort the manager's incentives sufficiently to make common ownership harmful" (Grossman & Hart, 1986, p. 692).

Recent developments in the trade theory have embedded firms' heterogeneity *à la* Melitz (2003) into the property-rights framework in order to study the relation between firm-level characteristics and their organizational choices (see for instance Antràs & Yeaple, 2015). One important result is that it is

possible to observe different productivity sorting of firms by their organizational mode. For instance, it may be reasonable to assume that integration makes production more efficient, but requires a higher initial investment. In this case, ownership is associated with a lower marginal cost and a higher fixed cost. Additionally, it is typically assumed that international activity requires firms to pay a fixed cost. This cost structure can generate a productivity sorting as the one showed in Figure 2. In the figure, the lines represent profits (π) as a function of firm's productivity (φ) and the intercept represents the fix costs;¹ the productivity cutoffs show that (i) internationalized firms are more productive than domestic firms (in line with the findings of Melitz, 2003, and others) and (ii) integrated firms are more productive than independent firms. More specifically, the ordering is such that $\pi_{DO} < \pi_{DV} < \pi_{IO} < \pi_{IV}$, i.e. that internationally integrated firms (*IV*) are more productive than internationally outsourcing firms (*IO*), which are more productive than domestically integrated firms (*DV*), which, in turn, are more productive than domestically outsourcing firms (*DO*).

Figure 2 - Sorting into organizational mode.



Source: Antràs & Yeaple (2015).

The resulting theory of the firm is particularly insightful and suited to be applied to the study of GVC as it accounts for the observed firms' heterogeneity while clarifying the mechanisms that affect the decision of whether to integrate. However, while these economic models are useful precisely because they provide clear mechanisms and testable implication thanks to strong simplifications, the available evidence suggests that the actual GVC governance structures are more complex and are probably better considered by conceptualizations such as the one in Figure 1, which instead lacks some more formal structure. It certainly would be a mistake not to consider the two approaches as complementary. Reading together the above figures, for instance, it is easy to observe that Figure 2 is dichotomous regarding the organizational structures, while Figure 1 encompasses five modalities. We can link the integration vs. outsourcing (also "make or buy") decision to the two extremes governance types, i.e. market and hierarchy, or, more generally, to hierarchical and non-hierarchical value chains. The property-rights model would then explain precisely why we could observe that firms in GVC are more productive than firms in DVC and hierarchal governance structures are more productive than non-hierarchical ones (as in Figure 2); furthermore, with adequate data, we could try to formally test the model against the alternatives.

The available empirical evidence is generally supportive of the productivity sorting of firms sketched above. Tomiura (2007) finds a productivity premium for Japanese firms involved in foreign direct investments and intra-firms trade. Corcos *et al.* (2013) use French data to assess a productivity premium for firms involved in foreign direct investments *vis-à-vis* foreign outsourcers. Similarly, Kohler & Smolka (2014), focusing on Spanish firms, show that firms that integrate and chose foreign sourcing are more productive *ex ante*.

¹ Additionally, $\sigma > 1$ is the elasticity of substitution between any two varieties, w_N is the wage in the North country and fixed costs are denoted by f and expressed in units of labor. For details we refer to Antràs & Yeaple (2015).

Similar evidence is available also for Italy. Federico (2010) finds that foreign integrated firms are more productive than domestic outsourcers. Outsourcing is typically associated with lower productivity levels and suppliers tend to have a productivity disadvantage with respect to final firms. This is confirmed by Agostino *et al.* (2015), who find evidence of a “subcontracting discount” for suppliers, while innovative suppliers are more able to benefit from GVC. Focusing on value chains, Giovannetti *et al.* (2015) find evidence of a productivity premium both for firms involved in value chains activities and for firms involved in inward or outward foreign direct investments; additionally, they find that participation value chains does not seem to improve the international projection of suppliers, while it is beneficial for downstream firms.

3 The Dataset

Our main data source is the 2011 census of firms with at least 3 employees operating in Tuscany (Istat). The census includes 16,435 firms, with 7,351 in manufacturing according to the ATECO classification (the Italian implementation of the NACE classification). In what follows we describe the main characteristics of the dataset relevant to our analysis.

Production of intermediate goods is one of the main aspects to look at when trying to assess participation in domestic or global value chains. This information is available only for firms operating in manufacturing.² We observe whether the firm produces a final or an intermediate good for 6,192 firms. 35.5% of the firms for which we observe the type of good produced produce intermediate goods (i.e. 2,197 firms).

To assess how firms are positioned (whether upstream or downstream) is important to know whether the firm operates as a buyer or as a supplier or as both. We have this information for all the firms in the dataset: 1,261 are pure suppliers (7.7%), 3,125 are only buyers (19%) and 5,675 are both (34.5%).³

Another important available information regards the main source of firms’ demand. 22% of the firms sell their goods to final consumers (households), while the rest sell to other firms or to non-households consumers.

Interestingly, about 2/3 of the firms claim to belong to a business group and to entertain commercial and other types of relations with other firms of the group;⁴ however, only about 15% of the firms is formally owned by another firm or by a holding, while almost 84% are owned by an individual or a family. About 4% of all the firms are involved in offshore outsourcing, producing at least part the production abroad in the form of either foreign direct investments (FDI) or joint ventures, while a small fraction (1.6%) is foreign owned. More precisely, since information on foreign ownership is only available for firms with at least 10 employees, and given that in our dataset there are 8,662 firms with at least 10 employees, the share of foreign owned firms is 3%.

The dataset also provides information on firms’ internal organizational structure. For the bulk of firms the managerial responsibility is held by the main entrepreneur or stockholder (about 72%); 28% employs professional managers or others. Firms with less than 10 employees (3 to 9 employees) are characterized by a higher weight of the main entrepreneur since the managerial responsibility is held by the entrepreneur (which is also typically the owner) or a member of his or her family in 75% of the cases, hence implying a high level of decisional centralization. The corresponding share for larger firms (at least 10 employees) is less than 70%. The dataset also provides more detailed information about the actual strategic decisional power of the entrepreneur. In particular, more than 73% of the firms with at least 10 employees report a high level of core business decisional centralization and around 25% a medium degree; for smaller firms, more than 77% report a high level of decisional

² According to the Ateco classification of firms, not all these firms belong to manufacturing codes. This is an advantage of our dataset, since it possibly overcomes some of the limitations of the available sectoral classification. We have information on the type of goods produced for a vast majority of manufacturing firms according to the ATECO code (about 82%) and a negligible fraction of non-manufacturing firms (about 1.8%). Not surprisingly, almost all of firms for which we observe the type of good produced are in fact in manufacturing also according to the ATECO code (more than 97%).

³ The rest of the firms (6,374) is neither supplier nor buyer, but may have other types of relationships such as consortium, franchising and other formal or informal agreements with other firms and institutions.

⁴ According to the definition of value chain employed in this paper (see next section) the share of firms belonging to a group raises to almost 98% for firms participating in a value chain.

centralization, since the strategic decisions are taken directly by the entrepreneur, either alone or with his/her family.

Finally, we have information on total sales and employment for the years 2008-2011, an interesting period since it covers the economic and financial crisis as well as the debt crisis.

4 Methodology: The Positioning-Governance Taxonomy of Firms

Building on the literature on heterogeneous firms and on business and global value chains, we use the information contained in the dataset described above to construct a taxonomy of firms in value chains along two main dimensions: i) positioning and ii) governance. This taxonomy allows us to proxy those characteristics identified as the most prominent in determining the structure of the value chain. A *caveat* applies, as all the variables used, no matter how detailed, are likely to be only a rough approximation of the complexity of the actual organizational structure of firms. Nonetheless, we believe that the analysis contributes to our understanding of firms' behavior. To our knowledge, this is the first attempt to link these two strands of the literature and assess the firms' performance looking at the characteristics of where firms are positioned in value chains (domestic or global and upstream or downstream) and whether there are any links to the governance structure of the firms themselves.

Let us start with the analysis of "positioning." This variable allows us to assess whether a firm is part of a value chain and, in case, in which point of the chain it operates. The definition of value chain adopted in this paper is related to input-output relations among firms and to the exchange of intermediate goods, since producing or buying intermediate goods to or from other firms is, in fact, a "value chain activity." Hence, firms for which we can determine positioning are considered to operate in a value chain (1,370 firms).⁵ Our objective is to classify firms as being upstream or downstream in the production process, whether they operate in a domestic or in a global value chain. To this end, the relevant information comes from the combined consideration of three characteristics: i) the production of intermediate goods; ii) the status of buyer and/or supplier; iii) the source of firm's demand, either households or other firms. We single out three types of firms:

1. *Downstream producers or (pure) buyers.* Buyers that produce final goods and sell to households (about 7.8% of firms in our sample).
2. *Midstream producers or mid-suppliers.* Firms that are both buyers and suppliers, produce intermediate goods and sell to other firms (about 72% of firms in the sample).
3. *Upstream producers or (pure) suppliers.* Suppliers that produce intermediate goods and sell to other firms (about 20% of firms).

The above types of firms can further be divided into domestic and global based on whether they operate only at home or also abroad, thus producing intermediate goods and/or trading with domestic or foreign counterparts. All in all, we observe firms outside value chains, firms in DVC and firms in GVC.

The second dimension is "governance", i.e. power (and the ability) to exert control along the chain. A firm, embedded in a value chain, sets (enforces) parameters under which others in the chain operate. More precisely, the firm can set what is to be produced, including product design and specifications; how to produce (e.g. the technology, or rules to comply with labor and environmental standards, etc); how much to produce and when (including logistics). We then consider the organizational choices of firms, their level of vertical coordination and their decision power. Note that this dimension is independent from the value chain participation as defined above, which mostly applies to manufacturing firms, while we can characterize the governance structure for all the firms in the dataset. The relevant information in order to characterize the governance structure of firms comes from the joint consideration of two factors: i) the level of integration of the firm, which is captured by the firm being owned by another firm or a holding, or by the presence of outward FDI, implying that the firm is related to other firms by an ownership structure, being a parent and/or an affiliate of other firms; ii) the degree of decisional centralization, which helps us take into account whether the firm

⁵ Recall from the above figures that almost all firms for which we know the type of good produced belong to manufacturing. Alternatively, one could also include buyers selling to households even though the type of product is unknown (659 firms). While these firms are likely to produce final goods, and are perhaps in a value chain, they normally operate outside manufacturing (95% of firms). To have a clearer picture, we opted for the narrower definition.

operates independently. Also in this case, we single out three typologies of firms by governance category:

1. *Centralized firms*. Independent firms that operate with a high level of decisional centralization, in which the entrepreneur is the main responsible for the strategic decisions (about 50% of the firms).
2. *Decentralized firms*. Firms which are independent, but operate with a lower degree of decisional centralization (about 35% of firms). The entrepreneur/owner may have managerial responsibilities, but he or she is not the main responsible for the strategic decisions, which involve also other subjects such as an internal or external manager and in some cases the employees.
3. *Integrated firms*. Firms that belong to an ownership hierarchy of firms, being either a parent or an affiliate of others (about 15% of firms).

Positioning and governance can be combined in order to obtain a taxonomy of firms involved in value chain activities. The distribution of firms is summarized in Table 1. The table shows how even when firms pursue value chains activities, most operate independently and with a high degree of decisional centralization.

Table 1 – Firms’ distribution by positioning and governance, in percentage.

		Governance			Total
		Centralized	Decentralized	Integrated	
Positioning	Downstream	4.23	2.55	1.02	7.81
	Midstream	36.86	24.38	10.80	72.04
	Upstream	11.31	6.50	2.34	20.15
	Total VC	52.41	33.43	14.16	100
Total no VC		49.32	35.39	15.29	100

Our taxonomy of value chain firms can be interpreted as a simplified empirical implementation of the conceptual schemes discussed in the previous sections. The three governance structures represent a proxy for the type of value chain in which firms operate.

First, firms in value chains with a centralized governance structure are not related to their upstream or downstream production partners by any strong link and are likely to operate in the market through arms’ length activities, characterizing what we may call a “market” or “arms’ length” value chain.

Second, firms in value chains with a decentralized governance structure, while not being formally related to other actors of the chain, show a more flexible decisional process which must be accounted for in evaluating how they interact with buyers and suppliers. These firms are likely coordinate to some degree with their production partners and this is reflected in the more decentralized governance structure. Firms in this category, thus, fall in the type of value chain that previous studies have identified as being modular, relational or captive (we use the term “relational” value chain for simplicity, see Gereffi *et al.*, 2005).

Third, the integrated governance structure keeps track of a clear ownership hierarchy of firms operating in value chains; in this case, firms are strictly related to other firms of the hierarchy and show a high degree of coordination, thus identifying a “hierarchical” value chain. In hierarchical value chains, often products are complex, or specialized suppliers are not easily available.

Having identified the type of value chain, the next step is to distinguish between the Domestic (DVC) and Global (GVC) chains. To this end, we take advantage of the information coming from the nationality of the production partner of buyers and suppliers. Note that this information is particularly relevant as many studies, often due to data constraint, rely on importing and exporting as a proxy for GVC activity. However, international trade only provides rough information on the true value chain relations among firms located in different countries. In this paper, we overcome this issue by directly observing whether a supplier sells to foreign firms and/or a buyer buys from foreign firms, since the questions are directly asked to the firms. Table 2 provides the distribution of firms for DVC and GVC, accounting for all the different characteristics discussed above (in terms of positioning and

governance). Relative to GVC, firms in DVC are more represented in upstream and downstream phases; also, they are less likely to be hierarchically organized. The larger presence of midstream firms in GVC is due to hierarchical GVC. This is made apparent in Table 3, which also shows a higher share of downstream firms in hierarchal GVC, while the share of upstream producers is lower.

Table 2 – Firms’ distribution for DVC and GVC.

	Market	Relational	Hierarchical	Total
DVC				
Downstream	4.47	2.63	0.96	8.07
Midstream	37.63	25.18	7.89	70.70
Upstream	12.02	6.58	2.63	21.23
Total DVC	54.12	34.39	11.49	100
GVC				
Downstream	3.04	2.17	1.30	6.52
Midstream	33.04	20.43	25.22	78.70
Upstream	7.83	6.09	0.87	14.78
Total GVC	43.91	28.7	27.39	100

Table 3 - Number of GVC firms by positioning and governance relative to total.

	Market	Relational	Hierarchical	Total
Downstream	0.12	0.14	0.21	0.14
Midstream	0.15	0.14	0.39	0.18
Upstream	0.12	0.16	0.06	0.12
Total	0.14	0.14	0.32	0.17

5 Descriptive Statistics

Considering DVC and GVC, we see a clear sorting in which, on average, firms in domestic value chains tend to be larger in terms of employment and sales. The same is not observed for export values, while GVC firms still perform better, DVC firms do not seem significantly different from non-VC exporters. This is graphically shown in Figure 3, Figure 4 and Figure 5.

Figure 3 - Employment by VC participation.

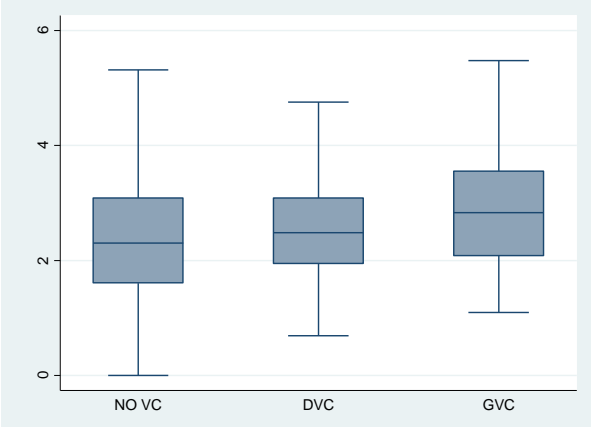


Figure 4 - Sales by VC participation.

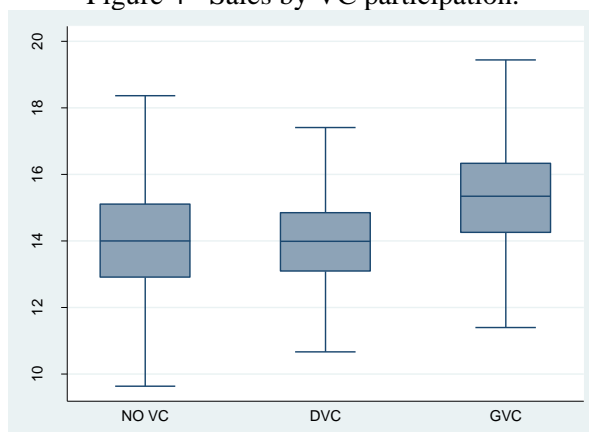
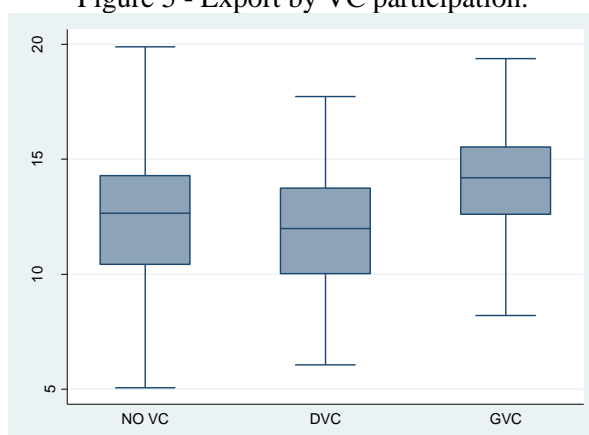


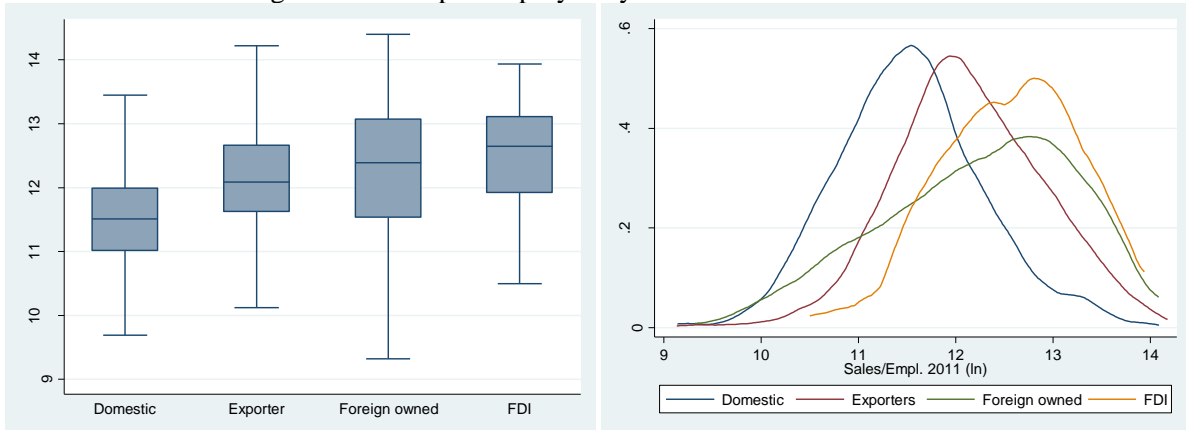
Figure 5 - Export by VC participation.



Our data are also consistent with the productivity sorting by internationalization mode typically found in the trade literature (Figure 6). As regarding to value chains, a pattern like that of export emerges if we consider as measure of productivity sales per employee. Firms in GVC have a distribution of sales per employee shifted to right with respect to other firms; on the contrary DVC and no-VC firms do not differ much one from the other (Figure 7). This evidence is in line with that provided for Spanish firms by Antràs & Yeaple (2015), in which foreign sourcing firms have a total factor productivity distribution shifted to the right relative to domestic sourcing firms (their Figure 9) and the productivity sorting by internationalization mode is similar to our (their Figure 6). Additionally, we document in Figure 8 the existence of a productivity sorting for DVC and GVC by governance type. For simplicity and for comparability reasons, let us consider only hierarchical and non-hierarchical value chains. We clearly see that firms in GVC tend to have higher sales per employee than firms in DVC, while at the same time hierarchical value chains perform better than non-hierarchical ones. This corresponds to the productivity sorting illustrated in Figure 2.⁶

⁶ Federico (2010) for Italian firms and Antràs & Yeaple (2015) for Spanish firms (in their Figure 11) obtain a productivity sorting that is not consistent with Figure 2 for the two central types, but instead with an alternative sorting of fixed costs.

Figure 6 - Sales per employee by internationalization mode.



Note: the graph includes only manufacturing firms with at least 10 employees.

Figure 7 - Sales per employee by VC participation.

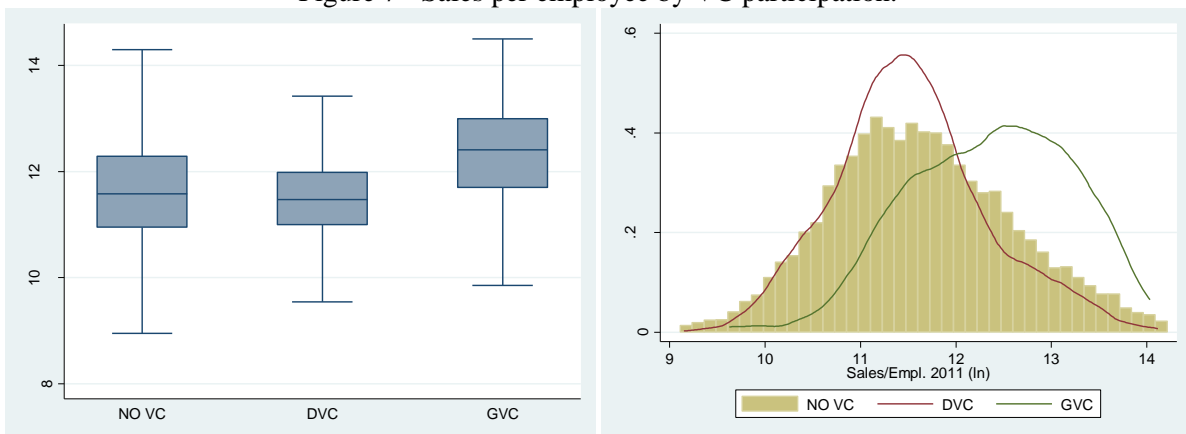
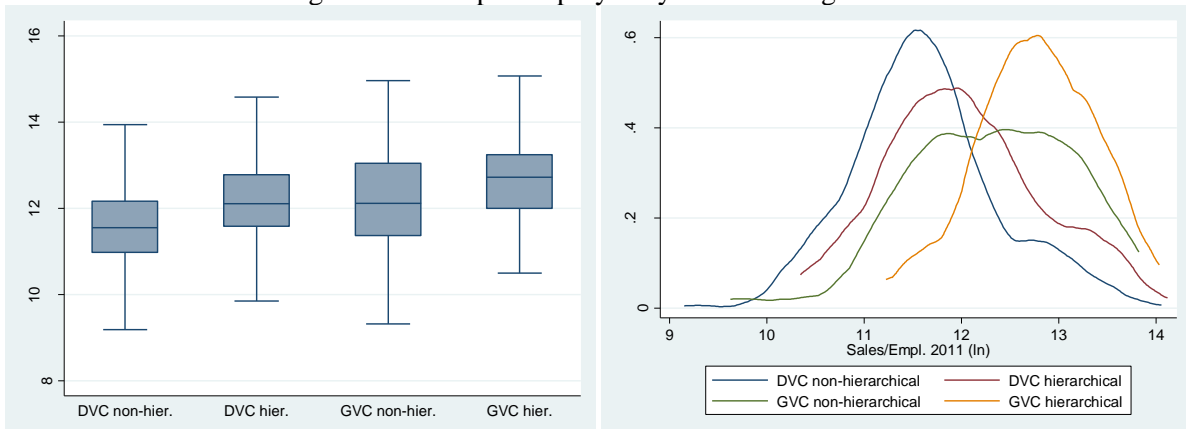
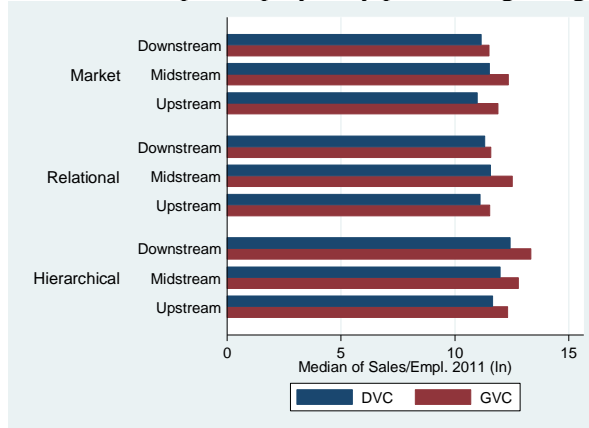


Figure 8 - Sales per employee by VC and integration.



We now expand the analysis by explicitly considering our taxonomy. Since nine different types of firms are possible both for DVC and GVC (eighteen in total), for simplicity we report the medians of the relative distributions. Figure 9 shows that Global Value Chains firms always have a higher median, implying that they tend to be more productive. Hierarchical value chains are characterized by the fact that downstream firms are more productive than midstream, which in turn are more productive than upstream. For relational and market value chains, instead, the most productive firms are the midstream. Consistently with the available evidence from other studies of a “subcontracting discount”, upstream firms are always characterized by lower productivity.

Figure 9 – Median sales per employee by positioning and governance.



In Figure 10, we report the productivity premium of GVC firms *vis-à-vis* DVC firms. As noted above, the premium is always positive, but now we see a difference between the three governance types that did not show before. First, the larger premia are found, on average, in hierarchical GVC. Second, upstream producers, while being less productive, show the largest premia in market and hierarchical GVC, while for relational GVC midstream firms benefit more. The value of the premia is noteworthy as the median upstream hierarchical GVC firm has almost 3 times the sales per employee of the median upstream DVC firms.

Figure 11 and Figure 12 show that firms in GVC innovate more and hire more skilled workers.

Figure 10 - GVC productivity premium.

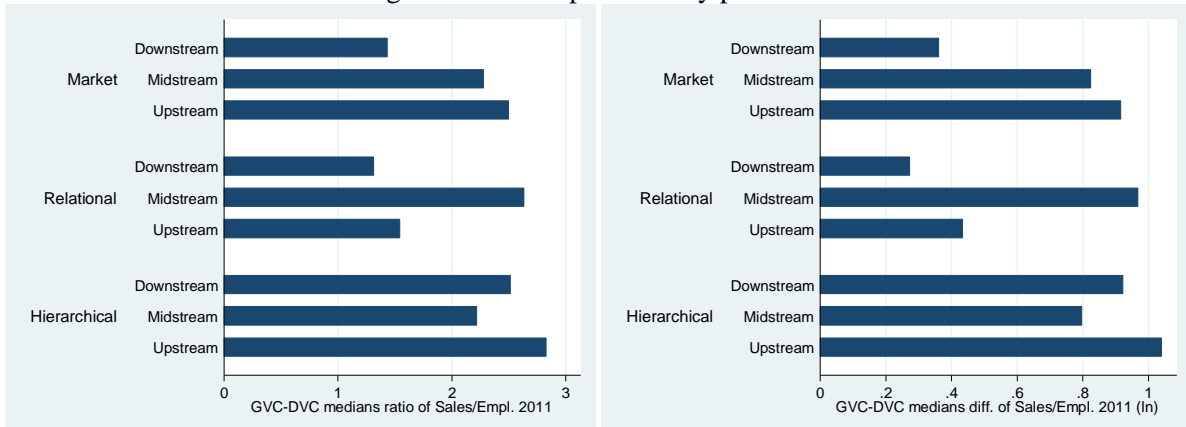


Figure 11 - Innovation.

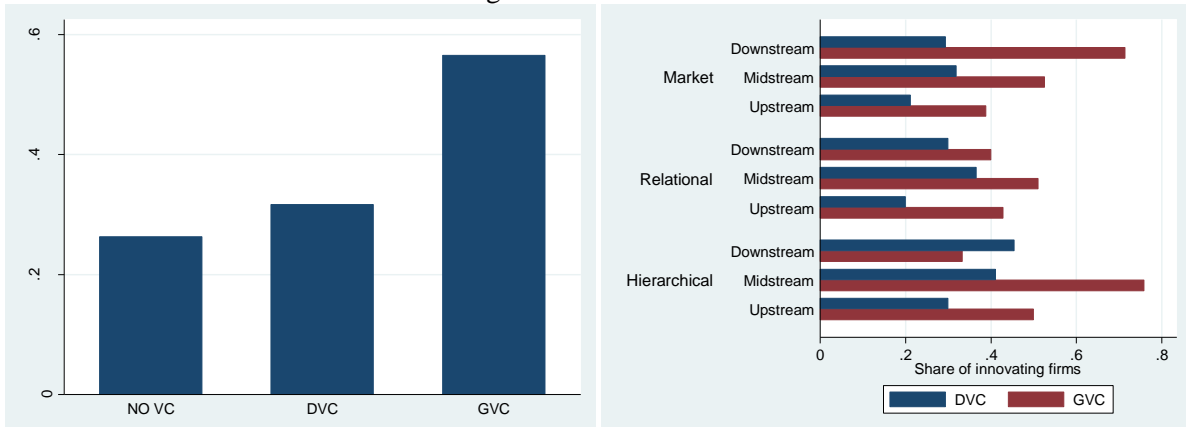
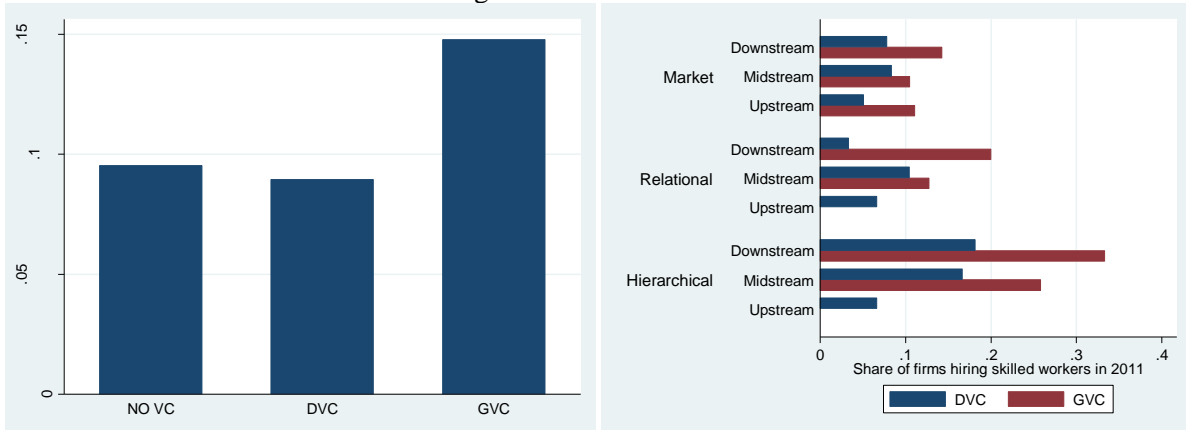


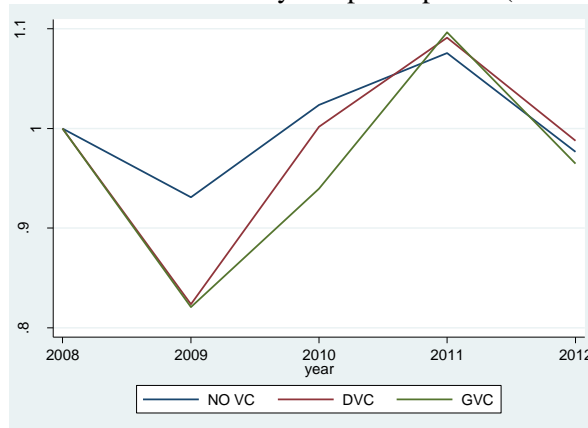
Figure 12 - Skilled labor.



Note: please note that the data for hierarchical upstream in GVC is missing.

Errore. L'autoriferimento non è valido per un segnalibro. shows the median sales by GVC participation for the years 2008-2012. It is clear that firms in GVC decreased their sales much more than other firms immediately after the crisis in 2008. This is in line with the findings by Escaith et al. (2010) and Baldwin (2009). More precisely, a recent literature has emphasized the role of GVC in the trade collapse. The recovery after 2009 is fast, but in 2011 the debt crisis hit and again the participation in GVC does not help.

Figure 13 – Median sales by VC participation (2008=100).



6 Econometric Analysis

In this section, we explore the descriptive evidence discussed above, by looking at the correlations. Our focus is on productivity (here measured as sales per employee). The objective is to verify whether any typology of firms, as identified by our taxonomy, tend to be more productive, other things equal. The identification of productivity premia for firms involved in value chains is a relevant issue both from an academic and from a policy perspective. Knowing how firms are positioned and where the productivity gains are generated, allows us to better understand what are the factors that help firms benefiting from GVC participation and to characterize more accurately the characteristics of Tuscan firms and their competitiveness.

The regression analysis performed is based on simple Ordinary Least Squares (OLS) estimations in which the dependent variable is sales per employee (in 2011). The variables of interests are introduced as dummies that capture the relevant aspects of value chains described in the paper, depending on the specification. In line with the literature, the control variables include the size of the firm (employment), their internationalization modes, innovation and human capital, and 2-digit sector fixed effects. With no claims of causality, our analysis allows us to describe and verify more precisely which firms are more productive and whether the productivity premia are statistically significant, once

we control for the main firms' characteristics. In this sense, our results represent at the same time an accurate description of Tuscan firms and an indication for future investigations.

Table 4 displays our baseline results. For simplicity, we first focus on DVC and GVC with no further specifications regarding positioning and governance. The control group is the set of firms which are not in domestic nor global value chains. Table 4 clearly shows that firms in GVC outperform firms not participating in value chains, while the opposite applies for DVC. Results are statistically significant and robust to the inclusion of 2-digit sector fixed effects and other control variables. All the control variables have the expected sign and are statistically significant. Specifically, larger firms tend to be more productive as well as internationalized firms, independently of the mode of internationalization (just exporters or more complex forms). Similarly, innovating firms and those who hired skilled workers during the year tend to be more productive. The results apply to our complete sample and to manufacturing firms. In both cases the numerical values of the parameters are very stable to the inclusions of controls.

Table 4 - Baseline regressions: DVC and GVC.

Dep. Sales per empl. (ln)	All firms			Manufacturing firms		
	(1)	(2)	(3)	(4)	(5)	(6)
DVC	-0.142*** (0.034)	-0.213*** (0.032)	-0.098*** (0.030)	-0.246*** (0.032)	-0.223*** (0.032)	-0.084*** (0.030)
GVC	0.752*** (0.072)	0.602*** (0.065)	0.297*** (0.062)	0.654*** (0.066)	0.597*** (0.064)	0.271*** (0.060)
Employment (ln)			0.147*** (0.008)			0.148*** (0.012)
Exporter			0.506*** (0.017)			0.570*** (0.023)
For. Owned			0.106* (0.059)			0.159** (0.081)
JV			0.225*** (0.040)			0.336*** (0.050)
FDI			0.386*** (0.084)			0.246** (0.104)
Innovation			0.141*** (0.017)			0.142*** (0.023)
Skilled empl.			0.122*** (0.026)			0.148*** (0.036)
Constant	11.626*** (0.009)	11.828*** (0.110)	11.264*** (0.106)	11.724*** (0.013)	11.828*** (0.109)	11.241*** (0.104)
Sector f.e.	No	Yes	Yes	No	Yes	Yes
R-squared	0.008	0.249	0.328	0.023	0.085	0.231
N	16090	16090	16090	7266	7266	7266

S.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

The above results provide a benchmark indication that the GVC productivity premium found in the descriptive analysis is supported by the data also when additional controls are included.

We now refine the analysis by considering our positioning-governance taxonomy. This is done by including a set of dummies into the baseline regression model. In line with the previous analysis, our taxonomy, combined with participation in DVC and GVC, produces a total of eighteen dummies. We introduce them into the analysis in two ways. First, we run a pooled regression including all the dummies. The control group in this regression are all the firms not involved in value chains (neither domestic nor global); hence the coefficients reported in Table 5 represent the productivity premium relative to these firms, other things equal.⁷ Second, we run three separate regressions for the three governance types, each including six positioning dummies (three for DVC and three for GVC). This specification allows us to have three different control groups of firms noninvolved in value chains, one for each governance type. Hence, the coefficients reported in Table 6 represent the productivity

⁷ The complete regression table is reported in the Appendix, Table A1.

premium with respect to non-value-chain firms with the same governance type.⁸ In both cases the results point in the same direction: upstream DVC firms tend to have lower productivity, while midstream GVC firms display a premium. The former confirms the existence of a “productivity discount” for domestic suppliers, already discussed in other studies. The latter, instead, is a rather new finding, as the productivity premium of GVC firms seems to exist only for firms that are both suppliers and buyers, and does not seem to be affected by the governance structure.

Table 5 - Positioning and governance coefficients, pooled regression.

Dep. Sales per empl. (ln)	Market	Relational	Hierarchical
DVC vs. no-VC			
Downstream	-0.367*** (0.129)	0.003 (0.167)	-0.184 (0.275)
Midstream	-0.068 (0.044)	0.028 (0.053)	0.185** (0.094)
Upstream	-0.401*** (0.077)	-0.308*** (0.104)	0.100 (0.159)
GVC vs. no-VC			
Downstream	0.126 (0.326)	-0.103 (0.386)	0.991 (0.611)
Midstream	0.282*** (0.101)	0.354*** (0.127)	0.487*** (0.117)
Upstream	-0.119 (0.204)	-0.203 (0.232)	0.158 (0.612)
R2	0.24		
N	7266		

Manufacturing only; 2-digit sector f.e. and controls included.

Control group: all no-VC firms.

S.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

Table 6 - Positioning and governance coefficients, regressions by governance type.

Dep. Sales per empl. (ln)	Market	Relational	Hierarchical
DVC vs. no-VC			
Downstream	-0.306** (0.132)	-0.037 (0.153)	-0.439 (0.308)
Midstream	-0.033 (0.047)	0.025 (0.052)	0.007 (0.112)
Upstream	-0.341*** (0.079)	-0.329*** (0.098)	-0.175 (0.183)
GVC vs. no-VC			
Downstream	0.134 (0.331)	-0.137 (0.353)	0.881 (0.675)
Midstream	0.339*** (0.104)	0.319*** (0.118)	0.380*** (0.136)
Upstream	-0.063 (0.206)	-0.268 (0.220)	0.065 (0.669)
R2	0.22	0.24	0.21
N	3846	2407	1013

Manufacturing only; 2-digit sector f.e. and controls included.

Control group: all no-VC firms by governance type.

⁸ The complete regression table is reported in the Appendix, Table A2.

S.e. in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

7 Conclusion

This paper has put together two non-competing strands of the literature, namely that on heterogeneous firms and that on Global Value Chains. By exploiting elements of both, we have could characterize firms along two different dimensions: positioning and governance. Our analysis concerns firms in Tuscany, one of the regions in Italy specialized in the “made in Italy” products, with many small and medium enterprises.

With positioning, we focus on where the firms operate along the value chain (whether downstream or upstream), while with governance we look at the links between the different firms along the chain. More precisely, we distinguish firms characterized by arm's-length or other kind of relationships from hierarchical firms (market, relational or hierarchical).

We first present descriptive evidence of these characteristics, then look at the productivity ordering. We find that there is a clear ordering, with firms in global value chains being more productive than those in domestic value chains, in turn more productive than firms outside the value chains. These finding are in line with the existing literature.

Furthermore, we find that firms in hierarchical value chains are more productive than those in market chains.

Finally, we estimate productivity, measured by sales per employees, against several different characteristics of the firms (positioning and governance). First against a control group of firms outside value chains and then against a control group of firms divided by governance type. In both cases our results are confirmed. A new finding however is that the firms with the highest productivity premium are those which are both suppliers and buyers. The governance structure, contrary to results by Antràs & Yeaple (2015) for Spanish firms, does not seem to play a relevant role.

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Table A2 - Positioning and governance regressions by governance type.

Dep. Sales per empl. (ln)	Market		Relational		Hierarchical	
	(1)	(2)	(3)	(4)	(5)	(6)
DVC Downstream	-0.465*** (0.145)	-0.306** (0.132)	-0.237 (0.170)	-0.037 (0.153)	-0.439 (0.324)	-0.439 (0.308)
Midstream	-0.072 (0.050)	-0.033 (0.047)	-0.088 (0.056)	0.025 (0.052)	-0.241** (0.115)	0.007 (0.112)
Upstream	-0.630*** (0.085)	-0.341*** (0.079)	-0.632*** (0.105)	-0.329*** (0.098)	-0.609*** (0.189)	-0.175 (0.183)
GVC Downstream	0.249 (0.366)	0.134 (0.331)	0.074 (0.392)	-0.137 (0.353)	1.112 (0.720)	0.881 (0.675)
Midstream	0.765*** (0.113)	0.339*** (0.104)	0.721*** (0.129)	0.319*** (0.118)	0.558*** (0.138)	0.380*** (0.136)
Upstream	0.062 (0.229)	-0.063 (0.206)	0.110 (0.235)	-0.268 (0.220)	0.088 (0.720)	0.065 (0.669)
Employment (ln)		0.206*** (0.018)		0.078*** (0.021)		0.010 (0.027)
Exporter		0.535*** (0.031)		0.581*** (0.036)		0.506*** (0.077)
For. owned		0.159 (0.192)		-0.126 (0.166)		0.252** (0.119)
JV		0.442*** (0.070)		0.301*** (0.082)		0.026 (0.130)
FDI		0.000 (.)		0.000 (.)		0.128 (0.119)
Innovation		0.110*** (0.032)		0.164*** (0.036)		0.103 (0.065)
Skilled empl.		0.081 (0.054)		0.174*** (0.061)		0.221*** (0.082)
Constant	11.605*** (0.017)	11.017*** (0.167)	11.699*** (0.020)	11.295*** (0.163)	12.237*** (0.035)	11.958*** (0.222)
Sector f.e.	No	Yes	No	Yes	No	Yes
R-squared	0.029	0.220	0.030	0.235	0.036	0.209
N	3846	3846	2407	2407	1013	1013

Manufacturing only; S.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01.