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The Outsourcing of Manufacturing and the Rise of Giant Global Contractors: A Marxian Approach to Some Recent Transformations of Global Value Chains

GUIDO STAROSTA

This article aims to show that the Marxian ‘law of value’ can provide solid foundations for the comprehension of the constitution and dynamics of Global Value Chains (GVC). It offers an explanation of the social processes of ‘value creation and capture’ within a chain based on the system-wide motion of global capital accumulation. A firm connection is thus established between the *particular* dynamics internal to each industry and the *general* dynamics of the ‘system as a whole’, which is, precisely, where the greatest weakness of the GVC approach lies. Furthermore, the usefulness of those general theoretical insights is then shown through a more empirical discussion of recent transformations in the composition and governance structure of GVC resulting from two interrelated processes: the tendency for a growing de-linking between innovation and manufacturing and the rise of highly concentrated global contractors. These phenomena have paradigmatically developed in the electronics industry, giving rise to the formation of the so-called *modular* or *turnkey* production networks. The discussion therefore focuses on that particular industrial sector.

Keywords: global value chains; electronics industry; Marx; law of value; capitalist competition

Introduction

Perhaps one of most salient features associated with the so-called globalisation process has been the increasing functional integration of spatially dispersed phases of the production and circulation of social wealth through novel inter-firm relations (Dicken 2003: 12). The intellectual response to this social phenomenon has been the proliferation of a plethora of theoretical approaches that see global networks or chains of firms as fundamental agents in shaping the dynamics and transformations of the world economy (Henderson et al. 2002: 448). Among

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them, the Global Value Chains (GVC) approach stands out as one of the most widely adopted perspectives for the study of the international organisation of industries, both by scholars across the social sciences and within international agencies and policy-making organisations (Gibbon et al. 2008).

In this context of growing popularity and nearly 15 years after the publication of the seminal work by Gary Gereffi and Miguel Korzeniewicz (1994) that laid the foundation stones of this approach (then under the Global Commodity Chains label), GVC analysts recently started to critically examine and debate many of the tensions, ambiguities and weaknesses of this framework for the study of global industries (Gibbon et al. 2008). Many of the criticisms aimed at challenging the overly simplistic nature of the original two-fold typology of governance forms put forward by Gereffi in his 1994 contribution – that is, the distinction between Buyer-Driven Commodity Chains (BDCC) and Producer-Driven Commodity Chains (PDCC) (Henderson et al. 2002; Raikes et al. 2000). Other authors have raised the need to bring into the picture the broader ‘institutional framework’ shaping the dynamics of GVC (Hess and Yeung 2006: 1196) for instance, by paying greater attention to the role of the state (Smith et al. 2002). Finally, some scholars have raised the issue of the relative neglect of labour as a social agent (Cumbers et al. 2008). All these critical points have been for the most part addressed and, to different extents, eventually incorporated in the more recent GVC literature. However there is one area that even proponents of this approach recognise as a kind of ‘black box’ for GVC research, namely, the comprehension of the determinations of the ‘creation’ and ‘capture’ of value along the chain (Gibbon et al. 2008).¹ As Marcus Taylor notes (2007: 8), it is striking for a theory whose explicit aim is ‘to understand where, how and by whom value is created and distributed along a commodity chain’ (Bair 2005: 157) that GVC research operates with a heavily under-theorised conception of the social processes regulating the generalised production and exchange of commodities, that is, with a very undeveloped ‘theory of value’.

A first aim of this article is to fill this gap. Drawing and elaborating further on theoretical arguments made elsewhere (Starosta 2010), I show that the Marxian ‘law of value’ can provide solid foundations for the comprehension of the constitution and dynamics of GVC. More concretely, the article offers an explanation of the social processes of ‘value creation and capture’ within a chain based on the system-wide motion of global capital accumulation. In this way, a firm connection is established between the *particular* dynamics internal to each industry and the *general* dynamics of the ‘system as a whole’, which is, precisely, where the greatest weakness of the GVC approach lies.

The usefulness of those general theoretical insights is then shown through a more empirical discussion of recent transformations in the composition and governance structure of GVC resulting from two interrelated processes. The first is, the tendency for a growing de-linking between innovation and manufacturing, with lead firms retaining the former productive activities in-house and outsourcing the latter function almost in its entirety to suppliers. The second is the transition away from more hierarchical governance forms comprising a network of small suppliers under the tightly-structured command of chain drivers, with the rise of highly concentrated global contractors, which has led to a partial shift of the

power asymmetry between brand-name firms and their suppliers. In other words, these transformations have entailed both specialisation (at the top end of the division of labour in the industry) and vertical re-integration along the rest of the supply chain (Lüthje 2002a: 233). Although these phenomena have been observed in a variety of industries, they have paradigmatically developed in the electronics industry, giving rise to the formation of the so-called modular or turn-key production networks (Sturgeon 2002). My discussion shall therefore focus on that particular industrial sector and attempts to uncover the general macro-dynamics and processes that are needed to explain those changes of particular industrial trajectories on the basis of the specific nature of the social relations of global capitalism.

The rise of giant contract manufacturers and the changing organisational and territorial dynamics of the electronics GVC

The electronics industry is at the heart of the current phase of capitalist development. It is clearly one of the most dynamic sectors driving world trade in the era of 'globalisation'. Its products dominate the rankings of increase in share of world trade since the mid-1980s, with the electronic and electrical goods accounting for 15 per cent of total world goods exports in 2002 (UNCTAD 2005). It is a very complex industry which manufactures a wide array of products revolving around computers and telecommunications, such as semiconductors, semiconductor manufacturing equipment, computer hardware, software, disk-drives and storage systems, networking equipment, simpler electronic components (for example capacitors), mobile telephone handsets, audio and video entertainment and so on. Beyond those quantitative manifestations, there seems to be a broad consensus among scholars on the qualitative centrality of this industry based on its strategic role as enhancer of productivity, competitiveness and long-term growth (Ernst 2002).

This centrality and dynamism of the electronics industry has its correlate at the level of industrial organisation as well. As Dieter Ernst notes (2002: 320), if until the early 1990s the automobile industry provided the role model with its shift from 'Fordist' to 'lean production', the last 15 years have seen the electronics industry become the breeding ground in novel forms of firm organisation and industry structure. More specifically, some of these changes in the organisation of the electronics value chain can be synthetically captured through the emergence of Electronics Contract Manufacturing (ECM) as the cornerstone of turn-key or modular production networks (Lüthje 2002a; Sturgeon 2002).

Unlike the traditional subcontractors' focus on labour-intensive assembly processes, these ECM companies provide brand-name firms with activities as varied as product engineering at the board and systems level, component design, process engineering, parts procurement, product fulfilment, logistics and distributions, and after-sales services and repair (Lüthje 2002a: 229). Moreover, they do not serve just or mainly one brand-name firm through a captive relationship but manufacture for many of them, and even from very different product markets, from personal computers and servers to communication equipment, industrial and automotive electronics, and space and aircraft electronics (Lüthje 2002a: 229). On this

basis, ECMs have rapidly grown into global giant corporations in their own right with production facilities dispersed worldwide (Sturgeon 2002: 432). Accordingly, the ‘balance of power’ between brand-name companies and contractors has become less uneven without, however, entirely eliminating the leadership of the former.

The development of electronics contract manufacturers is the other side of the outsourcing of an increasingly wider array of productive functions by brand-name electronics firms since the late 1980s. The latter have nonetheless retained overall leadership of the commodity chain by reasserting control over, and concentrating their efforts on, product definition, development and design. Thus, the emergence of turn-key production networks has led to both specialisation (at the top end of the division of labour in the industry) and vertical re-integration along the rest of the supply chain (Lüthje 2002a: 233). For brand-name companies, this governance structure has brought all the benefits of outsourcing associated with the riddance of the heavy costs and risks of the immobilisation of capital entailed by manufacturing but on a larger scale. But additionally, it has allowed them to have a greater focus on product innovation, thereby enhancing their capacity to respond to shortening product cycles and increasing product complexity in a context of fierce competition within the industry. For suppliers, the contrast with the situation in more ‘captive’ forms of governance is also very pronounced. Inasmuch as these global ECM companies tend to specialise on relatively generic base processes that cut across product categories and therefore enable horizontal integration along with attendant economies of scale and scope, these global suppliers have the possibility to offset at least part of the heavy burden of the manufacturing stage with the flexibility to shift production lines accompanying the changing rhythms of demand from their broader pool of customers (Sturgeon 2002: 466, 476). This is why these global suppliers manage to combine flexibility and speed (the attributes generally seen as residing in small firms) *with* large scale (Sturgeon 2002). The result has been a progressive decline of smaller regional contractors in the face of the rise of these global giant manufacturers that, moreover, have sometimes absorbed the former (Sturgeon 1998: 22). In this sense, it is remarkable that the rise of global ECMs has been closely associated with the progress of the automation process in electronics assembly; more specifically, in the phase of circuit-board assembly, which constitutes the core process of product level electronics manufacturing, also accounting for the bulk of its cost of production (Sturgeon 1998: 12–4). However the adoption of new assembly technologies involves outlays of capital and productive scales that are beyond the potentialities of smaller capitals (Sturgeon 1998: 16).

These organisational changes associated with the rise of giant global contractors in the electronics GVC have been coupled with spatial reconfigurations. Specifically, the rise of ECMs has given new impetus to the development of the international division of labour revolving around the geographical fragmentation of the different qualities of labour power. Although the origins of the latter can be traced back to the very first phases of the globalisation of the electronics industry (Henderson 1989), this form of the international division of labour has recently intensified through the renewed search for low-cost locations as a response to the electronic industry’s downturn of the early 2000s (Sturgeon 2003). As

discussed more extensively below, this social process has superimposed the formal mediations of citizenship, gender, race and ethnicity upon the material differentiations in the productive subjectivity of the diverse organs of the collective labourer of the industry.² On the one hand, unskilled direct production work continues to be dominated by young, female labour power (McKay 2006). On the other hand, most work requiring the more degraded productive attributes tends to be done by immigrants at home or relocated to low-cost locations.

Thus, modular production networks in the electronics industry have become spatially structured around a geographical pattern involving both dispersion and agglomeration (Sturgeon 2003), which reflects the embedding of the different kinds of worker in particular territorial locations, that is, their spatial and political fragmentation. In turn, this allows capital to accentuate the divergence in the conditions of reproduction of labour powers of heterogeneous qualities beyond that which simply reflects the relative complexity of productive attributes. The composition of the collective labourer of the electronics industry is therefore territorially organised roughly as follows (Lüthje 2002a). The most expanded forms of labour power in the value chain are located in the more dynamic national spaces of accumulation of the North (the US and the most powerful Western European countries), sometimes concentrated in specific regions that have turned into innovation hubs like Silicon Valley. They include, at the very top of the hierarchical composition of the collective labourer, the partial organ responsible for the fundamental research and Development R&D activities underlying conceptual and architectural product design and which is exploited by 'lead firms'. Also in those locations tends to be the next layer in the hierarchy of labour powers: the relatively complex forms exploited by ECMs at their new product introduction centres and those taking part in high-mix/low volume production processes (as well as their headquarters). Finally, the mass manufacturing of low-price, standardised products tends to be located in low-cost national territories such as Mexico, Eastern Europe (mainly Hungary), South East Asia (fundamentally Malaysia) and, more recently, Mainland China.³ The latter countries therefore tend to concentrate workers with the more degraded productive attributes in the value chain and are mainly exploited by ECMs.

The rest of the article proposes an alternative framework to cast light on these recent transformations of the electronics industry and is organised as follows. Firstly, I set out the more general conceptual tools needed to grasp the nature of GVC as a form taken by capitalist competition by examining how its dynamics can lead to a process of differentiation of individual capitals of the sort found in value chains. The article then examines the way in which those general dynamics underpin capital's organisational transformations associated with the formation of GVC and, more specifically, utilises those theoretical insights to examine the changing composition and forms of governance in the electronics industry associated with the development of so-called modular production networks. Subsequently, I address the underlying social processes impinging on the current forms of the international division of labour, in order to comprehend the general foundations of the spatial dimension of global value chains and how it interacts with organisational transformations. Finally, the electronics industry is shown to express in a

paradigmatic form the joint realisation of capital's organisational and spatial dynamics in the contemporary configuration of the world market.

Capitalist competition and the qualitative differentiation of individual capitals⁴

In order to understand the foundation of the 'chain' or 'network'-form characterising the organisation of GVC from the perspective of the Marxian critique of political economy, it is first necessary to establish the precise level of abstraction at which the phenomenon should be located. As Henry Bernstein and Liam Campling note (2006: 439), the main focus of value chain analysis lies in the realm of the relation between individual capitals. In particular, it is a relation among individual capitals that, although they belong to what is commonly referred to as the same 'industry' (for example, electronics), actually comprises different individual branches of the social division of labour, each of them producing a qualitatively different use value or useful product of labour. At the most general level, the relations that structure GVC are thereby those of cross-branch competition. In other words, GVC are predicated on the essentially *indirect* general social relation that regulates the establishment of the material unity of the social division of labour in capitalism. And yet, what makes up the peculiar character of GVC as a form of capitalist competition is that they seem to give those indirect social relations the form of their opposite, namely, relatively enduring *direct* social relations of 'explicit co-ordination' that mediate the complex material interdependency between particular branches of social production through the configuration of 'chains' or 'networks' of capitalist firms. They do this by establishing 'how financial, material, and human resources are allocated and flow within a chain' (Gereffi 1994: 97). A further peculiarity of GVC is that those forms of 'explicit co-ordination' involve power asymmetries of different degrees between the varied agents involved in them, which, in turn, redound in different profitability for each of the participants (Gereffi 2001: 1620). The intellectual challenge is thereby to comprehend this differentiation of the valorisation capacities of individual capitals (that is, their profitability) as the result of the general nature and dynamics of capitalist competition itself.

In volume 3 of *Capital Marx* develops the social processes regulating inter-branch competitive relations through his discussion of the formation of the general rate of profit and the 'transformation of values into prices of production'.⁵ The problem is, however, that Marx's argument in those pages seems to provide the contemporary reader with no elements for the comprehension of the cross-branch hierarchical relations between individual capitals of differential profitability and power characterising GVC. In effect, as Marx argues, the *formation* of the *general* rate of profit takes the concrete form of a tendential *equalisation* of *average* rates of profit across the different branches of the social division of labour. And yet, several pages later, more precisely in the context of discussion of the genesis of capitalist ground-rent, Marx hints at a social phenomenon that can shed light on the nature of GVC (Marx 1981: 940ff). Specifically, when he is discussing the peculiarities of small-scale peasant ownership, Marx unfolds

the category of ‘small capital’ and shows that its valorisation is not regulated in the same form as normal capitals. What Marx effectively offers in those pages is the basic elements to conceptualise the qualitative differentiation between normal and small capitals which, as shown below, will prove of paramount importance for an alternative explanation of the constitution and transformative dynamics GVCs. Now, whilst Marx only develops those arguments in the specific context of agrarian capital (that is, industrial capital valorised in agriculture), the work of Juan Iñigo Carrera (2003) insightfully shows that their applicability is broader and can actually be generalised to industrial capital as a whole. Moreover, he draws additional implications from the reproduction of small capitals which, I believe, cast further light on GVC.

As Iñigo Carrera argues, normal capitals are defined by Marx as those that reach the specific magnitude ‘[that] is required in each line of business to produce commodities at their price of production’ (Marx 1981: 843). In other words, these are the individual capitals that have the concentration needed to set into motion the socially normal methods of production and that therefore *actively* participate in the formation of the general rate of profit. Small capitals, however, do not reach that scale and are therefore unable to take direct part in the tendential equalisation of the rate of profit at the normal general level. By contrast, their rate of valorisation in non-agricultural branches of production is usually regulated by the rate of interest (generally lower than the normal rate of profit) that those capitals of restricted magnitude could yield if they closed down business and were turned into interest-bearing capitals (Iñigo Carrera 2003: 124). Accordingly, this rate of valorisation will vary with the specific concrete magnitude of different small capitals, since the aforementioned rate of interest will vary in each case.

This means that although these capitals do not have the scale to keep up with the development of the productivity of social labour required to survive the competitive battle, they nonetheless have the chance to extend their agony by compensating their higher production costs with their lower rate of profit. The limit to the survival of small capitals is thereby given by the extent to which the price regulating their valorisation (determined by the cost price of their inputs plus the interest rate on the liquidation value of their respective assets) manages not to rise above the price of production regulating the valorisation of normal capitals. What is more, if the price that regulates the valorisation of small capitals is actually lower than the normal price of production that regulates the valorisation of normal or average capitals, the latter become effectively excluded from those branches of production. This is what explains the resilience and even dominance of small capitals in particular branches of production despite the general tendency for the concentration and centralisation of capital that characterises the capitalistic accumulation process.

The reproduction of small capitals has another implication which is crucial for the comprehension of the formation of value chains: the release of surplus-value by small capitals (Iñigo Carrera 2003: 126ff). If concrete circumstances are such that small capitals manage to sell their commodity at a price that stands above the one determined by their specific rate of valorisation but below the price of production of normal capitals, then a potential surplus profit emerges. However, although this surplus profit is borne by the commodities produced by small

capitals, their competition over that extraordinary mass of abstract social wealth eventually leads them to expand production and drives their prices down to a level determined by their specific rate of valorisation. Does this mean that the surplus profit vanishes into thin air? Certainly not. Although it slips through the fingers of small capitals, it ends up in the hands of some of the normal capitals that operate in directly neighbouring branches of the division of labour and with which they relate in the sphere of circulation. Assuming, for the sake of argument, that small capitals are suppliers of inputs for those normal capitals, the latter will benefit from a permanent flow of extra surplus value derived from the purchase of inputs at prices below their normal price of production whilst selling their own commodities at their full price of production. In turn, this means that those successful normal capitals that end up monopolising the market relation with small suppliers, will systematically obtain a higher than normal rate of profit. I shall term these ‘enhanced normal capitals’.

In brief, a stratification of individual capitals with differential valorisation powers emerges out of the immanent dynamics of competition that mediate the indirect establishment of the unity of social production through the exchange of commodities. Two important points should be emphasised in this regard. First, this is not simply a short-term phenomenon but can reproduce itself over relatively long periods of time. Still, this differentiation cannot persist indefinitely, as the aforementioned objective limits to the reproduction of small capitals are reached.

Secondly, this process of differentiation does not constitute, as theories of ‘Monopoly Capital’ would have it, the transcendence of the formation of a general rate of profit as the fundamental law governing the competition between individual capitals.⁶ Rather, it involves a further mediating instance in the realisation of that very same law. The realisation of the identity of individual capitals as ‘equally valorised values’ (hence the tendency for the equalisation of their individual profit rates) (Iñigo Carrera 1995), is further developed in the form of its opposite, that is, through the sustained inequality of their valorisation capacities predicated on the extended reproduction of small capitals. In this sense, the differentiation of individual capitals is a more mediated form in which they assert their class unity as particular organs of the concrete subject of the accumulation process (and hence of the exploitation of the collective labourer as a whole): what Marx termed the total social capital (Marx 1981: 297). This means that although the establishment of the concrete rate of profit of each capital in a ‘value chain’ is mediated by their respective exercise of power in the sphere of circulation (thereby *appearing* as the immediate outcome of those unequal market relations), it is in reality strictly and objectively determined in accordance to the macro dynamics of capital accumulation as whole. Power asymmetries are not the cause but an expression of profit rate differentials.

In my view, the dynamics of this process of differentiation of individual capitals can help elucidate the essential nature of GVC. The next section elaborates on this claim by firstly re-conceptualising the organisational dimension of GVC in general in order to subsequently analyse the recent transformations of the electronics industry in that light.

The changing organisational forms of capitalist competition and the constitution and transformation of GVC

Succinctly put, GVC can be seen as the social form through which certain normal capitals appropriate the surplus value released by small capitals in the sphere of circulation. The formation of commodity chains is therefore the form taken by the competition among normal capitals over the extra surplus value that escapes the hands of small capitals. The deeper immanent purpose and prime-mover of the outsourcing of manufacturing is therefore the multiplication of the sources of extra surplus value released by small capitals in the sphere of circulation (Iñigo Carrera 2003, p. 131), as particular functions of the social division of labour that were formerly done ‘in-house’ and thereby actively participated in the tendential equalisation of the rate of profit at the general level, are now carried out outside the immediate reach of that social process.

The imposition of strict conditions for chain membership (for example, the fixing of low prices for the suppliers’ output) is the concrete form that mediates this transfer of surplus value from small to normal capitals. The same could be said of ‘organisational flexibility’ which, as Raikes et al. (2008: 396) highlight, is flexibility *for the key agent in the chain*. From the perspective of the organic unity between the production and circulation of capital, ‘organisational flexibility’ actually entails the optimisation of the overall turnover structure of normal capitals at the expense of higher circulation costs or turnover times for other capitals in the chain (through, for instance, accumulation of inventories or unfavourable conditions of commercial credit) (see Smith 1998). More generally, the transfer of surplus value in the chain will always be mediated through the establishment of determinate conditions of turnover or rotation for each participating capital, since it is out of the whole cycle of valorisation (that is, production plus circulation) that their respective concrete annual rate of profit emerges (Iñigo Carrera 1998).

The above explanation concerns the simpler dimensions of this phenomenon and therefore bears mainly on the early constitution of GVC. Thus, Stefano Ponte and Peter Gibbon (2005, p. 4) have perceptively observed, against the argument that outsourcing does not only include ‘low-profit’ functions and entail ‘captive’ or subordinate positions for suppliers (Sturgeon 2002), that the upgrading of externalised segments is a later phenomenon reflecting subsequent technological changes and opportunities for scale economies (see below). At the very moment of outsourcing, those functions were indeed ‘low-profit’. This should come as no surprise given the original inner purpose of outsourcing by ‘lead firms’ commented just above.

The *general* nature of both the composition and governance structure of GVCs also follows from the differentiation of industrial capitals outlined above. Thus, although varying in its specifics with the particularities of each GVC, it seems reasonable to suggest that all commodity chains generally comprise at least three qualitatively different kinds of capitals: enhanced normal capitals, normal capitals and small capitals. The peculiarities of the governance structure will surely vary according to the composition of the chain, which can only be captured through detailed empirical research.⁷ Whilst stricter relations of

command/subordination will tend to prevail in nodes where exchange relations between normal and small capitals dominate, more 'horizontal' relations will tend to prevail among normal capitals and, to some extent, also between enhanced normal capitals and normal capitals. The simple reason for this is that more pronounced hierarchical relations are more likely to be the concrete mediating form involved in the appropriation of an extraordinary surplus value freed up by small capitals. In all cases, however, those varied *direct* social relations of command or co-operation remain forms taken by what essentially are *indirect* relations of competition through which the general articulation of privately undertaken social production takes place.

With these conceptual elements in mind, we can now re-examine the meaning and significance of the recent organisational transformations of the electronics value chain. In a nutshell, this alternative approach suggests that the concrete organisational evolution of the electronics industry reported earlier on must be seen as an expression of the unfolding of the process of differentiation of individual capitals and its limits discussed in section three. On the one hand, we have seen that it is the tendency for the concentration and centralisation of capital springing from the accumulation of the total social capital that ultimately undermines the competitive edge of small capitals. This it does by increasing the productivity of labour of normal capitals to the point where their price of production sinks below the price that regulates the valorisation of small capitals. On the other hand, in light of the particular attributes of ECMs described by the literature summarised in section two, it seems reasonable to consider those contractors as normal capitals that have eventually managed to enter into (or, rather, grow within) branches of production formerly dominated by small capitals.⁸ Those are the general economic processes that account for the initial tendency for a fragmentation of the supply base into a mass of small capitals and its subsequent consolidation through the emergence of giant global contract manufacturers.

As mentioned above, this concentration of capital at the level of contract manufacturers have reconfigured the power relations and modes of governance in the electronics GVC. In effect, although these dynamics have taken shape through a decrease of power asymmetries, turnkey contractors nonetheless remain in a relatively subordinate position vis-à-vis brand-name firms. How does one explain this re-composition of the particular direct social relations prevailing within the value chain on the basis of the general motion of the accumulation capital as a whole?

Some elements for an answer can be found in the arguments against the notion of modular production networks put forward by the 'systems integration' literature (Brusoni and Prencipe 2001). These authors have objected to the 'strong' notion of modularity implicit in the work of GVC scholars like Timothy Sturgeon on the grounds that the organisational fragmentation of innovation and manufacturing cannot be as 'de-coupled' and 'horizontal' as the latter tends to assume. The argument is that lead firms 'know more than they actually do', that is, they retain a broader and broadening knowledge base than what they concretely need to perform their particular special function in the division of labour within a chain, namely, conceptual product design and definition. Even when product design firms outsource all manufacture, they nonetheless maintain technological

capabilities in most aspect of their value chain (including process technologies and component production). The reason for this is that this broader ‘knowledge base’ is required for lead firms to act as ‘systems integrators’, that is, to undertake the necessary overall conscious co-ordination of the deeper material or technological interdependencies along a chain emerging from modular product architectures and the possibilities of separation of design and manufacture that they entail (both statically within each product architecture, and dynamically, in terms of changes in the overall product architecture itself). According to these scholars, it is this technological need for systems integration that ultimately constitutes the material foundation of the persisting authority of lead firms over the governance of the value chain as a whole (Brusoni 2003: 14).

This systems integration approach provides very interesting insights on the technological limits to modularity by emphasising the continuous need for an element of conscious organisation of the social division of labour within value chains, in spite (or rather, because) of the undeniable trend towards the vertical disintegration of design and manufacture. However, as happens more generally with the evolutionist/neo-Schumpeterian tradition of which these authors are part, this research is one-sidedly focused on the material or technological dimension of capitalist production and overlooks its specific social form, namely, the subordination of the production of useful things or use values to the production of surplus value (Smith 2004: 220–6). From a Marxian perspective, then, all those technical-organisational processes must be grasped in their contradictory unity with the value processes that shape the dynamics of capitalism (Gough 1996: 2067).

In this sense, the resilience of authority relations in modular production networks beyond what GVC analysts recognise is not simply predicated on the technical/material necessity of overall systems integration. Direct command by brand-name firms persists also because of the irreducibly antagonistic social relations between private producers on which modular networks are based, even if they entail a limited socialisation of production cutting across formally autonomous individual capitals (Gough 1996: 1072–3). This general nature of inter-firm relations acquires a peculiarly intensified expression due to the virtually total vertical disintegration between product development and manufacturing. Specifically, the lead firms’ invested and valorised capital can only exist materialised in commodities which are the outcome of the manufacturing activity, and hence the immediate possession, of ECMs. Similarly to the capitalist’s need to ensure through her command in the direct process of production that the worker does not expend more than socially necessary labour-time during the working day (Marx 1976: 303), brand-name firms need to ensure that the outsourcing of manufacture to ECMs does not compromise the completion of the turnover circuit of their own capital in at least the socially normal time and conditions for the respective branch of production. *Pace* Sturgeon (2002: 484–5), the pressures of competition from other ECMs do not suffice as a disciplining mechanism for this purpose; too much is at stake from the point of view of the valorisation of capital of brand-name firms to manage the relation with contractors simply through ‘arms’-length’ exchanges.

The function of brand-name firms as systems integrators also impinges on the concrete forms taken by the formation of the general rate of profit through which the all individual capitals assert their unity as organs of the total social capital. In the first place, it is to be noted that the organisational separation of product design and manufacture is premised on technological innovations by brand-name firms themselves that make it materially feasible to 'codify' and transmit more easily objectified design knowledge, so that it can be passed over more smoothly and cheaply from designer to producer (e.g. the use of simulation technology and modelling in Computer Aided Design and, more generally, the use of Information and Communication Technologies to transfer digitised information and to instantly monitor subsequent production) (Pavitt 2003: 84). These material pre-requisites for outsourcing do not fall from the sky but are the result of the competitive strategies of brand-name firms. As Stefano Brusoni graphically puts it, 'the division of labour can indeed be modular, but only once someone has made it so' (Brusoni 2003: 14). The fundamental active agent in this regard is the brand-name firm searching for cost reductions vis-à-vis its competitors by benefiting from the multiplication of economies of scale by contractors that have become normal capitals specialised in manufacturing services.⁹ This means that the very constitution of modular production networks through outsourcing to ECMs must be seen as a concrete form taken by the production of temporary surplus profits from innovations by brand-name firms through the general mechanisms described by Marx, that is, by allowing early innovators to sell at individual prices that stand below the socially general ones ('prices of production') until the innovation becomes universal and the surplus profit is eroded (Marx 1976: 433–5; Marx 1981: 338). The renewed outsourcing of ever increasing additional functions by brand-name firms recreates the generation of a surplus profit. In this way, the socially necessary labour for the reproduction of the class of wage-labourers indirectly diminishes and relative surplus value is produced by capital as a whole. This role of the technical and organisational innovations associated with modular production networks as a source of surplus profits for certain individual capitals (and hence of relative surplus value for the total social capital) provides further objective social foundations for the persisting dominance of brand-name firms in the governance of value chains.

This reproduction of the leadership of brand-name firms in GVC also bears on the question of the appropriation of the surplus value released by small capitals in the sphere of circulation. As we mention below, the rise of ECMs has not led to the total elimination of small capitals in the value chain; the latter remain in the branches of the industry that produce the still necessary simpler components. However, precisely part of the 'full service' approach to outsourcing of manufacturing emphasised by GVC analysts like Sturgeon is the overtaking of component purchase by ECMs (vis-à-vis prior 'consignment' arrangements) (Sturgeon 2002: 462). This means that, in their condition as normal capitals, ECMs would be in a position to control to their own benefit the direct relationships with small component suppliers in the sphere of circulation that necessarily mediate the said transfer of surplus value. However, riding on the objective social power derived from their role as 'systems integrators', brand-name firms will most likely maintain their 'entitlement' to the surplus profit freed by the remaining small capitals in

the chain even though they are no longer the individual normal capitals with whom the latter directly relate in circulation. Interestingly, Sturgeon reports that even though the capital needed to procure parts and components is advanced by ECMs themselves, they do not have full autonomy in the management of its circulation; brand-name firms closely monitor this process by requiring that contractors present them with a 'bill of materials' on which the latter are practically unable to add any mark-up (Sturgeon 1998: 7–8). This seems to be one of the concrete forms in which brand-name firms maintain the appropriation of the surplus value flowing out of the remaining small capitals despite the outsourcing of component procurement. In this way, they reassert their qualitative condition as enhanced normal capitals in their respective value chains.

As we can see, a sound comprehension of the changing organisational dynamics of value chains (including the transformations of power asymmetries) requires a solid grasp of the specific nature of capitalist social relations and ways in which they articulate the general motion of the capitalist economy as a whole. In the next section, I reinforce this point by looking at the other constitutive dimension of value chains, namely, their global character.

GVC and capital's reconfiguration of the modalities of the international division of labour

Implicit in the notion of 'chain driver' or 'lead firm' put forward by GVC analysts is a conception that raises certain *individual capitals* (usually transnational corporations (TNCs)) to the status of concrete subjects of the process of accumulation within each value chain. As Dick Bryan critically notes (1995: 34–5), this representation of certain global firms as the agents whose conscious strategies and actions actually determine the movement of the world market is rather widespread within the social science debates on globalisation, mainly in its critical versions and including certain traditions of Marxism as well (cf. Robinson 2004; Sklair 2001). The GVC literature and related 'network' approaches are quite expressive of this. Thus, in their appraisal of the current state of the art of the GVC, Gibbon et al. state that very idea of governance rests on the assumption that the processes leading to the constitution of GVC 'are initiated and institutionalized in particular forms as a result of strategizing and decision-making by particular actors, usually large firms that manage to access final markets in developed countries and, increasingly, emerging economies' (Gibbon et al. 2008: 319).

Now, the critical point to make against this view is not, simply to highlight the need to bring the nation-state back into the picture (Smith et al. 2002), as if it were another (relatively?) autonomous subject in its own right that puts external limits to the actions of 'lead firms' – by, for instance, setting the 'institutional context' in which they operate (Bair and Dussel Peters 2006) – so that the contours of the world market are then seen as determined by the interaction of these two externally-related institutions. As Peter Burnham (1994: 226ff) puts it in his critique of 'vulgar international political economy', the 'market' (or one could add, 'lead firms' or TNCs as the most powerful 'market actors') and the 'state' are not self-subsistent and opposing entities but differentiated forms taken by the capital relation.

Indeed, one of the most potent scientific discoveries of Marx's critique of political economy was that capital is neither a thing (for example, the instruments of production), nor productive unit or legal entity (that is, a firm), nor a social grouping sharing common characteristics and interests ('business elites'). In its general determination as self-valorising value, capital is actually a *materialised* social relation between commodity owners differentiated into social classes, and which, in its developed form as total social capital, becomes inverted into the very (alienated) subject of the process of social reproduction in its unity (Marx 1976: 763). Thus, capital is essentially the formally boundless movement of self-expansion of the objectified general social relation between private and independent human beings which, in its own process, produces and reproduces the latter as members of antagonistic social classes (Marx 1976: 251–7; Marx 1978: 185).

Moreover, as an expression of this inherently self-expansive nature, this fetishised social relation is global in content or substance and national only in form (Iñigo Carrera 2003: 134; Marx 1973: 227–8). This means that it is 'the self-valorisation of value' on a global scale, or accumulation on the level of 'total social capital', that constitutes the immanent end in the world market (Smith 2006: 193). The territorial or spatial dimension of GVC – and so the changing forms of the worldwide division of labour – therefore cannot be seen as determined by the locational strategies of lead firms faced with given qualitative national and regional differences, in turn seen as established by allegedly autonomous state policies. Instead, it needs to be grasped as an expression of the underlying formal and material unity of the essentially global contradictory dynamics accumulation of the total social capital, which are economically mediated by relations of competition among individual capitals (again, as opposed to *determined*), on the one hand, and politically mediated by the policies of the nation-state on the other (Clarke 2001). As Burnham (1994) states against traditional Marxist theories of the global political economy, the immanent content of these global dynamics is not one of imperialism or dependency (that is, a direct political relation between states, another mediating form), but those of the production of (relative) surplus-value on a world scale (Howe 1981). In other words, the spatial dimension of GVC must be searched in the changing forms of the exploitation of the global working class by the total social capital through the transformation of the material forms of the capitalist production process. These dynamics, which fundamentally entail the permanent revolution in the modes of exertion of the labour power of individual workers and of their articulation as a directly collective productive body (Marx 1976: 617), lie at the heart of the contemporary forms of the international division of labour. Succinctly put, these modalities are fundamentally based on the international fragmentation of the productive subjectivity of the working class (Iñigo Carrera 2003).

In effect, as an expression of the recent transformations in the capitalist labour process associated with the computerisation and robotisation of large-scale industry and the revolution in the means of communication and transport, capital has been increasingly able spatially to disperse the different phases of the labour process across the globe whilst maintaining their organic material unity. In light of our comments above, this evidently does not mean that the concrete agents

driving this transformation have exclusively been TNCs, as many critics of the so-called New International Division of Labour (NIDL) thesis have unfairly charged against it (cf. Fagan and Webber 1999). The geographical relocation of the valorisation of capital based on the exploitation of relatively cheap and compliant labour power might as well take place through the development of competitive 'national' capitals in the so-called 'periphery' or 'semi-periphery'. Moreover, these global transformations have been mediated by the policies of nation-states and the struggles of workers (Taylor 2007). In this sense, TNCs, 'national' capitals from the 'periphery', states and workers' agency have certainly been different active forces whose actions have personified the unfolding of the underlying determinations of these global transformations. However, this is the fundamental point that needs to be emphasised, none of them has actually been the concrete subject whose (alienated) inner 'laws of motion' have determined, and hence given overall unity to, their emergence and subsequent development, namely, the total social capital. Thus, out of all those different antagonistic social actions, but 'behind the back' of the diverse agents involved, a reduction of socially necessary labour-time for the reproduction of class of wage labourers as a whole results and, as a consequence, relative surplus value is produced on a world scale. This is the general content that is realised in the form of state policies, inter-capitalist competition and class conflict, and which underpins the changing forms of the international division of labour.¹⁰

This social process historically started with the relocation of simple manual labour processes while concentrating its increasingly more complex parts in the more dynamic spaces of capital accumulation. This is the particular manifestation of the NIDL that Fröbel and his colleagues rightly (though one-sidedly) captured in the late 1970s without being able to uncover its general content (Fröbel et al. 1980). However, subsequent historical developments revealed that those simple original forms of the NIDL have evolved into a more complex constellation, whereby capital searches worldwide for the most profitable combinations of relative cost and qualities/disciplines resulting from the variegated past histories of the different national fragments of the working class (through their impact upon their general conditions of reproduction and condensed in the so-called 'historical component' of the value of labour power). Each country therefore tends to concentrate a certain type of labour power of distinctive 'material and moral' productive attributes of a determinate complexity, which are spatially dispersed but collectively exploited by capital in the least costly possible manner.¹¹ In this context of exacerbated competition among wage workers, capital can therefore economise on the overall capital advanced for the total wage bill (since, as discussed below, this formal fragmentation allows it to undermine the conditions that could lead to a certain universality and homogeneity in the forms of reproduction of the different organs of the collective labourer), lengthen total working hours and increase the average intensity of labour, therefore benefiting from the 'institutional diversity' produced by the nationally mediated historical constitution of the quality of productive subjectivity of each partial organ of the global collective labourer.

The significance of the above transformations of the international division of labour for the comprehension of the inner determinations of GVC should be

obvious. For it is clear that the formation of GVC not only expresses the formal differentiation of capital into individual capitals of stratified valorisation capacities; in addition, they mediate the international fragmentation of the productive subjectivity of the collective labourer of large-scale industry.

The electronics GVC as the joint expression of capital's latest organisational and spatial transformations

In effect, the social processes described above have arguably been at the heart of the recent mutations of the electronics value chain through the emergence of modular production networks. In formally fragmenting the functional extraction of surplus value from the different organs of the collective labourer through the organisational de-coupling of design and manufacturing, the latter facilitates the exacerbation of the differentiation of the conditions of reproduction of labour powers of heterogeneous complexity. Whilst brand-name firms tend to concentrate mainly on the exploitation of the most expanded forms of productive subjectivity needed for fundamental R&D productive activities, ECMs tend to exploit the part of the collective labourer of less complex productive attributes. Although the latter do employ a number of engineers, technicians, administrative staff and so on, that might embody a labour power of considerable complexity (but still, on average, of less complexity than the kind of labour power employed by brand-name firms), the proportionally larger mass of their workforce is composed of workers bearing the degraded kind of labour power that acts as an appendage of a system of machinery in highly automated labour processes or, worse, that performs detailed manual tasks in whatever phases of direct production remain that are still subject to what Marx termed a manufacturing division of labour. Through this organisational fragmentation of the production process, capital undermines one of the material bases for the political unity of those two different organs of the collective labourer in the struggle over the value of labour power: the fact of being exploited by the same individual capital. In this way, capital economises on the total variable capital advanced by widening the differentiation between the value of the more expanded and more degraded kinds of labour power. The latter becomes simply determined at a level that reflects – at best – the reproduction of those immediate productive attributes needed to be employed as an appendage of the machine or a detail labourer (Iñigo Carrera 2003: 73). By contrast, in situations where the two kinds of productive subjectivity are exploited under the same ‘juridical roof’ (that is, the same firm), less skilled workers are in a better position to force capital to provide a certain degree of universality in the conditions of reproduction of the collective labourer as a whole.

Thus, Sturgeon reports how ‘production workers at lead firms typically enjoy benefit packages and, to some degree, wages that are set by higher paid employees at the firm’ (Sturgeon 2003: 214). This situation changes when production jobs are outsourced; workers employed by contractors tend to earn lower wages and receive inferior benefits (Sturgeon 2003: 124). But this is not the only difference. A large part of the workforce of ECMs is not directly hired by the latter as regular employees but as temporary workers through the mediation of employment

agencies (Sproll 2003). These workers are subject to highly 'flexible' forms of employment and extremely harsh pay and working conditions.

This increased differentiation of the conditions of exploitation and reproduction of the working class is further facilitated by the global character of these giant contractors. The latter take full advantage of the international division of labour revolving around the international fragmentation of the productive subjectivity of the global proletariat. Thus, they locate the exploitation of these diverse kinds of labour power in national spaces where they can find all the necessary material attributes required by each particular phase of the production processes, but with more compliant workers on whom they can impose those harsher working conditions associated with flexible contracts.

For instance, in Guadalajara (Mexico) the use of successive short-term contracts for several years is common practice, even though it is actually banned by national legislation (CAFOD 2004: 26). This additionally has an impact on benefits and social security payments since many of them are dependent on continuous length of service (CAFOD 2004: 28). Wages are so low that most workers have to forego holidays in order to meet basic needs. In China, workers must work an illegal number of hours of overtime in order to earn the minimum wage, which results in working days of up to 15 or 16 hours a day in poor health and safety conditions that include unprotected exposure to harmful chemicals or smoke (CAFOD 2004: 32–3). In Thailand, sub-contracted workers earn a minimum wage which does not cover the household expenses on food and housing (CAFOD 2004: 30). More broadly, workers in the electronics industry in general, and the workforce of ECMs in particular, experience very low average degrees of unionisation, albeit with pronounced national unevenness (Steiert 2005) – for instance, German and Swedish plants with stronger role for unions than in the US (Lüthje 2002a: 234–5). These examples seem to suggest that capital in the electronics industry does not only force the value of simpler forms of labour power down to what is strictly necessary for the daily reconstitution of the most elementary physical productive attributes of workers. In addition, it is without a doubt managing to pay these workers well below the value of their labour power, that is, below what is needed to secure the longer-term reproduction of productive subjectivity in an 'exploitable' shape throughout the workers' lifetime.

The role of the differentiation of individual capitals in accentuating the fragmentation of the conditions of reproduction of workers is not restricted to that between 'flagship firms' specialised in product design and development, and global contractors. The presence of small capitals in the value chain plays its part as well. Although this industrial sector has experienced an accelerated and pronounced process of concentration and centralisation of capital at the level of manufacturing, small capitals still subsist in the production of less complex components (for example, transistors, capacitors and so on) and of non-electronic parts (for example, precision metal parts and sheet metal manufacturing) (CAFOD 2004: 10; Lüthje 2002b: 11). As Iñigo Carrera points out, the precarious situation in which these capitals operate makes them generally prone to the most ruthless exploitation of the workers they employ (2003: 131). Indeed, even in contemporary Silicon Valley many of these lower-end component manufacturers are still characterised by sweatshop-type working conditions and very low wages (Lüthje 2002b: 15).

In sum, the electronics GVC provides perhaps one of the most striking examples of the unfolding of capital's organisational and spatial dynamics to their plenitude. These are not two externally related dimensions of the value chain. Each determination actually reinforces the other: the differentiation between capitals can be spatially mediated, thereby acting as a further mediation of the formal fragmentation of different kinds of productive subjectivity. Capital has turned this industrial sector into a veritable 'social laboratory', experimenting with all possible mediators in the process of differentiation of the working class – stratification of capital, citizenship, ethnicity, gender – that lies at the heart of the contemporary forms of global production of relative surplus value.

Conclusion

This article has examined the novel phenomenon of GVC in the light of the Marxian critique of political economy. It has shown that the latter approach can provide firmer foundations for the comprehension of the nature and dynamics of GVC. On the one hand, this perspective offers a more rigorous understanding of the determinations of 'value capture' in particular chains grounded on the specific social form of capitalist production, thereby addressing one of the theoretical gaps which GVC analysts themselves have identified as a persisting weakness of their own framework. On the other hand, the paper developed an alternative framework that allows us to connect the industry-specific trajectories of GVC with the macro-dynamics of global capitalism as a whole. As the more empirical discussion of the electronics GVC made clear, this is the only way to grasp the essential meaning and significance of those transformative dynamics and thereby assess both their potentialities and limits on the basis of objective general social foundations. My critical examination of the changed relations between brand-name firms and their global supply base has hopefully made this case.

More broadly, this latter point resonates with the concerns of some critical GVC scholars such as Jennifer Bair (2005), who point to the need to trace the changing configurations of value chains back to the 'systemic processes' that underpin the 'structural transformation in the global economy'. In this article I have taken up the challenge and provided a particular way of addressing those systemic processes by understanding GVC as the synthetic unity of capital's organisational and spatial transformations. In turn, these have been shown to be but two dimensions of the fundamental 'systemic' process defining the essence of the capitalist world market: the subsumption of the productive powers of the global collective labourer to the autonomised movement of the alienated product of their social labour. Such is the fundamental content of the self-expansion of capital on a world scale.

Notes

1. The notion of value-added, widely used in the GVC literature, is not explanatory but of a fundamentally descriptive/heuristic nature (Kaplinsky 2000) and, one could add, quite flawed when deployed as a substitute for the rate of profit as an indicator of the accumulation capacity of individual capitals (Starosta 2010).

2. The productive attributes of workers include the strictly material or technical dimension of labour power required by the particularity and complexity of the productive functions to be performed, as well as its 'moral' attributes (that is, the general forms consciousness and self-understandings that make those workers suitable for the specific forms of discipline that a certain organisation of the capitalist labour process entails). The term 'productive subjectivity' captures this two-fold dimension of labour power.
3. ECMs have kept some mass production facilities in the US located in the southern and south western states, which are precisely those characterised by low union presence (Steiert 2005).
4. The next two sections partly draw on arguments more fully developed Starosta (2010).
5. Prices of production of commodities can be resolved into cost prices (the cost of 'inputs' – labour power and means of production, including the depreciation of fixed capital), plus the normal profits of capital (the general rate of profit on the *total* capital advanced for its production). See Marx (1981: 257–8).
6. Although this is rarely noted by contemporary commentators, the very origins of the GVC approach can actually be traced back to the intellectual lineage of Monopoly Capital theory. Indeed, the World-System paradigm from within which the GVC developed (then under the label Global Commodity Chain or GCC) agreed with most of the essential tenets of the Monopoly Capital tradition (Hopkins 1977). The founding contributions to the GCC approach thus were variations on the themes of Monopoly Capital theory, albeit refashioned for a globally-dispersed but functionally-integrated hierarchical network of firms (see, for instance, Gereffi et al. 1994: 2; Hopkins and Wallerstein 1994: 18).
7. However, as Gough notes (2003, p. 25), those particularities must not be seen as an irreducible and self-subsistent singularity that escapes determination by the general motion of the social forms of capitalist production. Instead, they must be grasped as different possibilities grounded in the fundamental processes of capitalist economies. For more extensive methodological reflections on the connection between the general and the particular in the study of GVC, see Starosta (2010).
8. A more conclusive typology would need to be based on a rigorous quantitative measurement of the concrete annual rate of profit of each of the capitals in the chain (Starosta 2010).
9. In stricter Marxian terms, this depends on the extent to which the individual price of production of first-mover outsourcing firms sinks below a normal price of production still regulated by manufacturing in-house. In turn, this would be the outcome of the interaction between two major factors: the impact of outsourcing on 'cost price' and, on the other hand, its effect on the capital advanced (both on its magnitude and on its turnover time).
10. Furthermore, it is also clear that the relocation of the valorisation process is not the only concrete form taken by the politically mediated fragmentation of the productive subjectivity of the global collective labourer. As many scholars have noted, politically managed international migration of workers can do the job as well (Phillips 2009).
11. However, this different constellation does not involve the *transcendence* of the NIDL, but represents a more complex form assumed by the same general content.

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