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Articles

GLOBAL VALUE CHAINS AND NATIONAL INNOVATION SYSTEMS: A STRAINED INTEGRATION

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ABSTRACT: This study explores the recent attempts to integrate global value chain (GVC) and national innovation system (NIS) frameworks and the extent to which it might be unachievable coherently. These recent integration attempts disregard the tension between the organizational boundaries of multinational corporations (MNC) and the national space – as a *locus* of learning and generation of technologies – in two ways. First, the GVC approach assimilates microeconomic upgrading to learning and innovation, which might fail to account for systemic learning processes and structural competitiveness. Second, the GVC approach assimilates production to capital circulation, which is consistent with the logic that dominates the expansion of MNCs during financialization, which is more oriented to appropriation than to the international deployment of technology. We resort to Marx's decomposition of production and circulation processes to assess

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different internationalisation processes: trade internationalisation, productive internationalisation, and financial internationalisation. This analysis provides some insights to understand the limits of both approaches and the integration attempts to cope with the actual process of internationalization of production.

KEYWORDS: innovation systems; global value chains; economic development; multinational corporations' strategies; international division of labour.

JEL CODES: L23; F19; F23; F63; O00; O33.

CADEIAS GLOBAIS DE VALOR E SISTEMAS NACIONAIS DE INOVAÇÃO: UMA INTEGRAÇÃO TENSA

RESUMO: Neste artigo, exploramos as recentes tentativas de integrar as Cadeias Globais de Valor (CGV) e os Sistemas Nacionais de Inovação (SNI) a um nível teórico, e até que ponto isso poderia não ser alcançado de forma coerente. Estas recentes tentativas desconsideram a tensão entre as fronteiras organizacionais das empresas multinacionais (EMN) e o espaço nacional – como lugar de aprendizagem e de geração de tecnologias – de duas maneiras. Primeiro, a perspectiva das CGV assimila a atualização microeconômica ao aprendizado e à inovação, o que pode não ser suficiente para explicar os processos de aprendizado sistêmico e a competitividade estrutural. Segundo, a abordagem das GVC assimila a produção à circulação de capital, o que é consistente com a lógica que domina a expansão das EMNs durante a financeirização, mais orientada à apropriação do que à implantação internacional da tecnologia. Recorremos à análise de decomposição de Marx do processo de produção e circulação para identificar diferentes processos de internacionalização: internacionalização comercial, internacionalização produtiva e internacionalização financeira. Esta análise fornece alguns elementos para compreender os limites de ambas as abordagens e as tentativas de integração para lidar com o processo real de internacionalização da produção.

PALAVRAS-CHAVE: Sistemas de inovação; cadeias globais de valor; desenvolvimento econômico; estratégias das corporações multinacionais; divisão internacional do trabalho.

INTRODUCTION

Despite recent attempts to combine national innovation system (NIS) and global value chain (GVC) perspectives (JUROWETZKI; LEMA; LUNDVALL, 2018; LEMA; PIETROBELLI; RABELLOTTI, 2019; PIETROBELLI; RABELLOTTI, 2011), both approaches have been developed for decades without dialoguing with each other. The NIS approach has focused on the national accumulation of learning and technological capabilities (FREEMAN, 1995; LUNDVALL, 1992), whereas the GVC one has studied the international fragmentation of global production, focusing on governance structures and on upgrading possibilities for firms in developing countries (GEREFFI; HUMPHREY; STURGEON, 2005; HUMPHREY; SCHMITZ, 2002).

This mutual lack of interest has recently ended as scholars from both sides faced the fact that the deployment of GVCs have reshaped local sources of learning. Since then, scholars have increasingly concerned themselves with combining GVC and NIS frameworks (JUROWETZKI; LEMA; LUNDVALL, 2018; LUNDVALL, 2015), especially in the face of a new wave of reshoring, reinforced later by the Covid-19 health and economic crisis. These integration attempts have specifically focused on developing countries (LEMA; PIETROBELLI; RABELLOTTI, 2019; PIETROBELLI; RABELLOTTI, 2011), in which the imitation and adaptation of foreign knowledge have shaped technological learning processes (VIOTTI, 2002). Those integration attempts have delivered specific policy implications, aimed to enhance the insertion of local firms in GVCs and to build their upgrading capacities. Nevertheless, those policy implications have been criticized since they might enhance capacity-building processes disconnected from national productive system knowledge needs and the technological relations among different industries within national territories (SZAPIRO *et al*., 2019). Meanwhile, policy recommendations derived from integration attempts may be incoherent with policy implications of the two original NIS and GVC strands.

This study explores the recent attempts to integrate GVC and NIS frameworks and the extent to which they have failed to achieve a coherent conceptual approach. We propose that the lack of an exhaustive inquiry of their theoretical bases and the backgrounds upon which they rely leads to those failures. Integration attempts assimilate the upgrading of firms in GVC with systemic learning processes and, therefore, overlook the multiple and diverse sources of learning available at national and local systems that go beyond the global chain. Integration attempts also depart from GVC based on a transactional approach, which mainly assimilate networks to contracts without considering other institutional determinations and learning frameworks. This fact underestimates that multinational corporations (MNCs) — as organizational forms of the productive

internationalization of capital — exploit "coordination" advantages among different national localizations, which generate tensions between national and global spaces.

These tensions have previously emerged in literature. A wide range of innovation studies, published between the 1980s and the 1990s (EDQUIST, 1997; FREEMAN, 1987, 1995; LUNDVALL, 1985, 1992; NELSON, 1993), have focused on the national space as the privileged *locus* for systemic learning processes. Based on user-producer interactions, national science, and technological infrastructures, research deemed those learning processes as key for reaching structural competitiveness in a globalized world. On the other hand, several scholars stressed the necessity of considering MNCs as the main actor on the global deployment of technology (ARCHIBUGI; MICHIE, 1997; CANTWELL; IAMMARINO, 2003; CHESNAIS, 1992, 1997). New integration attempts barely consider this tension. This study aims to show that recent integration attempts fail to reach an adequate formulation of their main question: on which theoretical foundations lie the real tension between MNCs expansion and NIS.

We propose that the recent attempts to integrate NIS and GVC approaches have disregarded the tension between the organizational boundaries of the MNC and the national space — as *locus* of learning and generation of technology — in two ways. First, microeconomic upgrading as a main source of learning and innovation is insufficient to account for systemic learning processes and structural competitiveness. Therefore, any attempt to assimilate interactive learning in the national space to microeconomic upgrading at GVCs — especially without any institutional-level mediation — underestimates the systemic characteristics of technological learning as well as MNCs' strategies which may constraint such systemic processes. Second, GVC approach assimilates production to the circulation of capital, a fact that is consistent with the logic dominating the expansion of MNCs during their financialization stage, which is more oriented to appropriation than to the international deployment of technology.

This study is structured as follows. The next section explores the backgrounds of the GVC approach and its relation with its current form. We show how the approach has mutated from a theory-driven to a policy-driven perspective, losing its analytical capacity. Its third section introduces three central concepts developed by the foundational articles of NIS which would raise contradictions to the contemporary version of GVC and thus difficulties for any integration attempts. Based on the analysed backgrounds of these two sections, the fourth section provides a critical analysis of recent integration attempts. In the fifth section, based on Marx's decomposition of the production and circulation process, we offer some insights into the limits of both approaches and the integration attempts to cope with the actual process of internationalization. Finally, we conclude by reflecting on some feasible paths to achieve a more effective integration.

1. THE GLOBAL VALUE CHAIN APPROACH: THEORETICAL BACKGROUNDS AND ITS EVOLUTION TO A 'FIRM-CENTRIC' APPROACH

Global value chains are generally perceived as a phenomenon linked both to the organizational aspects of production (driven by the 'globalization' of the economy) and to power asymmetries between firms (or sectors) which are in different national spaces. Following Bair (2009), we can understand the current GVC literature as the result of a gradual combination of concepts which have its origins in different theoretical approaches: 'commodity chains' (CCs) (HOPKINS; WALLERSTEIN, 1977) and 'global commodity chains' (GCCs) (GEREFFI; KORZENIEWICZ, 1994) — which are connected with the world-system perspective — and the notions of 'supply chain management', 'value chain,' and 'upgrading' (PORTER, 1985, 1990), the last three associated with an organizational or microeconomic approach to global production. By the early 2000s, the GVC approach emerged. It follows mainstream theories of the firm in its analysis of governance via new institutionalist approaches (COASE, 1993; WILLIAMSON, 1985) in a more determinant way than their predecessors. The main strength of the GVC approach is that it provides a framework which works as a focusing device to address empirical cases and helps to characterize the concrete forms of the relational structure of production internationalisation. It is widely recognized that the GVC approach has made multiple contributions to characterize offshoring and outsourcing phenomena. It provides sharp classifications of i) the different links of a value chain, according to the type of knowledge involved (regarding their complexity and codifiability), ii) the upgrading trajectories of firms (which commonly start at 'low value-added' links), and iii) the 'strategic' (or, as we say below, 'rational') decisions of leading firms to command the chain governance. Thus, the GVC approach might constitute a powerful tool to organize a research agenda based on a qualitative analysis of case studies, offering concepts to identify (ex-post) either 'successful' or 'failed' value chain's configurations. It also provides a general framework for policy interventions to i) insert local firms into the GVCs by removing trade barriers (both tariff and non-tariff), and ii) foster upgrading opportunities by enhancing competition among local firms, reducing labour costs, and generating conditions for investment in infrastructure, connectivity, institutions, among others (BALDWIN, 2013; CATTANEO *et al*., 2013; WORLD BANK GROUP *et al*., 2017).

However, the GVC approach has some theoretical blind points which, its predecessors had paradoxically considered. For instance, a CC, which is defined as 'a network of labour and production processes whose end result is a finished commodity' (HOPKINS; WALLERSTEIN, 1986, p. 159), emphasizes that asymmetries between countries easily emerge when the labour-capital relation, is extended to a global scale. Pioneer works on CC are linked to the theory of world-systems which, together with the unequal

exchange theory, explain the reproduction of two related processes: the core-periphery structure of the global economy and he global exploitation of the working class. CC aims to assess wealth transfer mechanisms between activities through the chain and to analyse the unequal distribution of rewards between countries (ARRIGHI, 1990; ARRIGHI; DRANGEL, 1986). This perspective uses the labour theory of value 'to explain how surplus value extracted from the working class of the periphery is transferred to core regions' (PETRAS, 1981, p. 149).

The passage from CC to the GCC concept — since the publication of *Commodity chains and global capitalism* (GEREFFI; KORZENIEWICZ, 1994) — implied abandoning the labour theory of value and keeping the analysis of inequalities expressed in international trade. Thus, Gereffi (1994) introduces the notion of governance to explain differences in value appropriation, but he refrains from delving into an explanation of how value and surplus value are produced: his chain analysis is mainly focused on firm networks, dismissing variable capital. As Santarcángelo, Schteingart, and Porta highlight (2017, p. 105), "the GCC approach as it emerged in world-systems theory supported the idea that nodes capturing the most surplus are those that perform in conditions of low competition", which is generally related to the analysis of Paul Baran and 'monopoly capital' (SANTARCÁNGELO; SCHTEINGART; PORTA, 2017; STAROSTA, 2010). In contrast with world-systems theory, GCC studies open upgrading possibilities for developing countries firms as long as they can reach those niches of low competition, despite core-periphery dynamics and constraints for development. The notion of upgrading is taken from Porter (1990), who explains the competitiveness of firms given greater microeconomic competitiveness due to organizational virtues and their ability to innovate and differentiate themselves from their competition. Following Porter, upgrading is a defensive response of an individual firm to external competitive pressure.

Thus, the GCCapproach starts with an ambiguous definition of 'value' and progressively shifting its focus from surplus value, production, and appropriation to an *ad-hoc* interpretation of market power, which varies depending on the specificity of each commodity and production process. For example, different operations of global chains (producer- or buyer-driven) are defined depending on whether the goods are cars or clothing. However, these early works neither focus on the generation, use, diffusion, and appropriation of knowledge in the chains nor explain why global capital has these advantages over the small capital of developing countries. While certain researchers, who had studied industrial clusters – such as John Humphrey and Hubert Schmitz – analysed the generation and appropriation of knowledge, they have failed to consider the concentration and centralization processes which reproduce asymmetries in these appropriation processes.

The starting point of the GVC approach can be found at a Conference organized by the Rockefeller Foundation in the 2000s, which supported a five-year Global Value

Chains Initiative, with the aim of creating 'an integrated research paradigm' on global production (BAIR, 2005; PONTE; GEREFFI; RAJ-REICHERT, 2019). The first publication after the Conference (GEREFFI; KAPLINSKY, 2001) defined the core concepts of governance and upgrading (PONTE; GEREFFI; RAJ-REICHERT, 2019). The theoretical results of this initiative appeared mainly in works by Humphrey and Schmitz (2002), and Gereffi, Humphrey, and Sturgeon (2005).

The concept of governance has been initially introduced by Gereffi and Korzeniewicz (1994) to consider, at least partially, the core-periphery perspective raised by world-systems theory. Thus, 'governance' in the GCC approach acknowledged the heterogeneity of capitals within the chain and the existence of global asymmetric networks among firms, which mainly rises as a result of the impact of MNC efficiency strategies on capital accumulation. Meanwhile, depending on which type of capital commands the GCC (weather industrial or commercial), governance forms in commodity chains could define producer- or buyer-driven chains (GEREFFI, 1994).

In contrast, Gereffi, Humphrey, and Sturgeon (2005) distinguished three 'network' governance modes — captive, relational, and modular — which lie between the two extreme cases of hierarchy and market (arm's length), a keystone of the GVC approach. Thus, it reduced production to a set of transactions in correspondence with the *continuum* of 'governance models' (inspired in new institutional theory). Accordingly, the possibilities of upgrading seem accessible to any firm. While the GCC approach linked governance to whom (or which type of capital) commands the chain, GVCs link governance to ways of coordinating international production more efficiently (WILLIAMSON, 1985). Therefore, both GCC and GVC approaches address the circulation of capital but not of production. Even when GVC analyses guide production relations, they assimilate production to transactions (circulation) under different forms of governance. Therefore, they neither create value nor analyse concrete production learning processes.

Although the aim of the GVC approach is to analyse learning via the concept of upgrading, it has several limitations. GCCs established that companies would have two mechanisms to achieve upgrading: i) by increasing the "knowledge content" of their activities or ii) by focusing on a market niche with great entry barriers (HUMPHREY; SCHMITZ, 2002). Therefore, they saw upgrading as any firm innovation which increases added value (PIETROBELLI; RABELLOTTI, 2006) to "maintain or improve their positions in the global economy" (GEREFFI, 2013a, p. 440). Although these authors have failed to explain the source of this "added value," the GVC approach has developed a more detailed taxonomy to explain increasing productive capacities, differentiating among four types of upgrading: i) new or better products; ii) new or better processes; iii) new activities or functions within the chain (functional upgrading); and iv) new activities or functions in other chains (HUMPHREY; SCHMITZ, 2002).

However, this 'broadened' notion of upgrading neither reached a detailed analysis of the systemic space (in which learning occurs based on 'knowledge flows') nor explained the relation between upgrading and the quality of the local learning process (see Section 3 for a critical assessment of this aspect). Therefore, it took upgrading as an ahistorical and microeconomic process, failing to explain its dynamics and interaction in a broader system than the chain. Following the GVC approach, the predominant type of governance would affect upgrading possibilities. Certain firms would have a greater propension to upgrade because the modular governance in which they are involved enabled it, whereas those which remain in captive governance types would face greater constraints, although research has ignored these matters.

Regarding sources of knowledge, we find an extended idea that comes from the technological transfer from the leading company (technical standards and training). Therefore, firms from developing countries should seek to join a pre-existent chain, under the general assumption that the relevant knowledge for upgrading will come from it. The learning process occurs within the chain, and it is based on the transfer of technology from leading companies to subordinated firms. Thus, 'upgrading' is understood as a simple externality, for which the insertion of firm is a precondition, linked with a microeconomic phenomenon, affecting every individual firm (without distinctions of time or context).

The GVC trivialization of upgrading implies two big changes regarding the pioneering works of GCC and CC. On the one hand, abandoning any explanation of how technology upgrading affects the modality of value and surplus value creation and appropriation (which was already evident in GCC) persists in the GVC approach, despite its decision to replace the term 'commodity' with that of 'value.' This is because the use of the word 'value' in the GVC approach is superficially understood as 'added value' and associated only with competitiveness gains (without explaining in which link of the chain the value or wealth is created). On the other hand, it neglects the core-periphery perspective — which was still present in the GCC approach under the recognition of international inequalities in the appropriation of value. It was replaced by an optimistic approach of firms' upgrading opportunities, in a world in which national states and institutions seem to have a marginal role, exclusively aimed at facilitating the entry of firms into chains (BAIR, 2005; GEREFFI, 2013b; GEREFFI; HUMPHREY; STURGEON, 2005).

This optimistic perspective of upgrading fails to explain why and how 'captive' governance forms (in which suppliers are subordinated to the technical requirements of the leading firm) can move or evolve to relational or modular governance forms in which suppliers would intervene in stages of higher added value. The former GCC approach acknowledged that these paths often face considerable difficulties due to the increasing barriers to entry as one moves along the chain (GEREFFI *et al.*, 2001).

A more comprehensive 'policy-oriented' approach should consider other deliberate policy areas, such as domestic selective commercialization, distribution networks, intellectual property, and policy-promoting trademarks.

Lastly, approaches differ in their assessment of institutions. While the world-systems theory is embedded in an institutional set-up, which understands institutions as macro-institutional forms issued by historical social processes, the GVC approach understands institutions as merely transactional governance arrangements, issued by economic agents' individual rational behaviour. This overlooks the explicit incidence of asymmetries between different actors on knowledge (and value) creation, diffusion, and appropriation, even though they were considered by world-systems, GCC, and other approaches (such as the MNC literature). Although GVC considers (at least implicitly) qualitative differences between actors and their roles (when talking about 'leading firms'), it seems that those differences fail to constitute determinants which explain global dynamics since some characteristics of multinational companies and economic corporations are invisible or unexplained (it specially lacks a historically grounded explanation about the process which enabled them to be 'leaders').

Paradoxically, as the GVC approach lost its theoretical accuracy and abandoned many of the fundamentals which had originally enabled it to explain historical processes, it added the functional policymaking design used by multilateral organizations. Although policymaking has been adapted in each case, it has tended to uncritically insert firms into GVCs, generate conditions for these insertions (e.g. trade openness and legal certainty), and adopt the standards of leading firms under an optimistic veil of 'development.' The taxonomic structure of the GVC approach and its methodological individualism were a clear advantage for its adoption by international organizations, making the approach a 'policy-driven' tool (see Section 4.2).

In sum, the GVC approach represented a significant advance for the study of international productive fragmentation, of which contemporary offshoring and outsourcing processes at a global level are specific modalities. Although this approach offers a valuable input to interpret the obstacles and potential profits of supplier companies in global supply chains, it has also overlooked its own backgrounds, and this implied some blind perspectives on the phenomenon under study. From its origins to its current version, this theoretical approach has mutated from a history-based world-system approach toward a firm centric approach based on an ahistorical methodological individualism. This transition involved four main transformations: i) the abandonment of the 'theory-driven' core-periphery perspective and its replacement by a 'policy-driven' one; ii) the abandonment of any reference to value and surplus value production and appropriation, which had supported the hierarchical structure of the international division of production in pioneering works, and its replacement by a trivialized version

of upgrading as capture of an unclear and fuzzy notion of 'added-value' by individual firms; iii) the consequent invisibility of MNCs as the main organizational forms that appropriate value and surplus value along supply chains and in the competitive mechanisms they use for maintaining entry barriers which assure the reproduction of existing asymmetries; and iv) the progressive underestimation of national state institutions and its international hierarchies as one of the main (if not the main) determinant of the technological advantages of MNCs (or 'lead firms').

2. THE CONTRIBUTIONS OF NIS TO UNDERSTANDING SYSTEMIC LEARNING PROCESSES

Individual capital strategies are unable to entirely explain ability of firms to actively or passively participate in 'upgrading' processes. This capacity relies on general scientific and technological production conditions, shaped by institutions of national spaces as well as the productive structure which provides learning opportunities and shapes capacity building processes. These capacities will depend on the historical trajectory of the national space and on the real possibilities of configuring the national "scientific and technological potential" (CHESNAIS, 1981; MICHALET, 1986). The neo-Schumpeterian literature has conceptualized this potential, within the historical framework of the commercial internationalization phase, in its comparative studies on national innovation systems (FREEMAN, 1987; JOHNSON; EDQUIST; LUNDVALL, 2003; NELSON, 1993).

In this section we will argue that three interrelated concepts at the core of national innovation systems approach in its original formulation conflict with the GVC approach as it was defined in the Section 2. Those concepts are: i) structural competitiveness *vis-à-vis* microeconomic competitiveness, ii) interactive learning *vis-à-vis* upgrading, and iii) a broad definition of institutions beyond 'governance structure.'

First, the NIS approach has concerned itself with productive structures since their origins, when Christopher Freeman looked at how countries like Japan, with lower R&D effort than the United States or Europe, have managed to catch up (regarding exports of medium- and high-technology products) in a short span of time. The NIS literature has focused on innovation as a systemic process derived from interactive learning impacting not only microeconomic competitiveness but also the generation of variety (with the introduction of new processes and products) and structural changes (FREEMAN, 2004). The interest on the structural determinants of competitiveness is rooted in three aspects: i) the centrality of some sectors that enhance the productive performance of others, including machinery production and specifically machine tools (MISTRAL, 1983; PAVITT, 1984; ROSENBERG, 1964); ii) the idea of growth poles (PERROUX, 1955),

unbalanced growth (HIRSCHMAN, 1958), and developmental blocks (CARLSSON; STANKIEWICZ, 1991; DAHMÉN, 1988), which stressed the structural conditions of industrial development, and iii) the importance of bridge institutions to articulate scientific, technological, and industrial policy (KLINE; ROSENBERG, 1986). These three aspects, together with a major emphasis on interactive learning, define structural competitiveness as a keystone of the NIS approach (CHESNAIS, 1992).

Second, among the numerous empirical studies showing the importance of 'interactive innovation' embedded in productive structure (ANDERSEN; DALUM; VILLUMSEN, 1981; HIPPEL, 1976; ROTHWELL *et al.,* 1974), Lundvall's (1985) work is the most influential. He pointed to the relevance of interactive learning processes involved in user-producer relationships for product and process innovation. The NIS literature states that learning processes are embedded in institutional and productive structures, highlighting the crucial role of proximity and different types of interactions within learning processes. Interactions will also be affected by the completeness of the productive structure, especially regarding the presence or not of sectors which diffuse technical progress (called by Pavitt specialized suppliers, i.e. machinery, electronics, among others) (ANDERSEN, 1992; EDQUIST, 1997). Thus, user sectors are learning sources for specialized suppliers. At the same time, innovations introduced by knowledge intensive sectors spread out the productive structure, enhancing the productivity levels of several branches of activities.

Third, the NIS approach assumes that 'institutions' constitute a complex multilevel network (micro, meso, and macro) formed by learning- and competence-building processes. This network includes from habits, routines, and behavioural rules to national and local policies affecting those learning processes. Then national science and technology systems are constituted by technological centres, universities, professional training institutions, and bridge organizations which help them to meet industry needs via scientific and technological research. In the NIS approach, institutions are territorially embedded and endogenously change due to interactions among the components of the systems.

Considering these three concepts (structural competitiveness, interactive learning, and institutions), the differences between the NIS and GVC approaches clearly emerge. GVCs assume that the relevant knowledge for upgrading comes from leading companies transferring technology (technical and quality standards and training), opening upgrading possibilities to every company as long as the latter can absorb it (COHEN; LEVINTHAL, 1990). Even when learning by experience ('learning by using') and from interactions with the technology transfer ('learning by interacting') would be possible, the scope of acquired capabilities would be limited to specific activities, engaged with a commodity chain, carried on with specific technology (in some cases, proprietary, i.e. licenses) with a low possibility of application beyond the chain. Then, this kind of learning process is unable to lead to a qualitative change in the capacities of local systems

since its applicability may be constrained to the chain, limiting spillovers and cross-fertilization learning processes. Therefore, they are inconducive to building the competitive advantages of the national system as a whole.

The NIS literature highlights that learning processes imply a multiplicity of actors as well as tacit and codified knowledge, the sources of which are historically determined in an institutional framework of national scope. Thus, possibilities for the effective imitation and adaptation of foreign technologies depend not only on the absorption capabilities of local firms but also on the absorption capabilities of national or local systems in which they are embedded (NARULA, 2004). These capabilities refer to the possibility for innovation systems of accessing, using, and transforming external knowledge for their own interests (or their own challenges) and fundamentally concern the ways in which past achievements influence their future learning potential.

Although the NIS literature has mostly ignored blockage effects to learning processes, with the notable exception of Lundvall's early works, they can arise and limit the possibilities for building structural competitiveness. Inspired by the French "*filière*" approach, Lundvall (1985) pointed to how the interactions derived for asymmetrical (market) relations affected learning processes, especially in the presence of unbalanced market power (monopsony and monopoly). He identified the possibility of "unsatisfactory innovations" as a result of these asymmetrical relations. According to him, these situations are possible if the rhythm and direction of innovations fail to reflect users' needs and are derived in innovation which will be unable to enhance firm capabilities as long as they are incoherent with their knowledge base but result of client demands in their competition strategy (LUNDVALL, 1985).

In contrast, before the GVC approach, the CC and GCC framework understood asymmetrical market relations, although rather than explaining knowledge blockages, explaining indirect surplus value appropriation by commercial capital. Though the GVC approach focuses on efficiency in production as the main source of extraordinary profits, it reduces production to a set of transactions implicit in the different 'governance models.' Therefore, upgrading possibilities seem accessible to any firm. While the GCC approach linked governance to *who* (or *which type of capital*) leads, the GVC framework links governance to *how* to efficiently coordinate international transactions. This implies two main qualitative differences between the GVC and NIS approaches.

First, we find differences in the type of interactions. User-producer interactions are the main source of learning in the NIS framework. They are embedded in production systems, giving place to processes of collective learning which go far beyond governance structures. Problem-solving processes lead to user-producer interactive learning. This differs from technology transfer processes which are predominant in the GVC framework, not because such forms are inconsistent with learning but because the focus

on transactions is unable to account for *how* learning processes are embedded in interactions between the two organizations. Only a clearer focus on production can explain new technological knowledge and therefore differentiation processes (LAZONICK; MASS, 1995). Learning processes involved in user-producer interactions cannot be reduced to a transaction. Even technology transfer is a complex phenomenon that goes beyond the codified knowledge incorporated in blueprints, handbooks, or patents. Knowledge recombination between MNC R&D laboratories and universities involve learning processes and requires minimum knowledge thresholds (CINCERA; POTTELSBERGHE; REINHILDE, 2006; GOEDHUYS; VEUGELERS, 2012). The GVC approach is more suitable to analyse appropriation of surplus in indirect relations (mediated by commercial transactions), although less appropriate to explain how it conditions production and innovation.

Second, both approaches differ in *how* they deal with institutions. While learning is embedded in an institutional set-up in the NIS approach, which understands institutions as meso-forms issued by historical social processes and codified by collective action of State; the GVC approach understands institutions as merely transactional governance arrangements, issued by the market interaction of the agents' individual rational behaviour. Thus, institutions help to determine interactive learning processes, configuring bounded national spaces as long as they constitute embedded customs, culture, and organization. Rather than a theoretical caveat, this is an historical observation since modern national states are a prerequisite to accelerate the learning processes which propelled industrialization (LUNDVALL, 1992). Furthermore, national states finance and promote the STI infrastructure. Therefore, virtuous processes of interactive learning increase (or reproduce) the competitiveness of national economies (FAGERBERG; VERSPAGEN, 2002).

The different treatments of those aspects deepened tensions and the possibility of integration attempts. While the NIS approach recognizes that the role of national states in supporting learning processes have been challenged since the trends to liberalization and privatization fostered globalization, it is unclear whether the global space is a *locus* for learning or, in contrast, an area which combines and recombines codified knowledge. The question of 'where' technology is produced and 'which actors (or capitals)' can codify or recombine (and appropriate associated extraordinary profits or rents on a global basis) knowledge is key for analysis, but the literature still show gaps in its assessment of this phenomenon. We can attribute the same problem to the GCC/GVC approaches, although they implicitly consider a qualitative difference between actors and their roles (when referring to 'leading firms'). However, acknowledging this difference is insufficient since some of the characteristics of multinational companies and economic corporations are invisible or unexplained (especially, we still lack a historically grounded explanation about the process which enabled them to be 'leaders').

Table 1 – Main differences in the characteristics of learning processes between the NIS and GVC approaches

Characteristics	'National innovation system' approach	'Global Value Chain' approach
Innovation process	Path-dependent and interactive learning processes which take time and resources	Upgrading via (time-free) technological transfer
Fundamental logic of learning process	Generation and accumulation of capabilities in the national area	Efficiency and appropriation of profit at a global scale
Learning sources	- The internal efforts and problem-solving processes of firms - Inter-firm interactions - Interactions with the S&T infrastructure - user-producer interactions	- Inter-firm interactions (transactions and contracts)
Unit of analysis	Codified or tacit knowledge (more or less complex)	(More or less complex) transactions (which generally imply codified knowledge)
Breadth of interactions	System	Firm-firm
Type of interactions (between firms)	- Dynamic - Symmetric - Complex	- Static - (More or less) asymmetric - Biunivocal
Knowledge fluxes (between firms)	Bi-directional (user-supplier)	Unidirectional (technology transfer, training)
Institutions	Formal institutions legitimized by deliberated political processes (methodological holism)	Efficient institutional arrangements regarding the characteristics of transactions (methodological individualism)
Sectoral differences	While not always explicit, they are very important because they determine structural intersectoral relations	They are not so important because their impact is only lateral. Sectoral differences are assumed and summarized in governance differences between the chains.
Role of Government (policy)	To strengthen and articulate the elements of the NIS: - To provide technological infrastructure and improve its educational system - To finance innovation (via capital markets, subventions, public procurement, etc.) - To foster complexity and volume of interactions	To simplify the insertion of firms into GVCs: - To foster free trade - To attract FDI fluxes - To finance general infrastructure
Fundamental actor	Not defined in detail (the focus is on the system, not on a particular actor but (implicitly) nationally bounded productive capitals	Multinational enterprise or holding (but invisible, implicit)

Source: Authors' own elaboration.

As Table 1 shows, the NIS approach considers that industrial policies should aim at deliberate changes in institutions and branches with more opportunities of supplier-user learning. This approach differs from the GVC approach, in which institutions are the result of private action and the State must limit itself to generating the conditions that facilitate the upgrading processes led by the leading companies.

3. RECONCILING THE IRRECONCILABLE? A CRITICAL ANALYSIS OF THE INTEGRATION ATTEMPTS BETWEEN THE NIS AND GVC APPROACHES

In this section, we will analyse the three main integration efforts of the GVC and NIS approaches and the criticism they have received in the literature. Finally, we make our own critique, considering the differences between both approaches.

3.1. MAIN INTEGRATION EFFORTS IN THE LITERATURE

Among the growing literature aimed at integrating GVCs and NIS, three streams standout. The first one analyses possible theoretical bridges without offering an integrated and founded approach to this day (LUNDVALL, 2015, 2016; JUROWETZKI; LEMA; LUNDVALL, 2018). The second stream, focused on the relation between GVCs and local spaces, formulates a straightforward integration of both approaches (PIETROBELLI; RABELLOTTI, 2011) which shows the upgrading possibilities and constraints for local clusters in GVCs, focusing more on a policy-driven perspective than a theoretical one (GIULIANI; PIETROBELLI; RABELLOTTI, 2005; PIETROBELLI; RABELLOTTI, 2006). The third stream proposes a multiscale approach of innovation systems concepts, seeking to analyse "structural couplings" among them in a global innovation system (GIS) (BINZ; TRUFFER, 2017a), especially in the case of innovation in high technology industries (SPENCER, 2003).

Jurowetzki, Lema, and Lundvall (2018) highlight the gains to both approaches if they converge into a single framework. NIS analysts could incorporate governance and asymmetric power relations in their analysis of user-producer learning, considering how different governance structure conditions these processes depending on the complexity of transactions and contracts, i.e. the (un)codifiability of certain quality issues which could constrain the exchange of technical requirements between firms or the extent to which subcontractors in GVCs participate in designs or decision-making of new product/process specifications. Meanwhile, GVC analysts could study upgrading dynamics as processes of interactive learning between a greater number of firms, academy, and bridge institutions, considering local, regional, and national institutional contexts. Pursuing similar goals as the first attempts, these focused on local (instead of national) innovation systems, regarding the territorial and historical embeddedness of firms and institutions, considered as socially determined formal and informal habits and rules (ASHEIM, 2002; GRANOVETTER, 1985). It specifies a concrete mechanism of mutual reinforcement between GVCs and GISs. First, note that global firms bring the "best practices" and new technologies to the local environment, whereas local firms, institutionally embedded in territories, help to spread those technologies and practices among other firms and formal institutions (such as research and development centres,

local development offices, universities, etc.) within the cluster and beyond it (PIETROBELLI; RABELLOTTI, 2011). This considers not only the different roles that local firms can play — i.e. gatekeepers, bridges, etc — (GIULIANI; BELL, 2005) but also how local firms act as a channel for diffusing foreign practices and provide tacit knowledge which MNCs are unable to codify and distribute globally. Local innovation systems should complement local learning sources with knowledge external to the system but internal to GVCs (in other words, the knowledge coming from leading companies). Thus, public policies, from an innovation system perspective, should aim to increase the absorptive capabilities of local firms to increase their possibilities for insertion and upgrading (PIETROBELLI; RABELLOTTI, 2011). On the other hand, the governance mode of the chain can constrain upgrading (as defined by GEREFFI; HUMPHREY; STURGEON, 2005). Then, the absorptive capabilities of firms, together with the nature of transactions (more or less asymmetric) and the type of knowledge involved (codified or tacit), ultimately determines the possibilities for upgrading.

The third proposal goes beyond a simple integration, trying to develop a whole new concept of innovation systems which would help to explain global innovation process in breakthrough technologies. It seeks to integrate all the scales of innovation systems from local to national and sectoral in a comprehensive global innovation system (GIS) (BINZ; TRUFFER, 2017a). When extending its analysis to international contexts, it should conceptualize actors as a "constitutive part of a wider network through which emergent power and effects are realized over the space" (BINZ; TRUFFER, 2017b, p. 5) rather than as atomistic agents per se. In line with several GVCs, this approach states that wider multi-scalar networks include not only MNCs but also other actors, such as research and education organizations and industrial associations, in a *continuum* of types of governance ranging from market to hierarchy. It could also include formal and informal institutions as international agreements (for example, intellectual property rights), quality standards or research communities. In this perspective, GIS are structured in several juxtaposed subsystems which create and recombine different types of externalities (knowledge, market access, financial investment, and technology legitimacy). As innovation depends on how actors combine these externalities, certain actors can couple different sources. Such 'structural couplings' open the door to a variety of firms, organizations, and communities which operates at several subsystems of recombining different sources by means of 'institutional couplings' (for example, standards that enable economies of scale).

3.2. CRITICISMS TO INTEGRATION EFFORTS

Some authors offered reasons to relativize the optimism about the possibility of integrating both approaches which revolve around two aspects. First, because of the different nature

of upgrading and innovation. Second, because of the incompatibility of policy recommendations emanating from each approach.

Regarding the first aspect, Szapiro *et al.* (2016) consider that upgrading in the GVC approach is profoundly different from innovation in the NIS framework. The GVC literature considers that relevant knowledge sources for upgrading are present only within GVCs. For instance, MNCs which coordinate GVCs will determine the quality standards for upgrading and will transfer knowledge to achieve it (KAPLINSKY, 2010). Process and product, but also functional or inter-sectoral upgrading, can only be triggered by management decisions of global corporations or suppliers, almost or completely ignoring the relevance of local suppliers, whose main decisions deal with accompanying or helping in deploying global corporation strategies. Nevertheless, the GVC approach neglects that the R&D infrastructure and local institutional embeddedness of developing countries is required to adapt external knowledge to local specificities. Thus, Szapiro *et al.* (2016, 2019) state that the NIS approach better conceptualizes different interactive learning processes in the domestic space, regarding different local or national institutions supporting learning processes of local firms, from research and education to public or private centres oriented toward technology diffusion. These institutions can play a crucial role in both domestic market innovation and GVC upgrading processes. In fact, they point out that failed upgrading processes can be better explained by the weakness of these local interactions than by an insufficient integration within the GVCs.

Regarding the second aspect, NIS Science, Technology, and Innovation (STI) policy recommendations focus on system interactions and encourage both formal and informal interactions between firms and institutions (more or less selective and structured) to generate innovation. STI policy support must be complemented with a coherent set of institutions which reinforce systemic (or structural) competitiveness. In contrast, the GVC approach recommends facilitating the insertion of local firms into the GVCs by i) removing trade barriers (both tariff and non-tariff), ii) enhancing competition among local firms and getting lower barriers to entry and exit, iii) reducing labour costs; and iv) passively adopting international IPRs or investment agreements to facilitate the entry of FDI (BALDWIN, 2013; CATTANEO *et al.*, 2013). For this reason, while Szapiro *et al.* (2016) consider these policy recommendations to be incompatible with the NIS view and the perspective of local capabilities accumulation, other authors see in the GVC approach a revitalization of market liberalization ideas of the Washington Consensus (WERNER; BAIR; FERNÁNDEZ, 2014).

It is important to note the differences between the initial perspectives on interactive learning in the NIS approach and the limited notion of transactional relation in the case of GVC approach. In the integration efforts based on assimilating learning to upgrading, the latter depends on the assurance of a technological transfer from a transnational

company, the absorptive capacities of firms, and the nature of transactions in the chain determining its type of governance. Here we recognize that user-producer relationships need and foster feedback and complex knowledge flows which not only go beyond the simple learning of existing techniques and norms, but also beyond the interaction between firms, involving an extended network of interactions. Asymmetrical relations can lead to blockages from leading firms. When product, inter-sectoral or functional innovation are involved, absorption capabilities cannot be limited to firm capabilities. Thus, it is difficult to derive effective policy recommendations from the integration efforts in the first section.

Finally, regarding the GIS approach proposed by Binz and Truffer (2017a), while it offers the possibility of a multiscale analysis which integrates GVCs and NIS, it is unclear what is the logic driving each 'subsystem,' other than their hierarchy. As we will analyse below, we find tensions between the logic of capital accumulation and national spaces, which gives place to non-linear (dialectic) relations between GVCs and NIS. In this context, MNCs have organizational advantages associated with the fact that they are the only type of firm which can operate at several sub-systems taking advantage of the 'structural couplings.' Furthermore, global oligopolies are the spaces of competition and cooperation in which 'institutional couplings' are usually defined (for example, standards that enable economies of scale). As we will argue in section 5, beyond any conception of harmonic structural couplings or integration between GVCs and NIS, these concepts show an indissociable tension between the centralization of geographically disperse technological capabilities and the reproduction of national spaces.

While these limits to integration are a very good starting point for criticism, they are insufficient to base a critical conceptual framework which would help us to address the actual process of reconfiguration of national innovation systems as a response to the expansion of GVCs since the 2000s. We must expand our critical analysis of theoretical GVC-NIS integration efforts considering, on the one hand, interactive and systemic learning as the national base for structural competitiveness as opposed to capital expansion and, on the other, the contradictory and therefore dynamic character of the relation (structural coupling) between GVCs — as an expression of the internationalization of capital in the current phase of financial globalization — and NIS — as spaces in which these interactive learning processes are historically manifested.

As we will see in section 5, these tensions and unity between valorisation and national base are not new. Some authors in the origins of the NIS approach and in the MNC literature have already shown them, although they have been disregarded by the recent attempts of integration. Thus, by underlining similar weaknesses in both approaches, as we will discuss, we show how this tension is reinforced when 'financial logic' constrains both national innovation policies (or, in an optimistic case, changes them so they become more 'market-friendly,' short-termist in public research programs, etc.) and MNC strategies.

4. THE TENSION BETWEEN GVCS AND NIS AS AN EXPRESSION OF THE CONTRADICTORY DYNAMICS OF CAPITAL. OLD WINE IN NEW BOTTLES?

As we have said, any integration attempt should consider that the GVC and NIS approaches operate in different spaces with different logics. The automatic translation from one theoretical concept to another can lead to a forced research scope which limits the explanatory capacity of each. Moreover, simply limiting them to structural couplings without identifying the contradictory dynamics which explain them would also be flawed. Thus, an integration of NIS and GVC approaches might fail to historically ground valorisation and institutional processes.

While the NIS approach assumes a national coherence based on institutions and policies ensuring interactive learning over other factors, giving the national state (transitory) autonomy regarding capital accumulation, the GVC approach assumes national states as a totally external source of low wage labour or natural resources.

To solve this analytical tension, we need to consider that the relation between GVCs and NIS are indissociable from changes in the forms of valorisation of capital at an international scale. This requires turning to Marx's decomposition of production and circulation processes in different capital circuits: commodity capital, productive capital, and money capital. This decomposition has enabled Michalet (1985) and Chesnais (1994) to identify different internationalisation processes depending on which form predominates: trade internationalisation, productive internationalisation, and financial internationalisation.

The pre-eminence of productive internationalisation results from the crisis of the post-war Fordist regime (MICHALET, 1986). Some authors (HYMER, 1976) have illustrated this process with the emergence of new MNC organizational configurations since the 1960s onward, when multi-domestic affiliates expanded searching to surpass national oligopolistic structures. Since the 1980s, as a consequence of liberalization and the opening of markets, the deployment of MNC rationalization strategies enabled international product and/or component specialization within 'global MNCs' (CHESNAIS, 1994; MICHALET, 1986; PORTER, 1986). We can claim that the expansion of GVCs is no more than a new form of MNC expansion in which vertically integrated affiliates have been substituted by external relations. Some authors have analysed these organizational changes as the result of a new stage of financial internationalisation in which the main actors are, rather than MNCs, new forms of centralized finance capital which go beyond the growth of pure financial operations (CHESNAIS, 2016; SERFATI, 2008).

The transition from trade internationalisation to that of production, accomplished between the late 1960s and the early 1990s, resulted in a new relation between MNC deployment and NIS reproduction. This relation expresses a more general dialectic homogenisation process of the productive forces in global capital and the differentiation of

national spaces. On the one hand, seeking to overcome the limits of overaccumulation and decreasing profit rates in national spaces, the expansion of capital via MNCs has resulted in a homogenisation of productive capacities which, in turn, has weakened local interactive learning coherence by spreading their predominant technological practices and organisational forms. On the other hand, this expansion has required differentiated national attributes which range from low wage labour and cheap raw materials to complex (and low wage) labour and science and technology infrastructures resulting from coherent NIS.

So, this dialectic process resulted in an internal tension between the weakening of national innovation systems (due to MNC deployment), and MNC requirement of technological capabilities associated with coherent and developed national innovation systems. This tension explains the different modes of MNC international deployment of technology. The more traditional one prevails in the period of multi-domestic MNCs based on the transfer of often obsolete technology to 'replica' subsidiaries abroad. By doing so, on the one hand, MNCs require the pre-existence of national differentiation processes based on localized productive learning to absorb and adapt imported technology, on the other, homogenizing the capacities of production abroad weaken the coherence of these national innovation systems.

This dynamic of homogenisation and differentiation assumed other modalities – as described by the empirical literature on the international technological deployment of MNCs (ARCHIBUGI; MICHIE, 1995; CANTWELL, 1995; CANTWELL; PISCITELLO, 1999; FLORIDA, 1997). This literature refrains from constraining the deployment of technology to its unidirectional transfer to exploit MNC technological advantages by exporting productive and technology capabilities. They acknowledge the organization of R&D worldwide via internationally integrated laboratories (IIL) and technological networks or alliances between companies (or R&D institutes). MNCs not only exploit existing technological capabilities but also generate new ones within the framework of global networks.

While this literature has broadened the modalities of technology 'internationalization' to the 'production of technology' at a global scale by recombining multiple science and technology sources resulting from national differentiation processes, they neglected new forms of MNC technology strategies. It assimilates these dynamics to symmetrical networks and alliances to horizontal collaborative spaces, ignoring the difference between technology co-production and appropriation. Therefore, Chesnais (1992) states that MNCs not only operate via the direct and indirect appropriation of profits (surplus value) but also by seizing technology (*technology sourcing*) from diverse national innovation systems. Thus, MNCs fail to enhance systemic dynamics based on learning, on the contrary, they exploit technology sourcing and recombine different bits of knowledge which weaken local articulations (LAVARELLO, 2004). This helps us to explain why, rather than finding technology internationalisation processes, we can only attest an international MCN technology deployment process, which combines the exploitation of their own technology advantages with technology sourcing practices.

Thus, the tension between homogenisation and differentiation manifests itself in R&D processes. On the one hand, the expansion of integrated R&D laboratories and cooperation with universities would enable the insertion of countries that have a minimum threshold of science and technology infrastructures specific to the developed NIS. On the other hand, inserting universities and technology centres in these networks results in a de-structuring of these NIS, which would be limited to those phases of R&D activity that correspond to the division of global innovation, by, for example, inserting universities in the clinical phases of R&D and in the formulation of the pharmaceutical value chain without transferring manufacturing capabilities (LAZONICK, 2018). Therefore, NIS are weakened. Thus, MNCs control intellectual property and distribution, capturing the rent of new drugs.

However, the countries and industrial branches in which technology sourcing justifies offshoring are very few due to the appropriation of surplus value on a global scale. Even in sectors which could be classified as high-tech (such as electronics or software programming), global value chains are expanding in search of low wages and high degrees of surplus extraction. Due to the current stage of financial internationalisation, the rise to power of shareholders, and the stock markets impacting offshoring and international outsourcing, expansion has focused more on the indirect (rather than on direct) appropriation of surplus value in certain GVC branches. The combined liberalization of trade and direct investment since the mid-1990s onward, enabled complex forms of indirect and external coordination, first among vertically integrated MNC affiliates and then increasingly by outsourcing and offshoring medium and small firms located in many countries. This new operation mode enables MNCs to reduce risks and costs of production and 'govern' global supply chains presiding labour exploitation at a distance (SELWYN, 2016).

In this new stage of financial internationalisation, the MNC role on international technological deployment has been limited. In the best case, it has aimed to diffuse best practices on GVC networks via quality standards and manufacturing process upgrades. While anecdotal evidence has analysed certain cases of functional upgrading based on 'modular' networks, they have omitted the driving force of competition of new emergent countries' capitals which have been strongly supported by their national states by explicit and deliberate industrial policies.

This requires us to introduce norms and standards into our analysis as the main institutions which structure the tension between the expansion of groups and industrial policy by national states. Standards are one of the main mechanisms which coordinates the international diffusion of techniques. This is one of the main interventions of industrial policies from certain developed countries (ALLEN, 2015). As global industries emerged, standard formation process became international, prioritizing cooperation and negotiation between national organizations either by the imposition of the standards of the leading country and/or the hierarchical consensus between countries, or because the product is

imposed by competition, giving rise to a '*de facto*' standard, as was the case of 'IBM-compatible' products, for example. Nowadays, in the framework of the world economy, standards which coordinate GVCs are increasingly defined by coalitions between companies which are constituted by technological alliances between them without considering all the interests of users and politicians of the involved countries (TEECE, 2018).

While the innovation literature focused on the importance of standards as institutions which can coordinate (or block) collective and complex learning, they assume that national governments are its main actors, ignoring the diffusion of global standards (LUNDVALL, 2016). The GVC literature has conceptualized standards as mechanisms of governance, omitting which producer associations participate in defining, monitoring, and enforcing them (KAPLINSKY; MORRIS, 2000).

With the emergence of the global oligopoly, global alliances and organizations have increasingly absorbed this role. Thus, the diffusion of standards does nothing more than guarantee the homogenisation of techniques via a rational governance that ensures the advantages of interoperability and compatibility between different devices. In doing so, they manage to consolidate scale and specialization economies, accelerating concentration and centralization by groups which assume a hierarchical role in the standard establishment. At the same time, this process can generate various lock-in effects and displace local providers by network effects, weakening provider-user interactions (FORAY, 2002). Thus, the tension between the homogenization of the global oligopoly and differentiation of NIS manifests itself in the new forms of technological competition.

This implies that technology and standard homogenization has been more orientated toward reinforcing its ability to displace competitors and capture value from those small capitals which can survive under a subordinated relation than to generate opportunities for technology upgrading (CHESNAIS, 2016; SMITH, 2010). Thus, we can claim that the MNC passage from a vertically integrated global strategy to the externalized organizational forms of GVCs limits the 'localization advantages' to value and/or surplus value 'predation' opportunities.

By incorporating the historical forms assumed by the tensions between different forms of MNC expansion and national state reproduction, we can re-situate the GVC approach in a holistic-historic approach. As financial internationalisation has been consolidated, the MNC global strategy has been substituted by GVCs as a new indirect form of surplus value and value appropriation on a global scale. Rather than implying a return to the initial perspective of commodity internationalisation in terms of core-periphery uneven trade, it offers a renewed approach of productive capital and financial capital internationalisation, giving up methodological individualism and systemic functionalism. Drawing bridges between innovation studies and Marxist approaches offers us a useful approach to understand the external competitive mechanisms which enforce the internal contradictory dynamics of global capital. These bridges should bring us more cautious insights about

the (limited) possibilities of structural change for the periphery and semi-periphery than over-optimism for GVCs and NIS (ARRIGHI; SILVER; BREWER, 2003).

The process of uneven economic and social development, reinforced by financialization, and the fact that GVCs have been at its core, pose strong challenges to industrial and technology policies. At least three main policy approaches emerge from our analysis, which governments could adopt. The first two have been explored by different governments and recommended by international organizations, whereas the third one would require particular social and political conditions.

The first one calls for liberalization and market-failure solving policies, with the aim of facilitating GVC deployment in domestic countries. However, they mislead the fact that the process of capital concentration and/or centralization and the consolidation of extremely powerful MNCs, which are behind GVCs, are the main consequence and cause of deep and pervasive 'market failures.'

The second one argues the need for governments to use a wide range of productive development policies to promote upgrading. The strength of this approach is in its 'realism.' Then, the only sensible and realistic policy is to give MNCs what they are looking for, namely a wide range of externalities derived from disarticulated NIS components, in particular: i) efficient business and communication infrastructure; ii) a trained and disciplined workforce; and iii) efficient local suppliers (or more precisely) national groups which coordinate this workforce and identify science and technology externalities. Other traditional demands are also present, such as the legal certainty or freedom to repatriate dividends in any context. If this is the case, some isolated MNCs will perhaps recognize the opportunity to profit from some NIS components, facilitating the development of some successful regional innovation systems or clusters. This approach could lead to a domestic economic and social dualism and deepen the uneven development among regions.

The third one calls for governments to go beyond providing 'externalities' to GVCs. The only way to try to avoid this tension between MNCs and NIS is to ensure the cohesion and interactivity between production and innovation systems, built upon national institutions and small and medium enterprises coordinated by a set of big state-owned corporations. GVCs can be incorporated into policies to the extent to which national environment has strong elements of cohesion. In some cases, such as agricultural and raw materials trading, it may be preferable to allow the participation of only some of them. However, it would require a strong government-oriented financial system. Since competitiveness is based on the capacity of domestic firms to articulate their own technology-related investments to public R&D, the degree of protection this investment receives against takeovers is vitally important. This is the only way national states can reproduce their capacity of differentiation in face of forces of selective homogenization.

FINAL REMARKS

This study aimed to critically analyse the recent debate about the efforts to integrate NIS and mainstream GVC approaches from a theoretical point of view. While GVCs represent a new organizational form created by MNCs to increase their control on value creation and appropriation, the mainstream GVC approach is unable to account for this new form of integration. Replacing production spaces for transactions makes it impossible to account for the tensions between GVCs and NIS. Considering that learning processes are the main bridge proposed for such integration, our analysis starts with two dimensions, linked to learning processes in NIS, which the recent debate has ignored: i) innovation understood as an interactive and systemic learning process in the national space; ii) and the influence of MNC strategies on NIS from the general perspectives of capital internationalization.

From this analysis, we noticed that these approaches offer different definitions for technological learning processes. While learning in NIS is based on problem solving and interactions between firms and other organizations with embedded institutions in the national environment, the GVC approach tends to assimilate learning with upgrading – in which success depends on the governance model in which firms are inserted. As GVCs reduce the level of complexity of learning to the complexity of transactions, they fail to explain the dynamic and complex essence of upgrading processes.

This difference has three consequences for integration attempts. First, it imposes the need to assimilate broad systemic learning processes to technology transfers. Second, it leads to a greater importance of the global space of firms over the national space of the State. New products and technological processes are valorised at the global space of firms and technology (and value) is 'created' in conception and production processes (not to mention labour processes), thus taking a 'concrete' place in firms at a national space. Third, it tends to narrow the international technology deployment of MNCs to a single specific mechanism (technology transfer) in detriment of others and underestimate the nodal role of MNCs in international technology sourcing.

Thus, we consider that combining the latest versions of GVC and NIS would be unfruitful not only because they refer to different objects of study but also because of their profound theoretical differences. Integration between the two approaches is only satisfactory if they are both analysed as the concrete expression of more general tensions between the internationalisation of capital and the role of the national space as the main generator of knowledge. These tensions are explained by the need of MNCs to valorise capital at a global scale and the possibility to create its material conditions at the national space. The latter provides not only conditions to quantitatively and qualitatively reproduce the labour force but also to strengthen the technological capabilities of MNCs, needed to produce commodities at the socially necessary labour time in a context of competition.

While productive internationalisation has resulted in a non-linear but mutually (and selective) reinforcing process between MNCs and NIS, financial internationalisation has reduced the scope of complementarity between MNCs and NIS. As new offshoring and outsourcing modalities of MNCs can be understood as an organizational form of this new stage of internationalisation, GVC results paradoxically better suit the analysis of appropriation mechanisms and the way that they can constrain learning. This enables us to understand GVCs as the result of a new configuration of the relation between capital-as-property and capital-as-function, which excludes 'leader firms' but prioritize surplus value appropriation over learning and value creation.

In our view, a deep understanding of the implications of these general phenomena (as well as the tensions between national and global scales in the world economy) requires recovering different contributions from the MNC literature which considered these organizational forms as concrete modalities which capital assumed to overcome the barriers preventing its expansion in certain geographical configurations. Returning to the origins of the NIS approach and the MNC literature contributions (which has studied this phenomenon for almost 30 years) would perhaps be a good start to an integration effort which drives fruitful recommendations for industrial policies for peripheral and semi-peripheral countries in the actual context of financial internationalisation.

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