Trajectories of structural change: Clustered or scattered? A Schumpeterian view on the evolution of Varieties of Capitalism

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Abstract

This paper examines how varieties of capitalism (VoC) shape the long-run evolution of productive structures. Analysing 72 countries from 1964 to 2017, it revisits the VoC approach from a Schumpeterian perspective of structural change. It introduces a novel indicator, scatteredness, based on economic complexity tools, measuring the dispersion of productive capabilities and their clustering around historical specialisation paths. Results show that institutional coordination mechanisms became clearly associated with distinct structural trajectories from the 1980s onwards. While both Coordinated Market Economies (CMEs) and Liberal Market Economies (LMEs) increased economic complexity, CMEs concentrated capabilities within productive clusters, whereas LMEs diversified across a wider range of activities. Extending the analysis to peripheral economies reveals heterogeneous trajectories: several Asian economies combined increasing complexity with different institutional forms, Eastern European countries converged towards coordinated or mixed models, while Latin America experienced declining complexity and scatteredness, associated with early deindustrialisation and a distinctive Peripheral Market Capitalism.

Key words: varieties of capitalism; structural change; economics complexity

JEL codes: P16, O14, O10

Highlights

- Schumpeterian perspective allows a dynamic analysis of Varieties of Capitalism (VoC)
- Regulations modes (VoC categories) leave observable traces in production structure
- Proposed “scatteredness” indicator captures these traces in productive structure
- Liberal/coordinated market economies differentiated since the 1980s in scatteredness
- Peripheries show heterogeneous responses to technological revolutions

Introduction

The Varieties of Capitalism (VoC) framework illuminates how institutional regulation shapes different capitalist development paths (Hall and Soskice, 2001). Persistent institutional differences generate distinct firm behaviours and productive activities. Hall and Soskice (2001) identify two ideal types of VoC: Liberal Market Economies (LMEs), where firms coordinate mainly via hierarchies and competitive markets, and Coordinated Market Economies (CMEs), where coordination occurs through strategic, extra-market interactions. CMEs' strategic coordination fosters labour stability and increase firm survival, encouraging investment in firm-specific assets and incremental innovation. In contrast, LMEs' market-centric institutions and flexible labour markets facilitate creative destruction via radical innovation and higher rates of death and birth of firms, jobs and activities. (Hall and Gingerich, 2009).

In particular, the national institutional framework would determine some comparative advantages that will shape the pattern of economic and technological specialisation and diversification (Boschma and Capone, 2015). By this way, the VoC approach has contributed critically to the understanding that there is no a single path of capitalist economic development. On the contrary, it is relevant to understand heterogeneous trajectories. However, this approach has shown limitations when analysing prolonged periods that encompass significant transformations in the technological and economic foundations of capitalist dynamics, as well as in its ability to account for forms of regulation and production beyond the centres of the system (Bohle and Greskovits, 2009; Schneider, 2013).

There is a broad and rich literature that has empirically tested the postulates of the VoC approach (e.g. Taylor, 2004; Alen et al., 2006; Akkermans et al., 2009; Herrmann and Peine 2011; Schneider and Paunescu, 2012; Lee and Shin, 2021; Chu and Kong, 2024). Most of the previous literature tend to corroborate the general propositions of the original VoC postulates (Hall and Soskice, 2001) for the central capitalist countries. However, these works do not arrive to conclusive results, stressing relevant heterogeneities within VoC ideal types, related to both the geographical context and the historical evolution. Regarding the geographical context, the capitalism varieties beyond central economies seem to be an elusive concept for a typological approach (e.g. Lane, 2005; Nölke and Vliegenthart, 2009; Schneider, 2009 and 2013; Buhr and Frankenberger, 2014; Lee and Shin, 2021). In addition, when historical change is introduced in the analysis, the discussion on the stability of the capitalist modes over time has regularly emerged (Nölke and Vliegenthart, 2009; Hundt and Uttam, 2017; Myant, 2018; Lee and Shin, 2021; Lee and Kim, 2024). The findings and interpretations in this literature are inconclusive as to how to adapt the VoC categories beyond the core capitalist countries, and have found conflicting evidence regarding the stability of the types of capitalism as postulated by Hall and Soskice (2001).

In this regard, Schumpeterian economics offer useful tools to analyse the diversity of capitalism according to the dynamics of structural change, productive specialization and diversification of national economies. Previous studies from this stream of research define economic development as a process of qualitative change in economic and productive structures, which may follow trajectories that are more or less disruptive in relation to the previous ones (Saviotti and Pyka, 2013). A qualitative change may be associated to an increase in the sophistication of the productive structure through related diversification, i.e. within the main sectors or activities

that drove the previous trajectory. Conversely, when the process of sophistication is driven by radically different activities or industries, new for the country´s trajectory, it is considered as unrelated diversification (Saviotti and Frenken, 2008; Dosi et al., 2022).

In turn, several contributions from the Schumpeterian approach have shown how the processes of structural change and productive diversification are associated to countries' income levels but also to the institutional framework, the industrial policies applied and the specialisation followed according to the technological product cycle (Lee, 2019; Bianchi et al., 2024). In this matter, a critical contribution from the Schumpeterian literature is the view on the cycling dynamics of capitalism according to the emergence, diffusion and consolidation of techno economic paradigms that transform a variety of institutional arrangement in the centres (Freeman and Pérez, 1988).

Both, VoC and Schumpeterian approach have highlighted the heterogeneity of capitalism and the critical differences between central countries leading industrial development and technological change regarding peripheral latecomers. Therefore, a key contribution to the dynamic study of the varieties of capitalism is the analysis of peripheries, considering the expanding waves of technological revolutions from the economic centres towards the peripheries of the system (Albuquerque, 2023). As some of the early contributors of the VoC approach has recently posed (Soskice, 2022), this perspective is particularly relevant in long periods that encompass historical turning points, such as the decline of the Fordist model and the gradual deployment of the ICT paradigm alongside the second globalization (Freeman and Louça, 2001).

Several questions are opening, particularly with regard to the patterns of structural change in the different types of VoC and their variations over time. In this sense, the research questions that guide our work are:

Do the different institutional regulation/coordination modes (namely the different VoC categories) leave a traceable print in productive structures?

If they do, to what extent the evolution of these traces since the 1960s resemble the original typology of VoC approach?

Are the VoC original types observable through the countries productive structure across the late Fordism and the emergence of the second globalization?

Finally, what can be inferred from the evolution of productive structure about peripheral VoCs?

In this article, we answer these questions, contributing with a novel approach linking the VoC typology with Schumpeterian analysis of economic dynamics. Firstly, this enables us to propose a novel analysis of trajectories of structural change in different types of capitalism. Secondly, by using tools from Complexity Economics, we create a novel indicator of the dispersion (scatteredness) or clustering of productive structures, which enables us to compare national trajectories along time using a uniform and consistent measure.

The indicator that captures the *scatteredness* of the productive structure measures to what extent productive capabilities are mainly clustered around a productive trajectory or if they are more dispersed (scattered) throughout the product space. Hence, using descriptive graphical techniques, we compare the evolution of the scatteredness of the national productive structures

regarding their relative level of economic complexity (Hidalgo, 2021) for a sample of 72 high- and middle-income countries between 1964 and 2017. By doing so, we identify the main clustering trends amongst countries and how these groups of countries have evolved over time. After that, we test the descriptive interpretations by estimating pooled and panel data econometric models.

Our results corroborate that the varieties of capitalism identified by Hall and Soskice (2001) for the core countries differ according to the scatteredness of their productive trajectory. In line with the VoC literature, both LME and CME, sustain high productive complexity as a general pattern. However, while LMEs have followed a path of unrelated diversification increasing the relative scatteredness of their productive structure, CMEs show a path of related diversification around their core productive sectors. The differentiation between these two groups of countries began during the 1980s and 1990s, the turning point for the Fordist paradigm and the emergence of the ICT paradigm.

On the other hand, analysing national cases of three peripheries of the capitalist system, we discuss specific aspects that differentiate these cases from the core countries. We can observe that Asian and Eastern European countries have increased the complexity of their productive structure, alternatively approaching CME or LME models according to the greater or lesser dispersion with respect to their historical trajectory in the processes of structural change. In Latin America, general trends of clusterization in productive structure can be observed, possibly as a consequence of the abandonment of the industrialization model and a strong specialization on natural resources since the 1980s. But in hard contrast to CME, a sharp decrease in complexity is evident in most countries in this region.

In summary, this paper offers a novel empirical contribution, based on a simple indicator of economic complexity, which presents consistent findings regarding the evolution of economic structures in the centres and peripheries of capitalism from the end of the Fordist paradigm to the advanced deployment of the ICT-based paradigm. This analysis is grounded in a theoretical synthesis that seeks to contribute to a dynamic and comparative understanding of the heterogeneity of the capitalist system.

1. The VoC approach from a Schumpeterian view

The original contributions of the VoC approach (Hall and Soskice, 2001) aimed to explain how persistent institutional differences between types of capitalism generate different economic comparative advantages. These authors draw on how the process of building capabilities by the firms is shaped by institutions that coordinate their interaction with other agents - unions, lobbying groups, government, financial institutions. According to this approach, firm-level capabilities encompass both internal and external aspects of firms. This refers to the way work is organised and the forms of corporate organisation, which will result in different forms of articulation between hierarchies and bargaining models. It also highlights a critical role for vocational training and the need for coordination mechanisms between firms seeking to secure a workforce with certain skills and workers deciding how much and in which skills to invest (Lorenz, 2012).

Hence, different forms of regulation and coordination between agents determine diverse Varieties of Capitalism. In turn, these varieties among the capitalist economies allow for different productive activities that involve different economies of scope, externalities and innovation processes. By this way, different varieties of capitalism are associated to the historical building process of comparative advantages in specific activities, which in open national economies that trade with each other, will lead to specialisation patterns (Hall and Soskice, 2001; Kim and Kim, 2023).

Studying developed countries, Hall and Soskice (2001) distinguished between two main VoCs' ideal types. The Liberal Market Economies[1] (LME), where firms coordinate activities mainly via hierarchies and competitive markets, and Coordinated Market Economies (CME)[2] where firms coordinate activities mainly through extra-market relations based on strategic interactions. Finally, they distinguished a group of intermediate cases - Mixed Market Economies (MME)[3] - that share features of both CME and LME.

Coordination in CME is driven by strategic dialogue between the agents, which promote labour stability and firms' access to information, allowing a higher firms' survival rate regarding the LME. Markets stability facilitates the investments in firms' specific assets, in addition workers are encouraged to invest in training specific to the firm's needs. In turn, competition process is based on product differentiation through incremental innovation rather than 'intense product competition'. It implies relatively soft creative destruction processes and high creative accumulation, which reinforce the technological trajectory (Bergek et al., 2013). Thus, there is a greater propensity to stay on the same technological path and the pressure for the sustainability of economic units is transformed into an impulse to innovate along the historical trajectory.

Conversely, the institutional framework of LME incentives the process of creative destruction through radical innovations that break with previous trajectories. Market interactions prevail over strategic dialogue between organizations, which, jointly with a flexible labour market, facilitate the birth and death of firms, technologies and productive sectors. This context encourages training in general skills and the investment in generic assets (Hall and Gingerich, 2009) which may be deployed in new and different activities, propelling a process of unrelated diversification towards novel trajectories.

These two main VoC types account for the most dynamic capitalist development models. When a country has the characteristics of either of these types, it is likely to have comparative advantages in innovation activities, whether these are of the creative destruction or creative accumulation types (Kim and Kim, 2023).

The concept of varieties of capitalism attempts to classify different modalities of a complex process such as capitalist development, which involves historical, geographical, economic and political dimensions. As has long been known, the construction of types or taxonomies cannot account for the richness and complexity of historical processes as they occur. Nevertheless, the VoC literature has shown interpretative capacity and offered a consistent theoretical framework for interpreting development processes in the core capitalist countries. However, the typological

[1] LME includes: Great Britain, US, Australia, Canada, New Zealand, Israel and Ireland. (Hall and Soskice, 2001)
[2] CME includes: Germany, Switzerland, Austria, Sweden Belgium, Finland, Netherlands, Norway, Denmark, Japan (Hall and Soskice, 2001).
[3] MME: Italy, France, Spain, Portugal, Turkey and Greece (Hall and Soskice, 2001).

approach leads to the fact that empirical efforts to analyse the propositions of the VoC approach, while identifying general patterns, show inconclusive results when analysing the varieties of capitalist development in a broad geographical framework and a long period of time.

Schumpeterian economics offer an interpretative framework for dynamic analysis and historical change in capitalist economies allowing to overcome some of the shortcomings of the VoC approach. In particular, the conception of capitalism as a dynamic phenomenon, characterised by cycles linked to the emergence, deployment and decline of different techno-economic paradigms (Freeman and Pérez, 1988; Freeman and Louça, 2001). This literature integrates the technological change as a critical driver of development, but also associated to socioeconomic regulation. It interprets the world-wide turmoil during the 1970s as the expression of the Fordism´s exhaustion and identifies a historical break in that period that end-up in a new techno-productive paradigm, unleashing far reaching productive changes.

In the same vein, the tools of Economic Complexity enrich the Schumpeterian approach, allowing to analyse the characteristics of different types of VoC and their trajectory of structural change. Economic Complexity follows an inductive approach to measure the capabilities of economic agents - firms, regions or countries - by observing what they produce and trade. The basic assumption underlying the complexity approach is that the activities that economic agents undertake offer a synthesis of their technological and productive capabilities (Hidalgo, 2021). This is complemented by the concept of relatedness between the capabilities needed to produce different knowledge and products (Boschma and Capone, 2015). According to this literature, there is a relationship between the capacities necessary for the production of the set of goods that a firm, region or country produces; and the probability to pursue diversification trajectories more or less close to its current productive activities.

Based on this view, Boschma and Capone (2015) applied Economics Complexity tools to the analysis of VoCs. In line with the early propositions of Hall and Soskice (2001), that firms operating in CME have a higher likelihood to invest in specific assets or in assets strongly related to the core trajectory, these authors state that CME countries have a higher probability to diversify in related sectors while LME have a higher probability to follow an unrelated diversification. Due to the comparative advantages that the countries' institutional framework creates to certain sectors (disadvantage in others), LMEs have comparative advantages in radical innovations and comparative disadvantages in incremental innovations and vice versa for CMEs.

Moreover, since the type of innovation is related to the technological industry cycle, sectoral specialization mediates the relations between institutions and innovation. Hence, emergent activities located in new sectors and based on new technologies, usually are the consequence of radical innovation, while mature sectors and technologies are associated to (and develop through) incremental innovations (Boschma and Capone, 2015).

Therefore, a country trajectory of structural change, would follow different successful diversification paths, more or less dispersed in relation of its historical trajectory, according to its accumulated comparative advantages.

2. Empirical evidence on Varieties of Capitalism

Since the publication of Hall and Soskice's (2001) work, many attempts to empirically test their propositions. For this purpose, different types of data have been used, generally corroborating the grouping patterns of national economies according to the LME and CME categories, but with heterogeneous and sometimes contradictory results. (Schneider and Paunescu, 2012; Walker et al, 2014; Kim and Kim, 2023).

Several authors tested the proposition that LMEs will present a higher probability of radical innovations while incremental innovation will prevail in CMEs. Analysing the patents and academic publications, Taylor (2004) partially corroborate these innovation patterns in the short term, but the differences between LME and CME countries decreases as the time period lengthens. Akkermans et al. (2009) refine the approach of Taylor (2004) considering the radicalness of innovation according to patent citations. By this method, these authors corroborated the propositions of Hall and Soskice (2001) for specific industries but also support the results of Taylor (2004), not observing a general pattern.

In this line, Schneider and Paunescu (2012) extend the original sample of Hall and Soskice (2001) including other central economies. Measuring radical and incremental innovations according to value added over R&D investment and considering a wide set of institutional variables for OECD's countries, these authors identified five types of VoC, including gradual variations of CME and LME, and a new type called "state dominated economies", that mainly includes Mediterranean countries. They mostly corroborate the postulates of Hall and Soskice (2001) but, analysing five time-windows, they identify changes between VoC types, putting in question the hypothesis of stability in VoC clustering.

On another hand, previous works pose that contradictory or not conclusive results on testing VoC typology, are due to empirical approaches unable to accurately distinguishing between different dimensions of countries' specialization – i.e. technological vs productive - (Meelen et al., 2017); or, due to use outcomes variables rather than processes ones which better capture coordination modes (Schmid and Kwon, 2020).

In line with the extant literature, we expect that the general patterns proposed in the VoC approach for the LME and CME, will be observed on the traces left in the economic structure. CME countries would tend to show greater clustering of productive capacities around sectors that reflect the main industrial conglomerates that, throughout history, have had institutional support to survive and develop. In this regard, CMEs are characterized by a qualitative diversification relatively close to a certain technological trajectory. This does not necessarily imply less productive diversification, since the variety of products around these clusters can be very large, but it does imply greater homogeneity of product types or of the technologies on which they are based. Moreover, we also expect to observe that these patterns are affected by cyclical changes over time

On another hand, LME countries tend to have greater technological and productive scatteredness, reflecting the greater stimulus to 'creative destruction' in the institutional context, showing less attachment to previous trajectories and thus more variety of technologically diverse initiatives. In this sense, scatteredness is used as an opposite to clusterization, referring to more evenly distributed capabilities (and revealed comparative advantages) across the product space.

3. Varieties of Capitalisms in the peripheries: an elusive concept

To the extent of this paper, we analyse three peripheral regions of capitalism: East Asia; Eastern Europe and Latin America. The selection of these three regions from among the peripheries of capitalism is due, on the one hand, to the fact that the conceptual approach on structural change and comparative capitalism is consistently applicable to countries or regions with a certain degree of economic development and productive diversification, which can be adequately captured in middle-income countries or countries that have attained high-income status during the period under analysis. Furthermore, this selection allows us to coherently apply the concept of periphery as a dynamic and heterogeneous space, where countries hold different position regarding the centres and can potentially move from the centre to the periphery and vice versa (Albuquerque, 2023).

3.1 The VoC approach on the peripheries

Multiple attempts have been made to extend the VoC analysis to the peripheries of the capitalist system, resulting in a rich literature which has shed light on the specific features of economic development beyond the central economies (e.g. Schneider, 2009; Buhr and Frankenberger, 2014; Hundt and Uttam, 2017; Feldman, 2019; Kim and Kim, 2023; Chu and Kong, 2024).

Studies on Asian capitalism have paid attention to the evolution of institutional features that shaped the growth and distribution regime in the economies that achieved high income level during the decades considered in this work. In this regard, East Asian countries have received relatively much attention from the VoC literature, even with several works that distinguished that the original typology of VoC does not fit for Asian economies (Witt and Redding, 2013) or proposing a specific type, mostly for East Asian countries, namely *state led capitalism* (Zhang and Whitley, 2013), or *networked market capitalism* (Walter and Zhang, 2012). The former, mostly inspired in the Korean experience, stress the relevance of state strategical leadership building alliances with large national firms. Conversely, the latter mostly captures the Taiwanese strategy, based on wide alliances among multiple national stakeholders.

In a similar vein, previous studies have shown not conclusive evidence on to what extent the original VoC classification fit for Eastern European countries. While Lane (2005) observed convergence with CMEs, later works (Nölke and Vliegenthart, 2009; Myant, 2018) criticized the idea of convergence of these countries to both the CME or the LME. However, all these works identified shared patterns and high heterogeneity in the Eastern European countries. In this vein, Nölke and Vliegenthart (2009) coined the concept of *dependent market economies*. Dependence refers to the critical role of foreign direct investment (FDI) and multinational companies (MNC) in the development model followed by Easter Europe since the transition from socialist planned economies, featured by the productive and trade integration with Western Europe on base of highly qualified and cheap labour force.

There is also a rich literature on VoC in Latin America, mostly built on the contribution of Schneider (2009 and 2013) and his concept of *hierarchical market economies* (HME). According to this author, the Latin American capitalism does not match with the classical types proposed by Hall and Soskice (2001), since neither market nor strategic mechanisms shape comparative

advantages in this region. On the contrary, Schneider poses that Latin American economies are characterized by different types of hierarchies. In particular, he stresses the high presence of MNC and patronage relations in diversified business groups. These features are reinforced by low skills, associated to low productivity and segmented labour markets. Moreover, these factors are strengthened for institutional complementarities between corporate governance and a political system that favour incumbents hampering new entrants (Sánchez-Ancochea, 2009; Cruz et al., 2023).

3.2 A Schumpeterian view from the centre-periphery approach

Previous works on VoC in the peripheries represent a great contribution to understanding capitalism heterogeneities. However, these works have mostly focused on a specific region or country, without a comprehensive argument on the peripheral capitalism (Prebisch, 1976).

The concept of the world economic system characterized by a centre-periphery structure enrich the VoC approach by recognizing the hierarchical interrelationships between different VoCs (Pérez Caldentey and Vernengo, 2023). In this sense, following the work of Albuquerque (2023), we understand that the productive structures of peripheral economies reflect the interaction between their position as latecomers in successive technological revolutions and the institutional arrangements through which they acquire, absorb and recombine technological and productive capabilities. Because technological revolutions reach peripheries unevenly and at different moments, peripheral countries do not reproduce the institutional–productive complementarities of capitalism centres, i.e. CMEs or LMEs. Instead, they develop heterogeneous configurations shaped by the timing of technological adoption, the mode of integration into the international economy, and their domestic capacity to coordinate learning and structural transformation.

In this line, integrating literature from Comparative Capitalism, Neo Schumpeterian economics and Structuralist approach, we can distinguish different ways these three regions entered or re-entered the global economy and how it helps to explain these peripheries participate in the expansive waves of technological revolutions.

The main explanation of the East Asian entry into the global economy after II World War can be summarized around the concept of state-coordinated and export-oriented late industrialization. After the early experience of Japan, South Korea, Taiwan and, later and in a different institutional configuration, China, used access to international markets and technologies as instruments for transforming their productive structures.

The literature has stressed the relevance of the capacity of relatively autonomous and technically competent state organizations to coordinate investment, direct credit, discipline firms and promote selected industries subject to certain conditions (Freeman, 1987; Amsden, 1989). These countries created initial advantages by mastering, adapting and improving technologies developed abroad rather by radical indigenous innovation. This was based on a sequential improving strategy supported by different mechanisms as an export-oriented discipline, selective technology imports and strong alliances with domestically controlled firms and supplier capabilities (Haggard, 1989; Amsden, 1989; Wade, 1990; Lane. 2005).

In sum, from a Neo-Schumpeterian perspective, East Asia entered the global economy through a capability-building strategy. International trade and technology flows were used to access existing technologies, which generate learning-by-doing and learning-by-exporting processes. This allows progressively developing indigenous innovation and exploit windows of opportunity created by new technological paradigms (Freeman and Pérez, 1988; Pérez, 2010). However, successful East Asian latecomers did not follow the same path of incumbent economies. They created "technological detours" according to technology cycles to avoid direct competition in sectors dominated by established firms (Lee 2013 and 2019).

Therefore, it is expected that East Asian economies display rising complexity, but not a single scatteredness pattern. Countries pursuing related diversification may become more CME-like and show clustered productive structures. On the contrary, countries entering several distant technological fields may show increasing scatteredness. The important common feature is that diversification has been supported by domestic capability accumulation and coordinated learning. Thus, in East Asia, both clustered and scattered structures can represent successful catching up, depending on the industrial organization and technological sequence followed.

Unlike East Asian economies, most Eastern European countries did not enter the global economy through a gradual, state-directed industrialization strategy. They inherited industrial, scientific and educational capabilities from socialist regimes, but also obsolete capital stocks, weak market institutions and firms poorly prepared for international competition (Myant, 2018; Radosevic, 2022).

After the sharp structural reforms period the prospect of EU membership was decisive. It provided access to the European market jointly with a stable institutional framework. Moreover, the incorporation into Western European production systems boosted a deep transnational economic integration (Bohle, 2018). FDI played a much more central role than it had during the formative stages in Asian countries. MNC acquired privatized firms or established new plants in several sectors. However, much technological control remained outside the region as stressed Nölke and Vliegenthart (2009) by the concept of *Dependent Market Economy*, where intra-firm hierarchies and multinational networks substitute for the market coordination of LMEs and the domestic inter-firm coordination of CMEs.

Eastern European integration seems to reflect a capability-modernizing integration, but only partially as capability-creating integration. The region brought significant pre-existing capabilities into the global economy – e.g. engineering traditions; industrial infrastructure; experience in machinery and manufacturing – and FDI recombined these capabilities with Western European capital, technology and market access (Nölke and Vliegenthart, 2009; Radosevic, 2022; Soyyiğit and Michalski, 2022).

This supported rapid movements into complex export industries. However, the model often produced functional specialization rather than complete technological catch-up. Therefore, it is expected that Eastern European countries resemble CME, where activities are expected to be clustered around some sectors related to their industrial traditions. But CME-like clustering does not necessarily imply CME-like complexity trajectory. Moreover, in this model, the central productive clusters may be coordinated externally by MNC rather than by domestic firms.

On another hand, the main explanation of Latin America's integration into the global economy is based on the commodity-export specialization, associated to external demand restrictions and

dependence on foreign capital and technology. Contrasting Eastern Europe and East Asia, Latin America did not "enter" the global economy in the post-war moment. Its modern productive structures were deeply shaped by successive forms of global integration since the colonial period (Bértola and Ocampo, 2012). After the primary-export model (1870-1930), sequential development models alternate state led industrialization first, and market oriented structural reforms later.

The structural reforms implied a strong creative destruction processes that changed the industrial specialization of the region creating different sub regional patterns: Mexico and Central America follow a strong insertion into US manufacturing value chains; South America: renewed specialization in agricultural, mineral and energy commodities; Brazil follows a hybrid trajectory combining commodities, a large domestic market and a partially preserved diversified industrial base; while the Caribbean economies specialized in tourism, services, offshore activities and selected assembly industries. Moreover, the commodity boom experience between 2003–2013 strengthened natural-resource-intensive specialization in much of South America after earlier periods of partial export diversification (Cimoli and Katz, 2003; Ocampo, 2017; Isabella, 2024).

In sum, Latin America can be characterized as a case of heterogeneous but weakly capability-building integration. The region repeatedly takes advantage of external commodity booms and access to large markets, but these episodes frequently fail to generate cumulative technological learning across the national economies (Pérez Caldentey and Vernengo, 2017; Isabella, 2024; Bianchi and Isabella, 2025).

Therefore, we expect that changes in scatteredness may reflect temporary entry into distant activities without sustained capability accumulation; disappearance of industrial activities during crises; simultaneous expansion of isolated commodity and service sectors; premature deindustrialization and contraction of the product space. A decline in both complexity and scatteredness would then indicate not coherent specialization around a strong cluster, but capability loss and productive contraction.

4. Methods and Data

We worked with exports data for a broad set of middle- and high-income countries (72 countries, see Appendix 2) for the period 1962–2017 using the Standard International Trade Classification Revision 2 (SITC 2) at four digits of disaggregation, which was obtained from *The Growth Lab at Harvard University, 2025.* The data was averaged in trienniums to avoid the effects of possible specific data errors and economic anomalies. The Economic Complexity Indexes (for each country/year) were taken from the same source.

For each triennium, the product space was calculated as the matrix containing the proximities between any possible pair of products. *Proximity* is a relation between two products that expresses the (minimum) conditional probability that given the presence of one product in a certain country's productive structure, the other will also be present (equation (1); Hausmann and Klinger, 2007). This is interpreted as a measure of the similarity in the capabilities needed to produce competitively these two products and, thus, as the inverse of the degree of difficulty to start producing one product departing from the production of the other.

It is important to stress that in this literature (and in this paper), the productive structure of countries is observed through their exports, and specially through those products in which the country is specialized, what is assumed when the Revealed Comparative Advantage (RCA) indicator[4] (Balassa, 1965) is equal or greater than 1. In this way, when we refer to a product "present in" or "produced by" a country we mean that the product is exported by the country with RCA>=1.

The literature on this topic has shown that products are not randomly located across the product space but tend to cluster according to their activity sector and sophistication level, defining a dense core where highly sophisticated products show high proximity to each other and a sparse periphery where less sophisticated products are located and show low *proximity* to most other products (Hausmann and Klinger, 2007; Hidalgo et al., 2007).

Using equation (1) we calculate the product space:

$$\phi_{j\,i} = min\left(\frac{\sum_c M_{cj}M_{ci}}{\sum_c M_{cj}}, \frac{\sum_c M_{cj}M_{ci}}{\sum_c M_{ci}}\right) \quad (1)$$

where ϕ_{ji} is the *proximity* between products *j* and *i*. M_{cp} is a vector for each product 'p' (*j* and *i* in this case) in which each element corresponds to a country 'c', and it takes the value 1 if the country is specialized in that product and 0 otherwise. The product space is then constructed calculating this relation for any possible pair of products for each triennium. It is expressed as a symmetric matrix in which any element informs the proximity between row-product and column-product.

The Economic Complexity Index (ECI; Hausmann and Hidalgo, 2014) is an indicator that ranks countries according to the complexity of their export basket, which is calculated iteratively from their diversification (how many different products they export) and the ubiquity of products they export (how many other countries also specialize in these products).

To calculate the indicator *Scatteredness*, we use the *proximity* indicator. In equation (2) $\emptyset_{ji}$, refers to the *proximity* between products *j* and *i*. *Mcp* is, again, a vector for each product '*p*' (*j* and *i*) in which each element corresponds to country '*c*', and takes the value 1 if the country is specialized in that product and 0 otherwise. *N* refers to the number of different products produced by country '*c*' in that period. The *S* indicator is defined for each specific year/period, so any variable refers to the corresponding year/period.

$$S_c = \frac{\sum_j \sum_i McjMci\,(\frac{1}{\emptyset_{ji}})^{\square}\; i \neq j}{N(N-1)} \quad (2)$$

The *scatteredness* indicator, equation (2), sums the inverse proximity (as a measure of *distance*) of every pair of products in which the country currently specialises, and divides that number by

[4] The RCA compares the share of a product in total exports of a country with the share of that product in total world´s exports.

the total pair of products considered in the numerator; yielding in that way, the average *distance* between its products of specialization. In this sense a high value means that the country has developed capabilities in very different sectors, which demand highly heterogeneous capabilities (low *proximity* between them), depicting a scattered figure when projected in the product space. On the contrary, a low value means that the country has developed highly clustered capabilities around some (or many) sectors.

An important clarification to be made is that scatteredness does not mean productive diversification. A high average distance between products in which the country has developed RCA may be consequence of RCA in just a few sectors, but very different (e.g. garments and agricultural products). On the contrary a low indicator may be consequence of RCA in many sectors, in all of which the country has diversified into many close products, resulting in high clustering level.

All indicators are calculated for each triennium in relative or standardized terms and the comparisons across (groups of) countries always refer to the same period. Then, the evolution of relative positions is used to assess the trajectories of countries across time.

To analyse the evidence, we follow a two-step approach. First, by using descriptive statistics and graphical analysis, we study the countries' evolution according to the complexity and the scatteredness of their productive structure. To this end, we select a more limited set of countries, including all the advanced economies originally considered in Hall and Soskice's analysis, as well as selected economies from the periphery: Korea, Taiwan, Singapore and Hong Kong from Asia; Hungary, Poland and Romania from Eastern Europe; and Argentina, Brazil, Mexico, Colombia, Chile and Venezuela from Latin America.

Second, we estimate a set of econometric models using pooled Ordinary Least Squares (OLS) and panel-data specifications. The OLS estimations provide an initial assessment of the relationship between scatteredness and economic complexity, while the panel specifications exploit the longitudinal structure of the data by accounting for both cross-country and temporal variation. We initially estimate random-effects (RE) models because they allow us to incorporate time-invariant institutional characteristics that are central to our analysis. However, the standard RE specification requires the unobserved country-specific effects to be uncorrelated with the explanatory variables.

We assess this assumption using the Hausman–Mundlak approach, which rejects the orthogonality assumption underlying the conventional RE estimator. We therefore rely on Mundlak's (1978) correlated random-effects (CRE) approach as our preferred panel specification. This approach allows the unobserved country-specific effects to be correlated with the regressors while retaining the ability to estimate time-invariant institutional characteristics. Standard errors are clustered at the country level to account for potential heteroskedasticity and serial correlation within panels. The econometric strategy is defined to answer the research questions that guide the study. In particular, to test whether differences between types of VoC are indeed observed in the core economies – LME and CME – as well as to identify their stability over time and possible points of rupture, dummy variables are used according to VoC type and sub-periods – relating to paradigm shifts. This makes it possible to identify the relationship between VoC and the scatteredness index, but also, through the use of interaction terms, to identify the specific changes in each period according to the type of VoC.

5. Results

5.1 Stylized facts

The evolution of the complexity and scatteredness indicators corroborate the importance of considering the long-term dynamics associated with changes in techno-economic paradigms, as well as the heterogeneity between both centre and periphery and between peripheries.

Figure 1 presents the evolution of the relationship between ECI and the *scatteredness* (S) indicator (standardized value) for selected countries. For the sake of clarity, we have selected three time-windows (1964-1966, 1991-1993 and 2015-2018) that capture the main changes in the evolution of the countries' trajectories. The first window (1964-1966) represents the phase of Fordist model while the second window (1991-1993) illustrates the phase after the crisis of the Fordist model and the liberal adjustment. Finally, the last window (2015-2017) represents the phase of expansion of globalization and the ICT based techno-economic paradigm.

The graphs plotted in Figure 1 represent the position of the countries according to the relationship between the interest variables divided into quadrants according to the median of the distribution of these variables for the whole database. It is worth highlighting that considering the world economy allows us capturing the relative position of the countries under analysis in the global capitalist system in each historical period.

A clear negative relationship between S and ECI is observed in the first triennium 1964-1966, suggesting a well stablished techno-economic paradigm in which complexity is associated to a few, well defined, set of sectors, around which advanced countries tended to diversify. This trend is progressively attenuated along the 1970s and early years of the 1980s, when critical changes transformed the Fordist model. These changes opened up new advanced activities, different to previous clusters, as a consequence of radical innovations. Since the end of the decade of 1980s, the relationship between complexity and *scatteredness* presents a cloud-like shape with no definite trend and with countries' clusters that broadly corroborate the types of VoC identified by Hall and Soskice (2001).

These indicators offer a novel approximation to the common characteristics of the comparative advantages of both CME and LME. As it can be seen, in most recent years, the countries originally included in the work of Hall and Soskice (2001) tend to cluster according to their classification in VoC, with few exceptions: LME (blue circles) in higher levels of S; CME (blue squares) in lower levels of S; both of them show high ECI levels; while Mixed (or Mediterranean) Market Economies (MME) (blue triangles) cluster at intermediate levels of S and lowers levels of ECI.

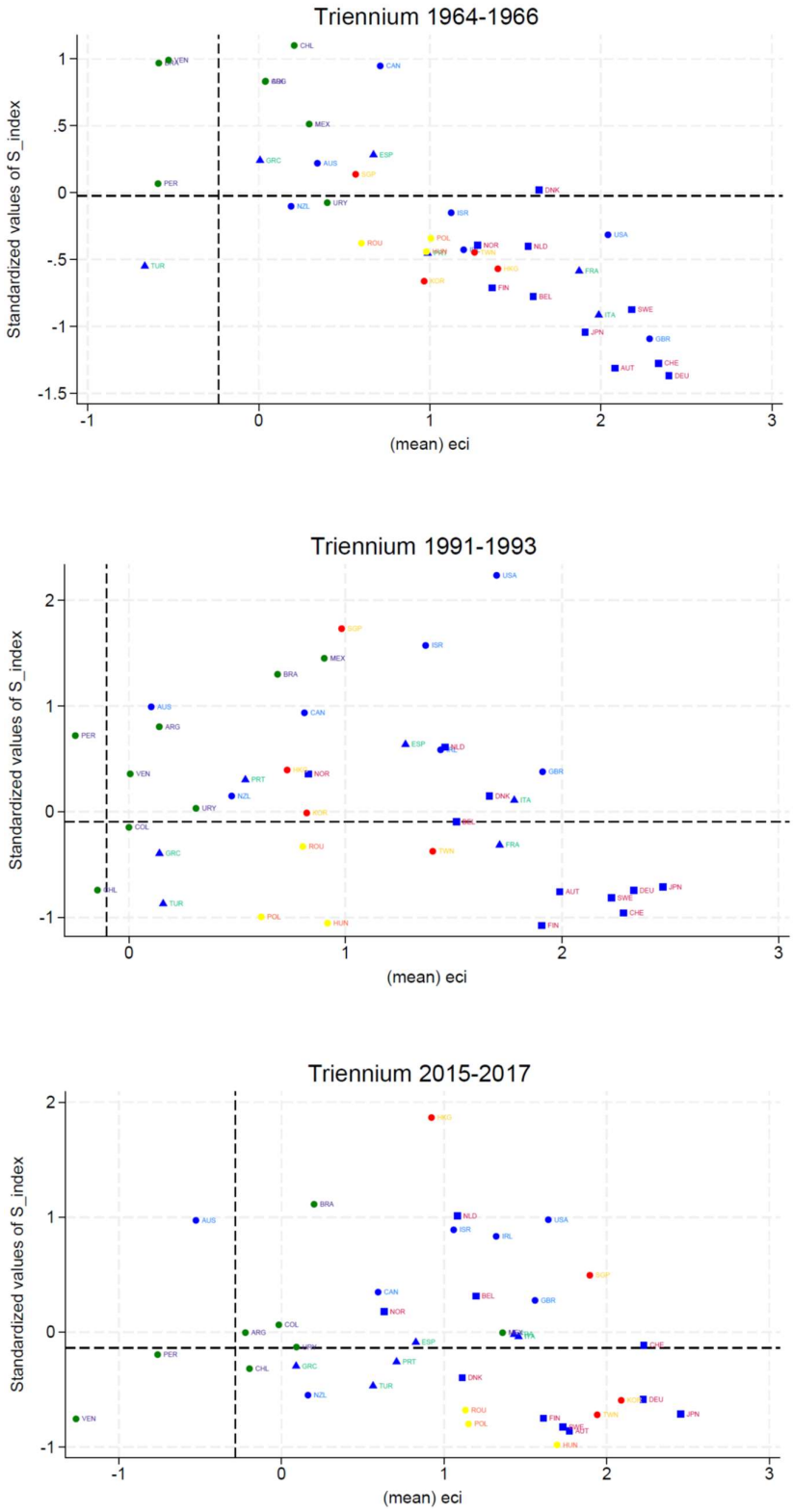
It seems that, since the 1970s, important changes occurred in world technology and productive systems that allowed central countries to keep their position of high productive sophistication through two main different ways. First, a process of related diversification on base of incremental innovations is depicted in the CMEs' trajectories: Japan, Germany, Austria, Finland, Sweden and Denmark are clearly in the bottom-right quadrant; while Switzerland is very close to it, exactly over the border of S. These countries were diversifying around some historical clusters of productive and technological expertise, showing high proximity between the products, what determines low levels of S, as had been the norm during Fordism. Second, LME diversifying in very distant activities, increasing dramatically the level of S, suggesting that in these cases high complexity and diversification are associated to the creation of new productive

paths through non-related diversification associated to radical innovations. Most LME countries clustered in the top-right quadrant: USA, Israel, Ireland, Great Britain and Canada. Australia also shows very high S, in line with its classification as LME, but a clearly lower level of sophistication, probably associated to its strong focus on mining (Gelb, 2012).

Moreover, France and Italy, also highly industrialized countries, show highly sophisticated economic structures, but, aligned to the Hall and Soskice (2001) classification as MME, they show intermediate levels of scatteredness, the same as Spain, Portugal, Turkey and Greece, that still seem quite laggard in sophistication, specially the last ones. On the other hand, the exceptions, challenging Hall and Soskice´s classification in the last periods are Netherlands, Norway and Belgium, which despite being classified as CME, tend to cluster with LME, and New Zealand in the opposite situation.

Besides these last cases, descriptive results suggest that effectively, the evolution of productive structures show differentiated prints according to the regulation modes. As Hall and Soskice (2001) posed, both CME and LME reflect a high development of comparative advantages, associated to different technological trajectories and institutional coordination mechanisms.

Figure 1: Complexity and scatteredness of productive structures of national economies: 1964-1966; 1991-1993 and 2015-2017



Note: Blue Squares: CME; Blue Circles: LME; Blue Triangles: MME; Red Circle: Asian; Green Circles: Latin American; Yellow Circles: Eastern Europe.

Using a sample only with the core countries analysed by Hall and Soskice (2001), we apply econometric models to analyse the evidence regarding the relationship between the types of VoC proposed by those authors and the evolution of the productive structure.

As explained in the methodological section, while three different specifications are shown (OLS, FE and Mundlak), the last one is considered the most appropriate, and so, the preferred one. The other two are only shown as robustness checks. Results presented in Table 1 confirm the general negative relation between complexity (ECI) and scatteredness previously observed in the descriptive analysis. More importantly, it also confirms the clear differences observed between CME (omitted variable) and LME with regard to S; that is, to the scatteredness of the productive structure. Using both, pooled and panel data (random effects and Mundlak), the LME dummy variable, applied to all countries identified in that category by Hall and Soskice (2001) during the whole time-frame, presents significant positive value.

Moreover, the differences between CME and LME seem to have its roots before the 1980s. When interacting the LME dummy with time dummy variables, it shows-up that the differentiation is ongoing during the 1980s and intensifies in the 1990s, in relation to the first period pre-1980s, omitted, what coincides with the crisis of Fordist model and the liberal adjustment, and then, the first stage of the second globalization. That suggest that during Fordism there was one well stablished trajectory for sophistication, with heterogeneities, but no varieties of capitalism yet, as shown in the first chart in Figure 1. However, during the 1980s and 1990s some countries, particularly those that later would become LME, engaged in structural change processes through non-related diversification, increasing their S' values in relation to other advanced countries. This means that the varieties of capitalism consolidated leaving a clear print in productive structures, but, later, since the 2000s the difference tends to vanish.

Table 1: Regression models for OECD countries (Omitted: CME and Pre-1980s)
Dependent variable: Standardized S

	(1) Pooled OLS	(2) Random Effects	(3) Mundlak (CRE)
ln(GDP per capita)	1.688***	0.762**	0.694
	(0.377)	(0.321)	(0.429)
ln(Human Capital)	-0.987	-0.210	-1.785
	(1.091)	(1.187)	(1.929)
Natural Resources share	-0.056	-0.019	-0.026
	(0.047)	(0.034)	(0.039)
Gross Investment / GDP	-0.471	0.837	1.046
	(1.220)	(0.654)	(0.645)
Total Export Value (USD)	0.000**	0.000**	0.000*
	(0.000)	(0.000)	(0.000)
Economic Complexity Index (ECI)	-0.569***	-0.366**	-0.334*
	(0.158)	(0.147)	(0.174)
1980s	-0.436***	-0.273***	-0.150
	(0.117)	(0.099)	(0.108)
1990s	-0.299*	-0.028	0.159
	(0.147)	(0.130)	(0.149)
2000s	-0.334	0.214	0.499**
	(0.233)	(0.187)	(0.201)
Post-2011	-0.994***	-0.141	0.261
	(0.317)	(0.231)	(0.248)
DME	0.016	0.973	1.146
	(0.778)	(0.849)	(0.710)
LME	0.729***	0.866***	0.590**
	(0.217)	(0.282)	(0.294)
MME	0.322	0.455	0.503
	(0.357)	(0.388)	(0.380)
1980s # DME	0.653***	0.416**	0.580**
	(0.142)	(0.173)	(0.270)
1980s # LME	0.348**	0.300**	0.274*
	(0.140)	(0.134)	(0.141)
1980s # MME	0.270*	0.189	0.242
	(0.155)	(0.146)	(0.167)
1990s # DME	0.042	-0.173	0.070
	(0.198)	(0.205)	(0.327)
1990s # LME	0.516**	0.521**	0.485*
	(0.243)	(0.244)	(0.250)
1990s # MME	0.286	0.234	0.334*
	(0.174)	(0.151)	(0.185)
2000s # DME	1.032	-0.080	0.131
	(1.001)	(0.462)	(0.535)
2000s # LME	-0.213	-0.227	-0.277
	(0.278)	(0.287)	(0.323)
2000s # MME	-0.150	-0.217	-0.075
	(0.194)	(0.207)	(0.255)
Post-2011 # DME	1.085	-0.193	0.096
	(0.857)	(0.447)	(0.596)
Post-2011 # LME	-0.358	-0.386	-0.459
	(0.273)	(0.289)	(0.351)
Post-2011 # MME	-0.085	-0.268	-0.090
	(0.232)	(0.248)	(0.319)
mean ln(GDP per capita)			1.768**
			(0.792)
mean ln(Human Capital)			1.087
			(2.365)
mean Natural Resources			-0.059
			(0.071)
mean Investment Share			-6.489*
			(3.357)
mean Export Value			0.000

			(0.000)
mean ECI			-0.273
			(0.188)
Constant	-15.512***	-7.926***	-22.727***
	(3.349)	(2.475)	(6.403)
Observations	357	357	357
R^2	0.628		

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Approaching the issue from a different perspective, we run another estimation with ECI as dependent variable (Table 2) for the whole dataset of 72 countries (See Appendix 2). Countries were grouped in the three VoC distinguished by Hall and Soskice (CME, LME and MME) and, for the sake of clarity, a fourth category called DME, that groups all the countries selected from the peripheries. As in previous estimations, the omitted category is CME, and the omitted period is the pre-1980s. While, in column (1) pooled data OLS regression, confirms the negative relation between ECI and S evident in Figure 1, that relation does not hold with panel data. Particularly, in the Mundlak (CRE) specification (Column 3), the relationship reverts to a positive and (weakly) significant sign. It suggests that, despite a general cross-section negative relation, focusing in the within effect, countries that increased their scatteredness, that is, that underwent structural change processes based on unrelated diversification, did not generally lose sophistication, and possibly increased it. This is reinforced by the fact that, in Mundlak specification, the coefficient of the mean S is negative, strongly significant and greater, in absolute value, than the coefficient of S (see Appendix 1). That is, the between effect (captured by that parameter) is negative, while the between effect tends to be positive.

Table 2. Regression estimates: ECI as dependent variable.
(Sample: 72 countries of high and medium income)

	(1) Pooled OLS	(2) Random Effects	(3) Mundlak (CRE)
Standardized S_index (s_indez_z)	-0.486***	0.157	0.308*
	(0.077)	(0.126)	(0.172)
Pre-1980	0.000	0.000	0.000
	(.)	(.)	(.)
1980s	-0.105	-0.138	-0.216
	(0.120)	(0.109)	(0.138)
1990s	0.126	-0.169	-0.229
	(0.109)	(0.169)	(0.205)
2000s	0.046	-0.336*	-0.402*
	(0.117)	(0.177)	(0.228)
Post-2011	-0.528***	-0.690***	-0.698***
	(0.163)	(0.186)	(0.243)
1980s # s_indez_z	0.010	-0.114	-0.238**
	(0.094)	(0.098)	(0.111)
1990s # s_indez_z	0.098	-0.236*	-0.365**
	(0.101)	(0.143)	(0.160)
2000s# s_indez_z	-0.049	-0.412***	-0.534***
	(0.092)	(0.156)	(0.175)
Post-2011 # s_indez_z	-0.067	-0.345**	-0.480***
	(0.119)	(0.138)	(0.154)
DME	-0.169	-0.947***	-0.499**
	(0.166)	(0.280)	(0.229)
LME	-0.070	-0.898***	-0.410**
	(0.187)	(0.313)	(0.188)
MME	-0.231	-0.464	-0.766***
	(0.300)	(0.283)	(0.270)
DME # s_indez_z	0.299**	-0.325**	-0.272

	(0.112)	(0.139)	(0.171)
LME # s_indez_z	-0.030	-0.187	-0.537**
	(0.202)	(0.149)	(0.210)
MME # s_indez_z	-0.154	-0.251	-0.621**
	(0.344)	(0.247)	(0.277)
1980s # DME	0.127	0.080	0.248
	(0.169)	(0.126)	(0.168)
1980s # LME	0.080	0.110	0.242*
	(0.132)	(0.118)	(0.137)
1980s # MME	-0.092	0.048	-0.034
	(0.151)	(0.164)	(0.161)
1990s # DME	-0.164	-0.037	0.203
	(0.193)	(0.182)	(0.224)
1990s # LME	-0.177	0.132	0.327
	(0.286)	(0.163)	(0.235)
1990s # MME	-0.122	-0.045	0.183
	(0.205)	(0.244)	(0.240)
2000s# DME	-0.260	0.044	0.355
	(0.198)	(0.194)	(0.234)
2000s# LME	-0.444	0.172	0.339
	(0.291)	(0.168)	(0.261)
2000s# MME	-0.340	-0.078	0.157
	(0.226)	(0.220)	(0.223)
Post-2011 # DME	0.108	0.279	0.587***
	(0.202)	(0.174)	(0.218)
Post-2011 # LME	-0.467**	0.174	0.282
	(0.214)	(0.153)	(0.202)
Post-2011 # MME	0.007	0.045	0.451**
	(0.282)	(0.188)	(0.217)
1980s # DME # s_indez_z	-0.044	0.226**	0.217
	(0.137)	(0.114)	(0.158)
1980s # LME # s_indez_z	0.094	0.139	0.267**
	(0.140)	(0.121)	(0.124)
1980s # MME # s_indez_z	-0.185	0.212	0.002
	(0.316)	(0.196)	(0.257)
1990s # DME # s_indez_z	0.025	0.503***	0.418**
	(0.169)	(0.158)	(0.185)
1990s # LME # s_indez_z	0.151	0.213	0.409**
	(0.187)	(0.158)	(0.171)
1990s # MME # s_indez_z	0.475	0.349	0.752**
	(0.433)	(0.329)	(0.350)
2000s# DME # s_indez_z	0.109	0.707***	0.538**
	(0.224)	(0.202)	(0.220)
2000s# LME # s_indez_z	0.444*	0.525***	0.788***
	(0.232)	(0.167)	(0.264)
2000s# MME # s_indez_z	1.228**	0.445	1.450***
	(0.546)	(0.356)	(0.372)
Post-2011 # DME # s_indez_z	0.013	0.444**	0.254
	(0.221)	(0.202)	(0.238)
Post-2011 # LME # s_indez_z	0.281	0.318*	0.723**
	(0.256)	(0.174)	(0.329)
Post-2011 # MME # s_indez_z	1.220**	0.355	1.788***
	(0.586)	(0.299)	(0.439)
ln(GDP per capita)	0.474***	0.183	0.161
	(0.134)	(0.112)	(0.138)
ln(Human Capital)	-0.063	0.645	0.336
	(0.439)	(0.407)	(0.581)
Natural Resources	-0.058***	-0.010	-0.005
	(0.013)	(0.011)	(0.011)
Gross Investment / GDP	0.082	-0.774*	-1.400**
	(0.504)	(0.461)	(0.553)
Total Export Value (USD)	0.000***	0.000**	0.000
	(0.000)	(0.000)	(0.000)
mean s_index_z			-0.498***
			(0.138)
mean ln(GDP per capita)			0.410*
			(0.242)
mean ln(Human Capital)			-1.502*
			(0.784)
mean Natural Resources			-0.064***
			(0.012)

mean Gross Investment / GDP			2.174**
			(1.003)
mean Total Export Value (USD)			0.000***
			(0.000)
Constant	-3.467***	-0.447	-3.322**
	(1.110)	(1.039)	(1.672)
Observations	522	522	522
R^2	0.776		

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

More importantly to our research concerns, when focusing on the double interaction effects of S with time-dummies and with VoC categories, it can be seen that, for LME, it is positive, significant, and increasing with time, meaning that these countries managed to increase sophistication while performing unrelated diversification. We noted in the first estimation (Table 1) that LMEs increase their S in the 1980s and 1990s with respect to CME. Now, the double-interaction term reveals that this unrelated diversification process was associated to complexification. In other words, since the 1980s, LMEs differentiate from the CME (omitted) finding ways to increase sophistication through unrelated diversification. Also, the peripheries (DME), since the 1990s, seem to find ways to increase sophistication through unrelated diversification, what coincides with a period in which many emerging countries, especially in Asia, started to grow through structural change and industrialization.

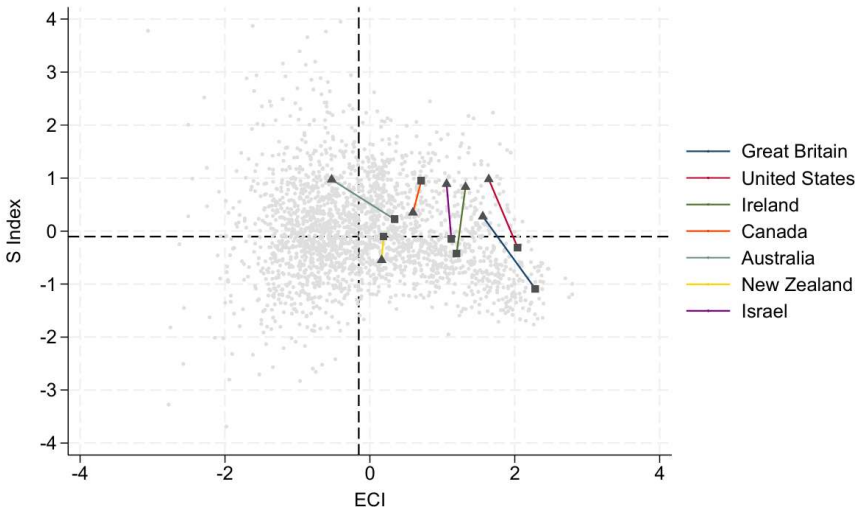
5.2 VoC and productive complexity along time

Hall and Soskice (2001) elaborated on the relevance of institutional stability for the functioning of capitalist models despite later works have questioned stability within VOC types (Schneider and Paunescu, 2012; Lee and Shin, 2021).

Figures 3 and 4 present the evolution of selected LME and CME countries along time, for the whole period studied (1964-2017), but, for the sake of clarity, only linking the first and last observation of each country according to the scatteredness and the complexity of their productive structure. As mentioned above, both types of countries present high levels of complexity but, the former are above the median of the scatteredness distribution while the latter are below it. Nonetheless, Figure 3 allows observing the movement of Great Britain from a zone of low scattering during the Fordist period towards a more dispersed productive structure since the 1990s, when this country joins the other LMEs in the upper right-hand quadrant of the chart. This movement seems to reflect the end of the Keynesian model of development in Great Britain and the progressive market-oriented transformation, as has been stressed by political science researchers (Baccaro and Howell, 2011; Egerton, 2021)

Although in a less marked trend, departing from a higher scatteredness level, US and Ireland show a similar trajectory, while New Zealand highlights because of it trends in the opposite direction, but the net movement seems small.

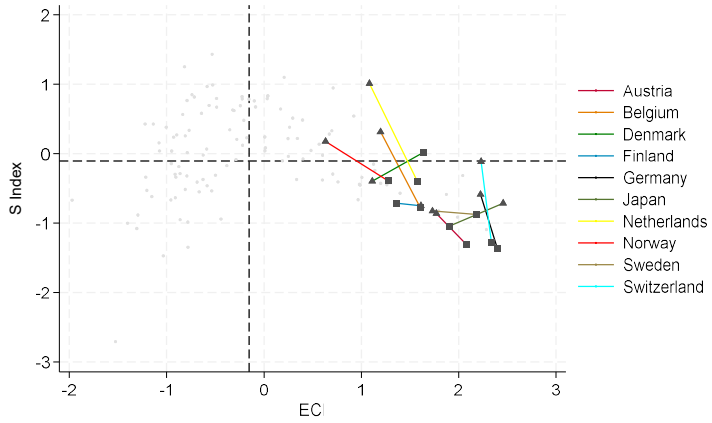
Figure 3 National evolution according to ECI and Scatteredness. LME selected countries



Note: Square correspond to the first data (1964-66), while triangle signals the last observation (2015-2017)

Figure 4 highlights the cases of Netherlands, Norway, and Belgium, classified as CME by the VoC literature, but that since the triennium 1988-1990 are also located in the upper right quadrant. Following previous works (Schneider and Paunescu, 2012), we interpret that the case of Netherlands is explained by the expansion of new tech industries; conversely, the divergence of Norway from CMEs seems reflecting the emergence of this country as oil producer and exporter. In the same vein, the Belgian case appears to reveal the successive processes of structural change, from the growth of heavy industry after the II World War to the subsequent diversification into knowledge-intensive manufacturing and services (Cassiers et al., 1996). These three cases increased the diversity of capabilities, and so, the average distance between the different sectors in which countries show comparative advantages. In an opposite way, Japan, Germany, Sweden and the other countries classified as CME seem to reinforce the strong clusterization of their capabilities.

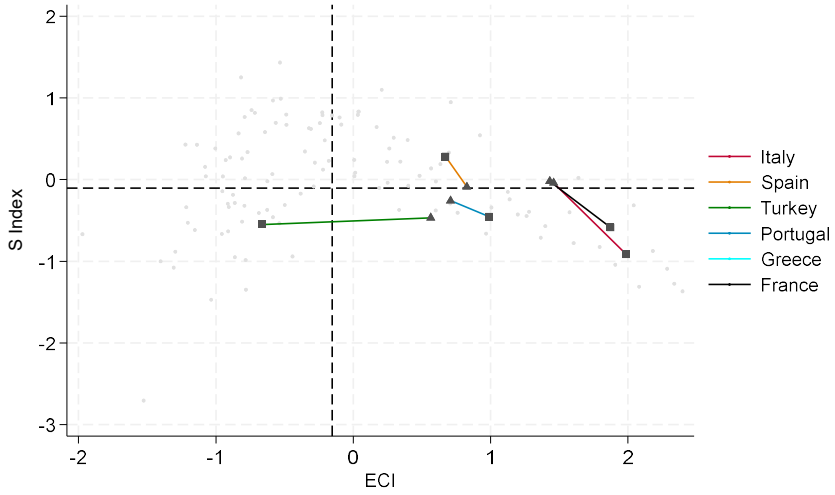
Figure 4 National evolution according to ECI and Scatteredness. CME selected countries



Note: Square correspond to the first data (1964-66), while triangle signals the last observation (2015-2017)

When the evolution of these variables is observed for MME countries, beside the intermediate levels of scatteredness, in line with what it is expected according to their VoC definition, it is clear that France and Italy stand out in this group because of the initial high level of complexity of their products and their very similar characteristics to CMEs. However, they both show a trend of increasing scatteredness and, at the same time, losing complexity, moving from a zone close to CME to a much more LME-like region. Turkey, in the opposite trend, shows a process of transformation of its economy associated with greater complexity and structural change while maintaining the trajectory of productive specialisation (low scattering), while Greece and Spain show little changes (Burrone et al., 2022).

Figure 5. National evolution according to ECI and Scatteredness. MME selected countries



Note: Square correspond to the first data (1964-66), while triangle signals the last observation (2015-2017)

5.3 Trajectories of productive structure in the capitalism peripheries

Capitalism peripheries follow uneven processes, which, depending on national cases and historical moments, are close to, or far from, the mainstream models: CME or LME (Lee and Shin, 2021; Lee and Kim, 2024). However, there is no a common interpretation of the evolution of peripheral capitalism. We take this approach further by analysing peripheries based on common concepts and indicators, which are interpreted according to how these regions have been integrated into the global system.

Figure 6 illustrates the temporal trajectories of the four selected Asian economies (Hong Kong, Singapore, Taiwan, and Korea) in terms of ECI and S. All four economies start in the 1960s from relatively similar positions, characterized by intermediate levels of economic complexity and low levels of dispersion, suggesting a high degree of clustering in their productive structures. An exception is Singapore, which already exhibits comparatively high initial levels of S. Since then, the trajectories diverge and the economies cluster into two distinct groups.

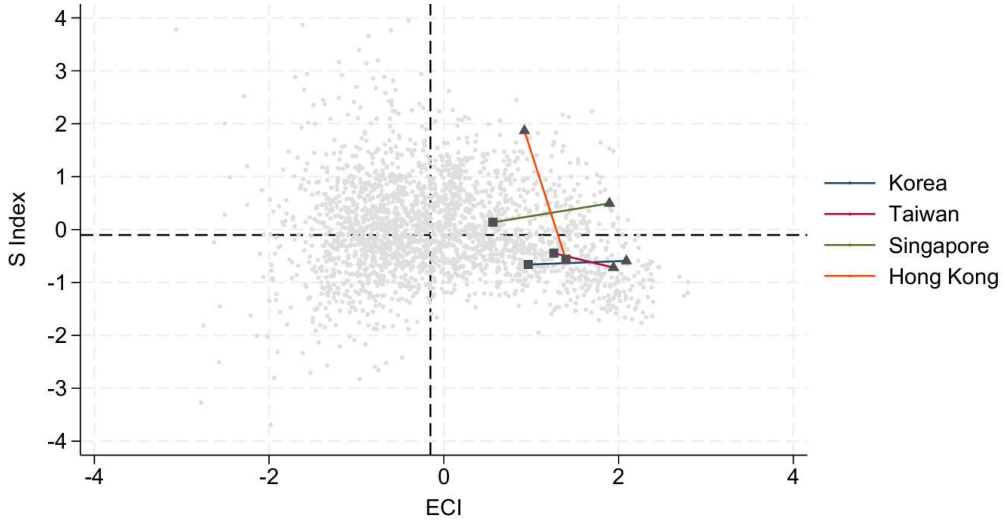
In line with the existing literature (Lee and Shin, 2021; Lee and Kim, 2024; Chu and Kong, 2024), we observe that Singapore and Hong Kong converge towards the upper-right quadrant of Figure 5, similarly to LME-type countries. In contrast, Korea and Taiwan move towards the lower-right quadrant, similarly to CME-type countries, which is associated with a pattern of structural

transformation characterized by high economic complexity and relatively low dispersion around their technological production core.

Hong Kong's trajectory is unique in that, unlike the other three Asian countries considered, it does not follow a process of increasing complexity, but rather an accentuated increase in the scattering of its production structure.

These results are in line with the interpretation posed by Hundt and Uttam (2017), who identify common factors between the cases of Singapore and Hong Kong on the one hand, and between Korea and Taiwan on the other hand. According to these authors, the development pattern of Hong Kong and Singapore was shaped by their strategic port code and the role they played during British colonisation. However, Hong Kong's development model is characterised more by a liberal bias, while Singapore's is characterised by a strong state – authoritarian- presence. Conversely, they refer to the influence of Confucian culture from in Korea and Taiwan, that shape cultural values and habits. In both there was a strong presence of the state through active public policies but, as previously mentioned the Korean model has been characterized by a top down – state-led - strategy while the Taiwan model has followed a bottom-up networked strategy.

Figure 6. National evolution according to ECI and Scatteredness. Selected Asian countries



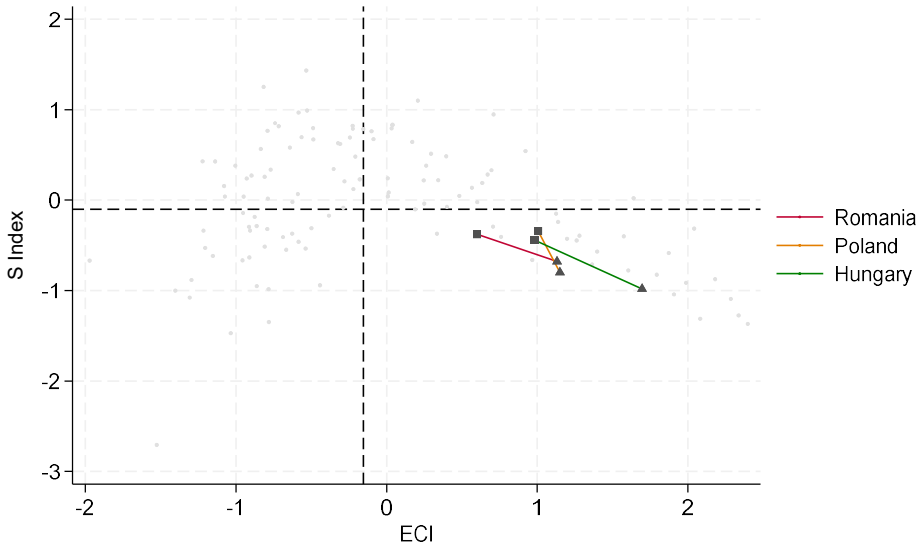
Note: Square correspond to the first data (1964-66), while triangle signals the last observation (2015-2017)

On another hand, Eastern European countries show strong similarities with the CME and especially the MME types (Figure 6). With lower levels of economic complexity than the former and less scatteredness than the latter, the three cases analysed are grouped in the lower right quadrant, with a sustained trajectory of increasing complexity in the last trienniums considered.

These trajectories rather than reflect a domestically coordinated clustering, characteristic of mature CMEs, it implies an externally coordinated clustering, characteristic of dependent industrial integration, where the strategic built of productive trajectories are defined by MNC and foreign investors. These results are coherent with the concept of dependent market capitalism (Nölke and Vliegenthart, 2009), and seems corroborate the observation that after the capitalism's crises of 2008, the slowdown in foreign investment revealed the strong dependence

of Eastern European countries on external fluxes of capital to sustain their development model, which reinforce the divergence process regarding the central VoC types (Myant, 2018).

Figure 7. National evolution according to ECI and Scatteredness. Selected East European Countries

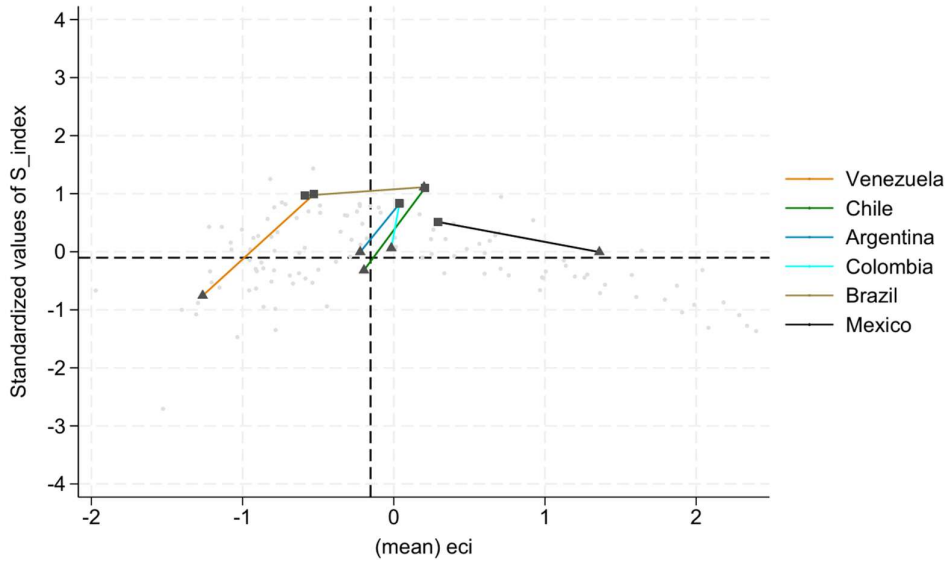


Note: Square correspond to the first data (1964-66), while triangle signals the last observation (2015-2017)

Finally, Latin American countries (Figure 8) show greater differences regarding both: VoC types of central capitalism and the previously analysed peripheries. With lower levels of complexity and erratic trajectories of structural change, such as Brazil, with moments of relatively high growth and sophistication increase, and subsequent decline in the complexity indicator. It highlights the case of Mexico, the only Latin-American country in the dataset that achieve a sustained increase in complexity (Bianchi et al. 2024).

In the first trienniums considered, which correspond to the last phases of the Stated Led Industrialization process (Bértola and Ocampo, 2012), Latin American countries show especially high scattered values (Figure 1). It seems reflecting the rich, even arguably inefficient process of industrialization in Latin America (Cimoli and Katz, 2003). The value of this indicator has decreased since the crisis of the 1980s and the subsequent process of economic liberalisation. Hence, the general trend of clusterization of productive structure may be reflecting the abandonment of the industrialization model and the strong specialization on natural resources since the 1980s. But in hard contrast to CME, these countries, with the exception of Mexico, show a sharp decrease in complexity levels, suggesting a particular evolution according to the way they participate in the global trade exchange. In this respect, Latin American capitalism reveals the chronic constraints facing processes of structural change and diversification, pointing to what might be labelled as Peripheral Market Economies.

Figure 8. National evolution according to ECI and Scatteredness. Selected Latin American countries



Note: Square correspond to the first data (1964-66), while triangle signals the last observation (2015-2017)

6. Discussion and conclusions

This paper revisits the VoC approach from a Schumpeterian perspective by analysing how institutional coordination shapes the long-run evolution of productive structures. Rather than focusing on institutions themselves, we examine the productive capabilities that emerge from different coordination regimes. In doing so, we propose that productive structures show traces of the institutional modes through which countries accumulate, recombine and renew capabilities over time. The scatteredness indicator introduced in this paper provides a simple way of identifying these historical prints by capturing whether structural change proceeds mainly through diversification around existing productive clusters or through the development of capabilities in technologically distant activities.

Our findings broadly corroborate the central intuition of Hall and Soskice (2001): different institutional coordination modes are associated with different trajectories of productive specialization. However, they also suggest that these relationships are more dynamic than the original typology implies. Coordinated and Liberal Market Economies have both sustaining highly sophisticated productive structures, but they reach this outcome through different patterns of diversification. CMEs tend to reinforce historical productive clusters through related diversification and cumulative capability building, whereas LMEs display a greater tendency towards unrelated diversification, progressively increasing the dispersion of productive capabilities across the product space. These differences become clearly observable only from the 1980s onwards, coinciding with the decline of Fordism and the emergence of the ICT paradigm. This historical timing suggests that varieties of capitalism should be understood not as immutable institutional equilibria but as historically contingent responses to successive and uneven techno-economic cycles.

This dynamic interpretation helps reconciling apparently contradictory findings in the empirical VoC literature. Rather than questioning the validity of the original framework, the evidence suggests that institutional complementarities evolve together with technological conditions. The paradigms transition modified the relationship between institutions, innovation and structural change, allowing different forms of capitalism to exploit distinct mechanisms of capability accumulation. Therefore, institutional diversity is better understood as a co-evolutionary process linking regulation, technological change and productive transformation than as a stable taxonomy of national economies.

The analysis of the capitalist peripheries reinforces this interpretation. Existing extensions of the VoC literature have proposed new institutional categories—such as state-led, networked, dependent or hierarchical capitalism—to characterize Asia, Eastern Europe and Latin America. While these contributions have substantially enriched comparative capitalism, they have generally remained region-specific. Our results make a complementary interpretation. Peripheral economies show different institutional responses to a common structural condition: late participation in successive technological revolutions and asymmetric integration into the world economy. From this perspective, East Asian economies illustrate capability-building integration, combining external technology acquisition with strong domestic learning and sustained structural upgrading. Eastern European countries represent capability-modernizing integration, where inherited industrial capabilities have been recombined through foreign direct investment and integration into European production networks, although strategic technological control remains largely external. Latin America, by contrast, exhibits heterogeneous but predominantly non-cumulative trajectories, in which recurrent episodes of commodity-led growth and market liberalization have failed to generate sustained capability accumulation, producing erratic structural change and, in several cases, premature deindustrialization.

This interpretation also highlights an important implication for the scatteredness indicator itself. Similar levels of productive dispersion may reflect fundamentally different development processes. In advanced LMEs, greater scatteredness is associated with successful unrelated diversification based on strong innovative capabilities. In peripheral economies, however, similar productive configurations may result either from genuine capability expansion or from fragmented specialization driven by external demand, multinational corporations or commodity cycles. Accordingly, scatteredness should not be interpreted in isolation but jointly with economic complexity and with the historical trajectory through which productive capabilities have been accumulated.

The paper has some limitations. The scatteredness indicator is an indirect measure of the organization of productive capabilities rather than of institutions themselves, and therefore cannot fully capture the mechanisms through which institutional coordination affects structural change. Likewise, export structures reveal only part of countries' productive capabilities, while ownership structures, innovation systems and firm-level organization remain outside the scope of the present analysis. Future research could integrate these dimensions by combining productive structure with evidence on innovation networks, multinational ownership and industrial policy.

More broadly, this paper argues that comparative capitalism can benefit from shifting its analytical focus from institutional typologies to the long-run evolution of productive capabilities. Institutions matter not only because they coordinate firms differently, but because they leave persistent, although historically changing, prints on productive structures. Analysing these prints through the joint lenses of economic complexity and Neo-Schumpeterian structural change provides a dynamic perspective that helps bridge the Varieties of Capitalism literature with theories of technological revolutions, capability accumulation and centre-periphery development. In this sense, varieties of capitalism are not only different institutional configurations; they are also different historical trajectories through which national economies organize learning, diversify production and adapt to successive waves of technological change.

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Appendix 1. Econometric interpretation using the Hausman–Mundlak approach

Aiming to illustrate the interpretation of the estimates, we start by presenting the standard equation for the estimation of the unobserved effects model written for unit *i* (country, firm, individual) in period t:

$$y_it = X_it\,\beta + \alpha_i + \varepsilon_it$$

where y_{it} represents the dependent variable, X_{it} is a vector of time-varying regressors, α_i denotes the time-invariant individual-specific unobserved heterogeneity, and ε_{it} represents the idiosyncratic error.

The fundamental econometric issue lies in the covariance structure between the unobserved heterogeneity α_i and the explanatory variables X_{it}:

$$Cov(\alpha_i, X_{it})$$

Traditionally, the literature addresses this decision through two competing alternatives: i) Random Effects (RE), that assumes strict orthogonality, i.e. $Cov(\alpha_i, X_{it}) = 0$. It efficiently utilizes both intra-unit (within) and inter-unit (between) variation via GLS. However, if α_i is correlated with X_it, the RE estimator becomes biased and inconsistent. ii) Fixed Effects (FE / Within Estimator), that eliminates α_i using the time-demeaning transformation for each individual: $y_{it} - \bar{y}_i$. It is consistent even if $Cov(\alpha_i, X_{it}) \neq 0$, but it loses all between variation and does not allow for estimating coefficients of time-invariant variables.

Instead of forcing a choice between the strict consistency of FE and the efficiency/flexibility of RE, Mundlak (1978) proposes formally parameterizing the latent correlation between the individual effect α_i and the explanatory variables X_it.

Specifically, it projects *α_i* linearly onto the time average of the explanatory variables for each unit:

$$\alpha_i = \bar{X}_i\lambda + u_i$$

where $\bar{X}_i = \frac{1}{T}\sum_{t=1}^{T} X_{it}$ denotes the time mean for unit *i*, λ is the projection coefficient, and u_i is a random error term truly orthogonal to the regressors: $Cov(u_i, X_it) = 0$

Substituting this projection into the structural panel equation yields the adjusted Mundlak model (Correlated Random Effects - CRE):

$$y_{it} = X_{it}\beta + \bar{X}_i\lambda + u_i + \varepsilon_{it}$$

To rigorously understand what the estimated λ represents, let us consider the two sources of variation in a panel: i) the Within model (dynamic): $(y_{it} - \bar{y}_i) = (X_{it} - \bar{X}_i)\beta_{within} + (\varepsilon_{it} - \bar{\varepsilon}_i)$; ii) the Between model (structural): $\bar{y}_i = \bar{X}_i\,\beta_{between} + \alpha_i + \bar{\varepsilon}_i$

Taking time averages in the expanded Mundlak equation for unit *i*:

$$\bar{y}_i = \bar{X}_i\,\beta + \bar{X}_i\,\lambda + u_i + \bar{\varepsilon}_i = \bar{X}_i(\beta + \lambda) + u_i + \bar{\varepsilon}_i$$

Since the coefficient β of the original regressor in the Mundlak equation is mathematically identical to the FE estimator: $\beta = \beta_{within}$

we equate the Between slope with the sum of the Mundlak parameters:

$$\beta_{between} = \beta_{withi} + \lambda$$

Solving directly for lambda yields the key theoretical identity:

$$\lambda = \beta_{between} - \beta_{with}$$

The parameter λ is not a first-order direct effect. It measures the gap or contextual difference between how the dependent variable responds when comparing units across each other at a structural level ($\beta_{between}$) versus how it responds when evaluating the evolution of the same unit over time (β_{within}).

Appendix 2. Database

The whole database includes all the countries with a population greater than 2 million in 2017, and which are classified as high or medium-high income by the World Bank (https://blogs.worldbank.org/es/opendata/understanding-country-income--world-bank-group-income-classifica): Albania, Algeria, Argentina, Armenia, Australia, Austria, Belgium, Brazil Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Czechia, Denmark, Dominican Republic, Ecuador, El Salvador, Finland, France, Germany, Greece, Guatemala, Hong Kong SAR, China, Hungary, Indonesia, Iran, Islamic Rep., Iraq, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Korea, Rep., Kuwait, Lithuania, Malaysia, Mexico, Moldova, Mongolia, Netherlands, New Zealand, Norway, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela.

Regression presented in Table 1 includes the following countries: Australia, Austria Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States