**State-firm Coordination and Upgrading in Spain's and Korea's ICT Industries**

January, 2020

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ABSTRACT

Generating sustainable growth and reaching advanced economy status Political economy; state depend on the ability of countries to host local, globally competitive activism; businessfirms in skill-, capital-, and knowledge-intensive industries. However, few government relationships; countries succeed. This paper asks whether state activism is necessary to industrial upgrading; late development foster economic transformation at high levels of complexity in the globalisation era, and if so, what strategies are effective. Using evidence from Spain’s and Korea’s ICT industries since the 1980s, the paper argues that state-firm coordination remains necessary to reach the efficiency frontier in complex industries. However, coordination has shifted from hierarchical structures to nonhierarchical models in which states and firms develop mutually agreed-upon working rules to reach beneficial outcomes. Nonhierarchical coordination may involve adopting different institutional configurations, depending on the identities and capabilities of firms and national governments and on the nature of linkages with other nations. These linkages may lead to alternative pathways to upgrading and diverse productive specialisations.

**Keywords**: political economy, state activism, business-government relationships, industrial upgrading, late development.

# Introduction

For liberals (Hayek 1944), economic development and sustainable growth require solid macroeconomics, market liberalisation, state retrenchment, and an export orientation. In the post-1980s context, they also require firms’ participation in global value chains (GVCs) and upgrading, or progressive shifting from low-value to higher-value activities (Gereffi et al. 2005). Upgrading increases value creation and capture, which are expected to translate into higher living standards and therefore development (Sen 1999).

Increased participation in GVCs correlates with a drop of over one billion in the number of people living in absolute poverty between 1990 and 2013 (World Bank 2016). But reaching the highest echelons of the global division of labour to become an advanced country is not easy. In 1980, 79 countries had per capita incomes that were between 20 and 50 percent of the US’ per capita income. By 2016, only 21 had raised their standard of living above 50 percent of the US’ (Maddison Project Database 2018). Of these ‘new advanced economies’ (NAEs), eight have economic structures that depend on extractive industries or agriculture, and only three (Spain, South Korea,1 and Taiwan) are the home base of at least one lead firm that controls the process of design, production, and distribution of a global production network, has global market power, and a recognisable brand name.

Unorthodox economists (Rodrik 1997, 2017, Chang 2002, 2011) criticise the liberal view for downplaying the role of government in mobilising and allocating resources. Backing their claims, the literature on the developmental state (DS) (Johnson 1982, Amsden 1989) articulates an alternative view of development based on proactive states, coherent bureaucracies and linkages to business

(Evans 1995). However, the DS literature is a theory of state power (Weiss 1998). It emphasises firms’ role in empowering the state rather than the processes through which firms develop the resources and capabilities needed to develop complex competitive advantages. In addition, the DS literature identifies the developmental approach with a strategy that involves ‘the pursuit of local manufacturing capacity, technological autonomy, and export competitiveness (Thurbon 2016, p. 16). The underlying implication is that this is the only pathway to the efficiency frontier.

Finally, several recent DS contributions engage with the ‘middle-income trap’ (Gill and Kharas 2007, Doner and Schneider 2016, Wade 2016). For fiscal year 2019, the World Bank (WD) defines middle income economies as those that have income per capita levels that range between 2 and 20 percent of that of the US ($996–$12,055).2 In empirical studies, this correlates with having firms that operate in low, rather than middle-, to upper-value segments of GVCs (Sturgeon et al. 2013, Gündoğdu and Saracoğlu 2016). The WB then defines high-income economies as those that have income per capita levels of $12,056 or above. However, this definition does not distinguish between countries that operate in the middle and upper-middle segments of GCVs and the world’s richest economies.

How then do we explain economic development at high levels of complexity? This paper starts from two related assumptions. First, generating the type of sustainable development that enables countries to reach advanced country status depends on the ability of a country to host local, globally competitive firms with market power in skill-, capital-, and knowledge-intensive (complex) industries. Second, reaching advanced country status depends on the ability of local firms to reach the higher value-added segments of GVCs.

To ensure we focus on the appropriate set of countries, this paper defines advanced economies as those whose income per capita are above 50 percent of the US. The paper also introduces an intermediary category of economies whose income per capita levels are above 20 percent and below 50 percent of the US income per capita. We then focus on countries whose per capita incomes were between 20 and 50 percent of the US’ per capita income in 1980 but raised their standard of living above 50 percent of the US’ by 2016 and call these countries new advanced economies (NAEs). This eliminates large emerging countries such as India and China. Within the group of NAEs, we further concentrate on economies with complex structures, defined as those that are the home base of at least one lead firm that controls the process of design, production, and distribution of a global production network, has global market power, and a recognisable brand name.

This paper, then, asks three related questions: Is state activism necessary to reach the highest levels of global production networks in complex industries? What forms of activism and state-firm interactions can foster upgrading? Are there different but equifinal pathways to upgrading, and if so, what determines a country’s choice of pathway?

The paper builds on Porter’s Stages of Development, the Resource-Based View (RBV), the Dynamic Capabilities literature, and Varieties of Capitalism (VoC) to argue that state activism is necessary to resolve coordination problems linked to the development of firms’ resources and dynamic capabilities in NAEs. We draw on the literatures on the DS and the logic of collective action to present a model of state-firm coordination based on nonhierarchical interactions and the pursue of mutually beneficial outcomes. The negotiated nature of state-firm interactions opens up space for different institutional configurations leading to alternative yet, equifinal pathways to upgrading.

The paper contributes to a firm-centric institutionalist literature that explores economic transformation. It builds on the DS framework to explain late stages of development and provides an empirically based interpretation of state activism that reflects the context of globalisation and transcends the Asian roots of the literature. Finally, the paper speaks to the literature on upgrading by characterising two different yet equifinal pathways.

The argument is based on evidence from Spain’s and Korea’s information and communication technologies (ICT) industries between the 1980s and the 2010s. Spain and Korea are examples of classic DS. They industrialised rapidly in the 1960s and 1970s on the basis of multi-annual development plans inspired by the French and Japanese examples (Jones and Sakong 1980, Amsden 1989, Pérez 1997, Smith 1998). From the 1980s, both countries followed parallel growth trajectories as they became integrated in the global economy (Figure 1). With the exception of Taiwan, they are the only two countries that have managed to host competitive lead firms with global market power in complex industries.

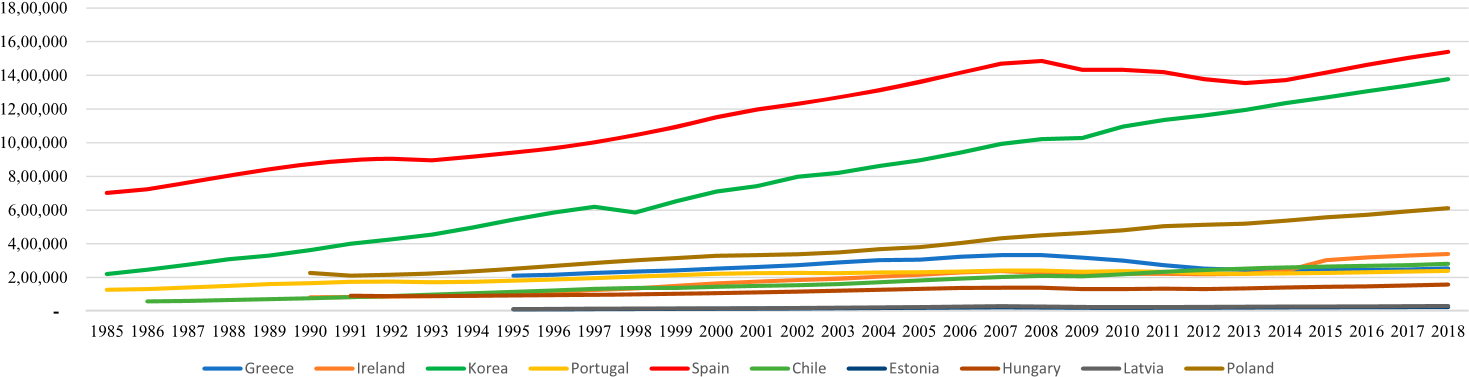


Figure 1. Gross domestic product in US dollars by volume, constant exchange rates.

OECD Economic Outlook n.101 (2017).

ICT’s deep intersectoral linkages, its post-1980s role in enabling global production changes, its high level of capital, skill, and knowledge, and its oligopolistic nature make it central to understanding economic transformation – and one of the most difficult environments in which to reach lead firm status.

Within ICT, the paper concentrates on telecommunications services (voice and data transmission over fixed and mobile networks) and telecommunications equipment (network and user equipment corresponding to the UN’s SITC classification subgroup 764.1). These two segments are closely interrelated (one provides demand for the other); represent Spain’s and Korea’s productive specialisations; and were the fastest growing segments of ICT during the period of analysis. The study concentrates on the period between 1985 to the early 2010s to capture critical transformations in Spain’s and Korea’s economies and a full industry cycle between the liberalisation of telecommunications services and the rise of platforms.

The research is based on process tracing and cases studies. It presents Spain and Korea as countries with different institutional structures, histories and external linkages that faced a comparable transformational challenge and managed it differently (Table 1).

The analysis is based on data from Spain’s and Korea’s electronics industry associations, the OECD’s Internet and Telecommunications Statistics, and the OECD Broadband Database. Thirty semi-structured interviews with civil servants, managers, and scholars conducted in Spain and Korea between 2011 and 2016 complement and help interpret data from other sources.

Section two of the paper builds the argument, section three develops it through empirical evidence and section four summarises and concludes.

# Argument

## Development, Upgrading, and Coordination

Achieving advanced development depends on the ability of a country’s industry to upgrade. Porter (1990) identifies three stages of development based on whether firms compete on the basis of (1)

# Table 1. ICT industry, percentages (2017).

|  |  |  |
| --- | --- | --- |
|  | Spain | Korea |
| Hardware | 18% | 73% |
| Software | 13% | 11% |
| Services | 69% | 16% |
| Total | 100% | 100% |

Sources: AMETIC (2018) and KISDI (2018).

factor endowments and natural resources; (2) low-order advantages based on investment, costs, and scale; or (3) complex advantages based on processes, organisational efficiencies and product features. This paper uses the term upgrading to refer to the transition from the second to the third stage.

The firms most likely to upgrade are those that muster resources and capabilities that are valuable, rare, imperfectly imitable, and non-substitutable (Barney 1991). Firms also need the capacity to integrate and reconfigure internal and external resources, organisational skills, and functional competences to respond effectively to changes in their environment (Teece 1997). A firm’s ability to build its stock of resources and capabilities depends on firm-level features, especially its size and internal organisation, but also on the characteristics of its home country institutional environment. This is because many of the capabilities they need depend on factors that socially embedded and whose access depends on coordination between firms and other external national actors (Hall and Soskice 2001). The Varieties of Capitalism literature identifies five such areas of coordination: industrial relations, education, corporate governance, interfirm relations, and employees.

By connecting dynamic capabilities to interactions between firms and national actors, VoC redefines upgrading as a coordination problem. However, where Hall and Soskice argue that coordination based on markets or extensive relational links (strategic coordination) can be equally supportive of profitable economic activity, this paper considers that market coordination is unlikely to provide adequate support for upgrading. First, complex advantages are by nature rare and imperfectly imitable, which means they cannot be purchased directly through markets (Teece et al. 1997). Second, global markets organised around GVCs unchain forces that discourage upgrading. Firms operating in the middle rungs of GVCs can remain profitable for long periods of time by exploiting existing cost advantages via specialisation, scale, and commercial expansion, a dependency strategy known as the ‘maquiladora syndrome’ (Smith 1998). In addition, firms from less advanced countries have incentives to sell their interests to foreign investors rather than upgrade, especially in complex industries where cost and risks are high. Third, less developed economies tend to have ‘institutional voids’, that prevent firms from obtaining the resources they need from their local ecosystem (Khanna and Palepu 2000). Business groups can help overcome limitations linked to generic resources such as patient capital or talent with general skills (Leff 1978, Khanna and Yafeh 2007). But they are less effective at bridging gaps related to industry-specific advanced knowledge (Berger 2013, Mazzucato 2013), specialised skills or international networks (Kim 2012). Intermediary agents such as unions and industry associations may also help bridge the gap, but compared to their counterparts in advanced corporatist countries they often lack a tradition of actively contributing to strategic decision-making processes.

States are possibly the only actors capable of orchestrating coordination in these cases. States are responsible for building and maintaining the economic architecture of a nation; they have a unique responsibility towards the common welfare, possess overarching capacities that surpass those of any individual firms, and have significant resources at their disposal to help firms develop industry-specific resources and capabilities. However, only states that have an intrinsic, long-term motivation to change their country’s standing in the world may decide to play an activist role (Thurbon 2016).

Even then, resolving coordination problems efficiently will depend on the quality of the norms or institutions governing state-firm interactions. These are institutions that establish patterns for information exchange, dialogue, and deliberation; enable actors to monitor compliance; and sanction deviant behaviour (Ostrom 1990). In theory, state-firm coordination can take one of three possible forms: two in which either the state or the firm dominates the other actor, and one in which both have equal status. The state-centric model that drove industrialisation in East Asia is no longer feasible. Liberalisation has eliminated important sources of state power over firms and firms have matured and gained power (Weiss 1998). Corporate capture of the policy-making process is associated with low levels of innovation and competitiveness (Hellman and Kaufmann 2001). Therefore, it is unlikely to drive upgrading. This leaves us with nonhierarchical coordination. We define this as a structure in which both the state and firms exercise control over their decisions and come to develop a set of mutually agreed-upon working rules that enables both parties to reach beneficial objectives. Like Weiss ‘governed interdependence’ (GI) (1994), nonhierarchical coordination is built on public-private interdependences. However, as a state-centric perspective, GI tends to neglect the needs of firms or the processes through which they develop complex competitive advantages. In addition, in nonhierarchical coordination firms not only empower the state it, but the state empowers insider firms and enables them to achieve their objectives. Finally, nonhiearchical coordination contemplates diverse pathways to upgrading.

## Pathways to Upgrading

Several factors may influence a country’s choice on how to pursue upgrading. This paper focuses on two that highlight the specificities of NAEs.

The ‘logic of appropriateness’, is a sense of what is suitable and feasible according to the identities and capabilities of the actors involved (March and Olsen 1989). For the purpose of upgrading, the identity of firms is determined by its specialisation. Even within an industry, firms operating in different segments tend to have different and sometimes conflicting needs (Porter 1990). Because countries will normally have firms operating in several subsegments of an industry, any given strategy will support some firms but deprive others of the resources and capabilities they need to upgrade. Preexisting production structures, the origin and the size of firms will influence such choices. Production structures that are heavily skewed toward a specific subindustry will tilt the balance in their favour. Local firms have more incentives to engage with the state than foreign invested firms, which always have an exit option (Porter 1990). Large firms can devote more resources to build a relationship with the state and exert greater influence in their favour due to their contribution to the national economy.

The identity and capabilities of the state depend on the characteristics of the bureaucracy and the background and orientation of policy makers. Economic development is linked to the presence of coherent bureaucracies with well-defined career prospects (Johnson 1982, Evans 1995), supportive adjacent agencies (Weiss 1998, Hall and Soskice 2001), and elites who share a common background (Breznitz 2007, Hancke 2001).

The literature also points out the role of shifts in the ideological orientation of decision makers in changing policy direction (Thurbon 2016). Less studied is the role of cross-national differences in the educational background of policy makers on a country’s strategy for upgrading.

This paper argues that when combined with different organisational structures, cross-national differences in the educational background of policy makers will lead to different types of governments. We distinguish between ‘technoindustrial’ and ‘generalist’ governments. The first tend to have high-profile technology ministries headed by individuals with technical backgrounds (engineering, physics). These specialists tend to prefer upgrading strategies that emphasise technological prowess applied to industry. When supported by specialised bureaucracies and public agencies in key adjacent areas such as education and innovation, technoindustrial governments may have the necessary capacity to carry out their strategies. By contrast, generalist governments tend to have high-profile economic ministries with broad attributions that are headed by individuals with generalist skills, such as economists and lawyers. Specialised technology competences in generalist states may reside within peripheral specialised agencies that often play a vicarious role in economic decision-making. As a result, generalist states may have less strategic capacity to support product upgrading in technically complex sectors and may be less willing to reprioritise public resources for this task.

Linkages, or interactions with other nations based on geographical, geopolitical, or historical factors also affect a country’s pathway to upgrading because they influence public and private preferences, market opportunities, and the likelihood of success of different strategies. NAEs are likely to follow closely the trajectories of very advanced economies on which NAE’s based their industrialisation models or with which they have particularly tight commercial relationships (Akamatsu 1962).

Colonial ties may facilitate the expansion of firms from former colonial power into its ex-colonies (Martinez 2008) but their impact on upgrading may be limited because upgrading involves the development of complex advantages rather than mere increases in scale. In addition, the underwhelming experiences of ICT firms from France, the UK, and Portugal and the success of firms from emerging countries such as Mexico suggest that cultural proximity is neither a necessary not a sufficient condition for competitiveness.

# Upgrading in Spain and Korea

This section develops the argument using evidence from Spain’s and Korea’s upgrading in the ICT industry.

## Transformation in the ICT Industry

In 1980, the ICT industry in most countries was structured around the public telephone and telegraph (PTT) model. The model enshrined a hierarchical structure, in which the state owned or controlled a monopolist telecommunications operator (PTO) and vertically integrated equipment manufacturers produced for the national market (Thatcher 1999, 2004). But sweeping technological developments led PTOs, governments and major users to support a market paradigm based on competition. Critical changes toward a WTO-negotiated competitive framework came into force in 1998. The new framework was defined by a shift in the balance of power between states and firms. The partial or full privatisation of PTOs, new price mechanisms, the liberalisation of equipment procurement, and generalised decreases in import duties deprived states of traditional sources of power over firms. Firms gained leverage through their sheer size, the concentration of the sector (Macher et al. 2011), and their technological, financial, and legal expertise.

Despite these changes, coordination at the national level remains a crucial feature of ICT. Liberalisation led to increased regulation of most aspects of an operator’s daily functions, giving states new sources of power as regulators, legislators and arbiters of competition. States also retained control over key areas such as license and spectrum allocation and management, and design and development of infrastructures (Garcia Calvo 2012). In manufacturing, rapid technological change, rising capital costs, and the increasing concentration of the industry increased firms’ dependence on patient capital, stable demand, and socially embedded resources such as knowledge and skills, in which states retain significant powers.

In this new context, states and firms were forced to find new ways to interact. In Spain, the model involved a combination of nonhierarchical coordination in telecommunications services with a market approach to manufacturing. In Korea, the model involved nonhierarchical coordination in electronics and the instrumentalisation of the telecommunications operator. Both models enabled insider firms to upgrade, had a negative impact on outsiders and enduring effects on production specialisations.

# Spain

In 1985, Telefonica, the PTO, provided telecommunications services as a monopoly by virtue of a 1946 contract between the operator and the state (Pérez Martínez and Feijóo González 2000). Although Telefonica was a publicly listed company, the state held a 41 percent stake (Second Economic and Social Development Plan 1969) and influenced strategic decisions through the presence of two government representatives at the PTO’s board of directors, the appointment of the firm’s CEO, and administrative approval for service tariffs (Amado Calvo 2010).

The manufacturing industry was indirectly controlled by the state through the PTO. Three of the four largest manufacturers, representing 85 percent of production and 90 percent of employment, were owned jointly by Telefonica and a foreign investor (Adanero 2006). Telefonica also absorbed the lion’s share of production. In 1983, 55 percent of the sales of Telefonica’s industrial arm were to the PTO, and only 15 percent to the export market (Adanero 2006).

The Spanish ICT industry operated behind the efficiency frontier. The telecommunications network fared badly in terms of coverage, network equipment, and profitability compared to more advanced economies (Tables 2 and 3). Low coverage came hand in hand with long waiting lists for new lines and deficient-quality service. Telefonica also lagged in the adoption of state-of-theart network equipment, especially the introduction of digital switches (Table 3). Low profitability (Table 4) can be partly attributed to the correlation between income per capita and intensity of use of the service: in 1985, Spain’s income per capita was 34 percent of that of the US (Maddison Project Database 2018). However, an unfavourable comparison with Korea and Ireland also suggests operational deficiencies.

Electronics manufacturing depended heavily on imports of foreign technology, parts, and components (Rico González 2006). The producer’s capacity for innovation – a key indicator of the industry’s sophistication – consisted mainly of applied improvements based on foreign technology (Adanero 2006) (Table 5).

## From Hierarchical to Non-hierarchical Strategic Coordination

The relationship between the Spanish government and industry changed along with global changes in ICT. Spain’s emerging model of coordination can be linked to the ‘developmental spirit’ that animated policy makers, the government’s generalist structure, Telefonica’s goals and priorities, and Spain’s connection to Europe.

Spain’s early democratic governments (1982–96) were determined to close the gap with western Europe by universalising and improving the quality of basic services such as a health care, education and utilities, including telecommunications (PSOE 1982). However, Spain lacked a ministry, subministerial agency, or specialised civil service for ICT because the 1946 contract between Telefonica and the state delegated most policy-making functions directly to the PTO (Amado Calvo 2010). In addition, economic policymaking was dominated by a cohesive group of orthodox economists trained at the Spanish central bank who whose main priority was macroeconomic stability (Termes 1991, Pérez 1997).

Telefonica was not keen to support the state’s goal of universalising the network because expansion to rural areas was unlikely to be profitable, but it was eager to deploy high-capacity networks and improve quality of service to address pressing corporate demands (Infante 2002). In line with this perspective, Telefonica’s five-year strategy (1985–90) stated three goals: (a) deploying highcapacity networks; (b) developing partnerships with global technological leaders; and (c) improving procedures and human resources (Telefonica 1985).

Table 2. Telecommunication services: networks, profitability and investment (1985).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Standard access lines per 100 inhabitants | Revenue per access channel in USD | Investment per access channel | Investment as percentage of revenue | Investment as percentage of fixed capital formation | Investment per inhabitant in  USD |
| Sweden | 62.78 | 347.50 | 104.36 | 30.03 | 2.56 | 66.44 |
| UK | 52.93 | 358.93 | 73.14 | 20.38 | 2.65 | 38.78 |
| US | 49.24 | 946.76 | 180.17 | 19.03 | 2.58 | 88.97 |
| France | 40.69 | 381.55 | 161.94 | 42.44 | 3.46 | 65.89 |
| Japan | 37.48 | 474.81 | 152.83 | 32.19 | 1.88 | 57.36 |
| Germany | 32.95 | 447.22 | 195.74 | 43.77 | 3.50 | 64.49 |
| Italy | 30.74 | 363.54 | 159.69 | 43.93 | 2.99 | 49.10 |
| Spain | 24.21 | 267.69 | 113.84 | 42.53 | 3.03 | 27.56 |
| Ireland | 19.85 | 670.91 | 204.16 | 30.43 | 3.84 | 40.55 |
| Korea | 18.48 | 253.39 | 177.65 | 70.11 | 4.98 | 32.84 |

Source: OECD Telecommunications and Internet statistics (2013).

# Table 3. Digital exchanges and waiting lists.

|  |  |  |  |
| --- | --- | --- | --- |
| Country | Percent fixed lines connected to digital exchanges (1990) | Waiting lists (1985) | Waiting lists (1989) |
| France | 75 | 37,741 | - |
| Ireland | 55 | 27,726 | 6,098 |
| UK | 47 | - | - |
| Korea | 46.5\* | 2,79,988 | 1,601 |
| US | 43 | - | - |
| Japan | 39 | - | - |
| Sweden | 38 | - | - |
| Italy | 33 | 3,30,064 | 17,374 |
| Spain | 28 | 2,52,762 | 3,49,580 |
| Germany | 12 | 28,369 | 25,532 |

\*Data for 1991.

Source: ITU Telecommunication Statistics (2010).

To accomplish these goals, Telefonica needed cooperation from the state. Deploying high capacity networks requires massive capital investments. Telefonica could obtain capital via higher service tariffs, public subsidies, or Spanish capital markets, but all three avenues required authorisation from the state. Struggling to lower double-digit inflation levels, Spain’s economists were unlikely to approve higher service tariffs because telephony services were part of the basic price basket and therefore higher tariffs meant higher inflation. Concerned with high public deficits, policy makers were unlikely to use direct subsidies or accept new issues of stock, since the state was obliged to purchase additional shares to maintain its participation in the company (Amado Calvo 2010). Issuing debt was problematic: Telefonica was the country’s largest listed firm, and there were concerns about an excessive concentration of national savings (Rico González 2006).

The hierarchical integration of manufacturing and the industry’s technological limitations caused critical delays in the deployment of high-capacity data networks and serious traffic congestion problems (Infante 2002). But seeing as the state was a controlling stakeholder, Telefonica could neither shift toward a competitive procurement policy nor divest from its industrial arm without government consent.

Finally, improvements in procedures and human resources were expected to involve massive layoffs of employees who were protected by lifelong, quasi-public contracts. This too required government approval.

The impasse was solved through a quid-pro-quo arrangement by which Telefonica assumed strategic and financial responsibilities for the universalisation of the network in exchange for a nonneutral, or favourable policy environment that enabled the operator to divest its industrial arm, undertake an internal restructuration, and expand into growing service segments unencumbered by competition. The arrangement was formalised through Decree 2,248/1984. Unlike hierarchical DS strategies, the decree attributed the articulation of specific plans for the expansion of fixed telephony services, decisions over deadlines, the development of technical solutions, and the responsibility for raising 75 percent of the necessary capital to Telefonica. In exchange, the state sold half of its stake in the operator between 1985 and 1987, which enabled the operator to list in major international markets (De la Dehesa 1993). After 1986, the state also facilitated the sale of Telefonica’s industrial group and helped the operator broker partnerships with foreign investors (Amado Calvo 2014). Finally, the state funded generous early-retirement schemes. The implementation of these measures was facilitated trade unions and by a tightly knit community of engineers affiliated to the engineering professional association.

# Table 4. Revenue per employee (USD) (1985 and 2008).

|  |  |  |
| --- | --- | --- |
| Country | Revenue per full time employee 1985 | Revenue per full time employee 2008 |
| US\* | 1,04,148 | 3,78,335 |
| Japan | 69,293 | 11,321 |
| Italy | 57,622 | 9,85,220 |
| France\* | 56,743 | 4,48,224 |
| Germany | 53,889 | 4,63,751 |
| UK | 45,780 | na |
| Sweden\* | 44,131 | 7,10,136 |
| Korea | 39,413 | 4,30,649 |
| Spain | 33,400 | 7,95,285 |
| Ireland | 29,178 | na |

Source: ITU Telecommunications Statistics. \*Revenue per employee in 2007.

# Table 5. Professional electronics (1985).

|  |  |  |
| --- | --- | --- |
|  | Spain | Korea |
| Production | 1,765 | 1,518 |
| Imports | 2,826 | 696 |
| Exports | 849 | 783 |
| Domestic demand | 3,742 | 3,391 |

Note: AMETIC, annual report (1986), and EIAK (1986). Data from national customs offices. Data in millions of dollars.

Through the 1990s, compensation to Telefonica also took the form of non-neutral regulation that enabled the operator to establish a dominant position in the mobile market. The Telecommunication Bill of 1987 and its successor in 1992 maintained Telefonica’s exclusivity for mobile telephony until the end of 1993. Mobile licenses were awarded through an administrative decision rather than an auction, and Telefonica obtained its license without issuing payment (Calzada and Estruch Manjón 2011). The government opted for a gradual liberalisation initially based on a duopoly, but the second mobile operator did not start operating until 1995 (Calzada and Estruch Manjón 2011), giving Telefonica a one-year head-start after the expiration of service exclusivity. When a third license was issued in 1998, the operator was a recently privatised public Spanish firm rather than an international carrier (Escribano and Zaballos 2001).

To prevent corporate capture, the state combined these non-neutral policies with measures that strengthened its position relative to the operator. In 1986, the state created the General Directorate for Telecommunications (DGTel) and the Secretary of State for Telecommunications and Information Society (SETSI), responsible for policy making, network supervision, license management, and interactions with national and international organisations (Royal Decree 1,209/1985). During its first years, the SETSI’s main aim was to develop a legal framework to substitute the contractual relationship that had ruled state-Telefonica relationships until then. SETSI’s workers were part of a new, high-profile body of civil servants specialised in telecommunications.

Telefonica used the favourable institutional setup to restructure, increase competitiveness, and raise profitability. Productivity passed from 118 lines per employee in 1981–228 lines per employee in 1996 (Telefonica 1996). Between 1992 and 1996 alone, net benefits from operations in Spain increased by 45 percent (Telefonica 1996), and between 1995 and 1996, market capitalisation increased by 70 percent – half the growth of the Spanish stock market in that period (Telefonica 1999). Between 1996 and 2003, Telefonica’s employment in Spain decreased from a peak of 75,500 employees to 35,000, the largest layoff of any European incumbent (Telefonica 1996, CMT 2009). Capital from the divestment of its industrial arm enabled the operator to engage in international expansion from 1989 onward; first in Europe and North America, and after a failed experience, in Latin America, where Telefonica’s most lucrative acquisition was a Brazilian operator (Telefonica 1996).

Nonhierarchical coordination became less visible through the 2000s as emphasis shifted from infrastructure development to service exploitation but the model was still operational in the early 2010s. In response to European plans to stimulate the development of next generation access networks (NGAs), the government engaged in non-public negotiations with Telefonica that resulted in a modification of the Telecommunications Bill (Royal Decree-Law 13/2012). This modification enabled Telefonica to charge prices over their leased lines ‘that take into consideration the investment made in the network to enable the operator to receive a reasonable return on its investment’, a major obstacle to NGA investment. Legal change was followed by Telefonica’s investment of 2,300 million euro in NGAs between 2012 and 2013 (Telefonica 2013). The government used this investment to build momentum for a 2013 Plan to Stimulate the Development of Ultrafast Networks, which together with additional investment incentives (Law 9/2014) stimulated investment in NGAs by multiple operators (Table 6).

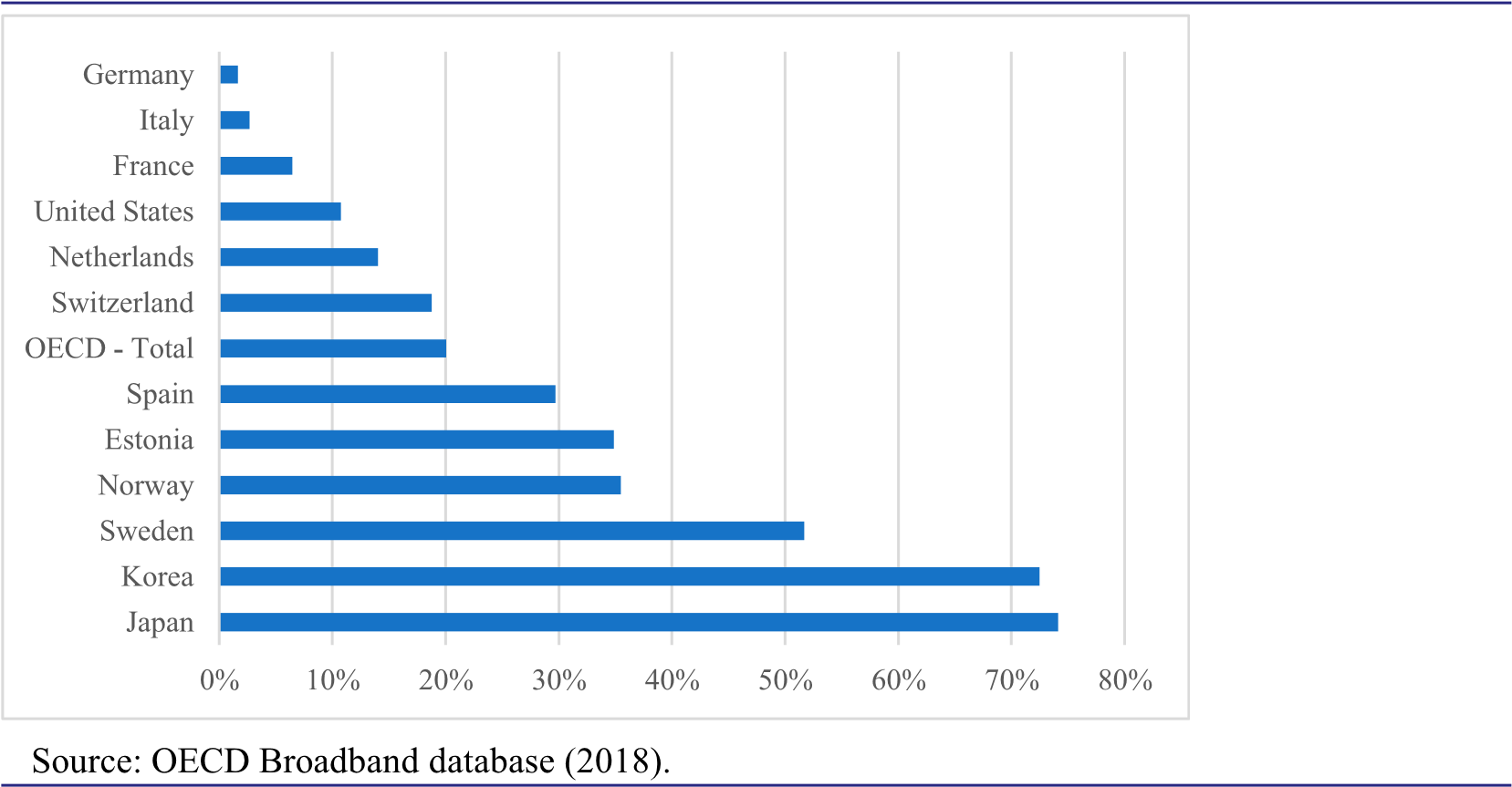
The characteristics of the industry facilitated continuity in the Spanish model. Telecommunication services reliance on physical infrastructures and national service licenses means that Telefonica’s global clout has not strengthened the operator’s position relative to the state in the same proportion, maintaining the balance of power between the two actors. Other contributing factors were the long term presence of key position makers such as Cesar Alierta, Telefonica’s CEO (2000–16); the common background of most telecommunications professionals (until 1986, there was only one school of telecommunications engineering); and the requirement for telecommunications engineers to be affiliated with the engineering professional association, which acts as an informal information hub (Table 7).

## Market Coordination and Manufacturing

Spain’s coordination model for services contrasts with its market approach to manufacturing. The government responded to industry demands for a classic DS strategy by issuing two National Electronics Plans (1984 and 1987). But out of several lines of action, only one, attracting foreign investment, gained traction (Buesa and Molero 1986). This was encouraged through the introduction of legislation that enabled foreign investment into most manufacturing sectors under the same conditions as resident Spaniards (Royal Decree-Law 1,265/1986).

Spain’s market strategy needs to be understood within its European context: in the early 1980s, every European country except France abandoned public support for electronics due to high costs and disappointing results (Thatcher 1999). Furthermore, the EU single market, coupled with Spain’s lower labour costs, offered Spanish producers the opportunity to survive by competing on cost and exporting to the EU.

# Table 6. Fiber/Land subscriptions as a percentage of total fixed broadband subscriptions in 2016.



There is no clear evidence that the market approach benefited Spanish manufacturers. Foreign competition increased pressure on local firms, many of which sold their interest to foreign investors, only to see their facilities downsized or repurposed for wholesaling and services. Other firms folded or shifted from hardware to software, as was the case with Amper, one of the largest producers. In those instances when foreign investment led to new manufacturing capacity, as was the case with AT&T’s microelectronics plant, legal provisions limiting technological spillovers (Ministerial Order of 5 June 1985) reduced upgrading opportunities for local firms.

Not all outcomes were negative. Some local firms leveraged their long-standing relationships with Telefonica and contributed to the PTO’s fulfilment of its commitment to universalise the national network by specialising in the development of reasonably priced, low-tech, customised network solutions (Santillana del Barrio 1997, Lopez et al. 2002, Rama and Ferguson 2007). In doing so, these firms carved a competitive niche that large global providers would have found unprofitable and contributed to Telefonica’s competitive advantage in Latin America. Nonetheless, Spain’s manufacturing capacity as a whole declined. In 2016 manufacturing represented 18 percent of Spanish ICT (Table 1).

# Korea

In the first half of the 1980s, the Korean Telecommunications Authority (henceforth KT) provided fixed telephony services under monopoly conditions. Although KT was incorporated in 1982, the state remained in change of strategic decisions through full ownership, the appointment of board members, and the approval of service tariffs (Larson 1995). KT (and therefore the state) maintained sizeable stakes in Data Telecom Corporation (DACOM), a public-private firm created in 1982 to provide data services under monopoly conditions, and in Korea Mobile Telecommunications, a KT subsidiary that offered mobile telephony from 1984 (Kim 1993).

Most Korean electronics were produced by local firms belonging to diversified business groups (chaebol). In 1988, Samsung, LG, Daewoo and Hyundai accounted for 56 percent of total electronics production (Bloom 1992). However, the state exerted significant power through control of import licenses for the parts and components the industry relied on, and through access to credit. In 1979, ‘policy loans’ accounted for 63 percent of total bank loans (Lim 1998).

The Korean ICT industry was underdeveloped. Telecommunications service penetration was lower than Spain’s (Table 3). Low profitability correlated with Korea’s low income per capita, which was 22 percent of the US’ in 1985 (Maddison Project Database 2018) but was also consistent with KT’s reputation as a bureaucratic and inefficient organisation (Kim 1993, Choung et al. 2016).

Korean manufacturers tended to produce as Original Equipment Manufacturers for other firms (Bloom 1992) and depended on imports of foreign technology, parts, and components. Local innovation consisted mostly of knowledge transfer, absorption, and adaptation to local production conditions (Kim 1997). Consumer electronics, and parts and components constituted 80 percent of Korea’s total electronics production. Manufacturers considered professional electronics excessively risky relative to their technological capabilities and resources (Choung and Hwang 2007).

## From Hierarchical to Nonhierarchical Coordination

The transformation of Korea’s hierarchical model can be connected to the government’s developmental mindset and technoindustrial structure, the needs of large local manufacturers, the instrumentalisation of the incumbent operator, and Korea’s linkages to Japan and the US.

The Korean governments of the early 1980s aspired ‘to participate more actively in the world economy’ (EBP 1981, p. 14) as per Korea’s Fifth Economic and Social Development Plan, (1982–86). The technological base, global scope, and excellent market prospects of ICT fitted with this purpose, while unmet demand for telecommunications services provided motivation.

The government’s technoindustrial structure and orientation provided the strategic capacity to implement a long-term plan for product upgrading. The president’s commitment to universalise the telecommunications service elevated the status of the ministry of communications within the ministerial structure (Oh and Larson 2011). From the early 1980s, the minister and vice minister of communications were trained engineers. They were supported by a cohesive, high-caliber, specialised civil service, many of whose members had been educated in US schools and worked in places such as Bell Labs (Kim 2012). Korea’s strategic capabilities were reinforced by the resources of the Economic Planning Board, the super-ministry that devised and coordinated Korea’s industrial strategies until its dissolution in 1994 (Oh and Larson 2011), and by a tight-knit network of ministryaffiliated think tanks, public research institutions such as the Electronics and Telecommunications Research Institute (ETRI), and a world-class technical school, the Korean Advanced Institute of Science and Technology (KAIST) (Kim and Leslie 1998).

Despite these capabilities, the severe crisis of the early 1980s had turned social perceptions against top-down political intervention in production (Lim 1998). Furthermore, Korean manufacturers had become larger, accumulated knowledge, and gained market power, preventing hierarchical control.

Nonetheless, in 1985, upgrading in electronics was an attractive proposition for firms. Global demand was booming, and US manufacturers were starting to outsource production (Bloom 1992). Emerging GVCs represented a critical opportunity provided Korean firms raised product quality. The revalorisation of the yen following the Plaza Accords created a supply gap. Finally, as the won appreciated and Korean wages rose, manufacturers needed to move toward more complex outputs to remain competitive.

To fulfil their aspirations, Korean firms needed cooperation from the state. As part of the four largest chaebol, large electronics manufacturers had access to capital and attracted some of the best national talent. However, the diversified nature of the chaebol made them unsuitable to develop the long-term, mission-oriented, cooperative, trial-and-error research culture necessary to generate innovation, address shortages of world-class specialised talent, develop channels to process and disseminate innovation, and plug firms into international innovation networks (Jho 2007). In addition, increasing levels of market concentration meant that Korean firms faced market disadvantages relative to first movers from advanced countries.

Korean firms could have addressed these challenges through inter-firm cooperation, but this was unlikely in Korea’s highly adversarial corporate environment. Even if they had succeeded, manufacturers still depended on their ability to use the state-owned PTO to test, scale up models for commercial operation, and debug them.

The state’s developmental aspirations and firms’ needs were channelled toward product upgrading through a coordinated approach characterised by a clear division of labour between the state and the large manufacturing firms. The arrangement was articulated in the Fifth Economic and Social Development Plan (1982–86), which deviated from its predecessors’ hierarchical approach in stating that the role of the state was to ‘indicate only the general framework and direction in which (investment) choices should be made’, to create ‘incentive systems’, and to foster ‘technological and manpower development’ (EPB 1981, p. 14). The new division of labour was articulated through a series of large-scale technology development projects in which the state guaranteed local demand, assumed a large share of the costs, and coordinated research and technology diffusion while firms concentrated on development and commercialisation.

The first was a plan to accelerate the development of the Time Division Exchange (TDX), a digital switching system. The government stimulated production via local content requirement rules that obliged KT to purchase from local manufacturers (Oh and Larson 2011). The prioritisation of digital network expansion to rural areas provided additional incentives because the first TDX models were expected to be small capacity switches unsuitable for urban areas (Kim 1993). The government funded the entire development process through increases in service tariffs, a dedicated telecommunications tax, bond issues, and the reprioritisation of public investment (Government of the Republic of Korea 1988, Kim et al. 1992). ETRI was responsible for conducting the research and diffusing knowledge to firms (Bloom 1992). Simultaneously, the 1986 Industrial Development Act stimulated the development of firms’ innovation capabilities through schemes that involved reductions in tariffs on imports of research and development (R&D) equipment, tax exemptions to attract US-educated and experienced Korean engineers, real estate tax exemptions for R&D institutes, and tax credits for expenditures on R&D and human capital development (Ahn and Jai 2007). Finally, in 1985, President Chun merged two preexisting educational institutions to form KAIST, thus ensuring a steady supply of technical manpower (Kim and Leslie 1998).

The TDX programme was deemed an export failure (Oh and Larson 2011) but laid the basis for a coordinated model based on a clear division of labour between the state and large producers. From 1989, the strategy found continuity through the expansion of mobile telephony. A key feature of this project was the government’s use of its power to choose technical standards to guarantee demand for local producers and shelter them from competition. By choosing the CDMA standard, which had not yet been developed at a commercial level, over TDMA, a standard in which European manufacturers already had a strong market position, the government set the Korean industry on a path that involved high up-front costs, a lengthy R&D phase, and long-term royalty payments to the owner of the foundational technology. In exchange, this strategy guaranteed that Korean manufacturers faced zero competition in the local market (Jho 2007) and enabled them to use the home market as a test bed to catch up with competing TDMA manufacturers. As with the TDX programme, the state was responsible for research coordination, knowledge diffusion, and most of the funding. Firms made capital contributions and were responsible for the development of handsets. The strategy enabled Korean firms to enter the mobile handset market, one of the segments in which they are globally competitive today.

Korea’s coordination model found continuity through development of the 3G version of CDMA starting in 1996. However, the liberalisation of telecommunications services and the adoption of GSM by most countries made it difficult for the government to subordinate the interests of mobile operators to those of the electronics industry, causing coordination to falter (Choung et al. 2016). Rather than abandoning its model, Korea changed its configuration. The new model no longer aimed to reach the efficiency frontier, but to ‘stay ahead’ (Mullins and Shwayri 2016, p. 51). The scope of the model broadened, from supporting the ICT industry to using ICT as ‘a driving force of national development’ (MIC 2004, p. 5).

The IT 839 strategy, launched in 2004, epitomises this approach. The plan aimed to ‘promote an effective industrial development model that creates future growth engines through strong collaboration among IT services, infrastructure and manufacturing’ (MIC 2004, p. 5). The strategy was based on a clear division of labour. The state was responsible for project leadership, policy design, the development of precompetitive technology, the creation of the initial market, technical leadership and standardisation. Firms were responsible for financial investment, product development, production, and commercialisation (MIC 2004). To avoid breaching WTO rules, the state substituted direct guidance with indirect advice via public agencies such as the National Information Society Agency to define the project (Kim 2012). Direct subsidies and patient capital were substituted for precompetitive funding, low interest loans, matching funds, and investments from the National Pension Service (NPS). Over time, the NPS has become a large source of patient capital. In 2019 it owned 10 percent stake in Samsung electronics, an investment equivalent to 30 billion dollars (National Pension Service 2020).

## Telecommunications Services and Upgrading

Korea’s coordination model benefited manufacturers but imposed a heavy burden on the incumbent. The TDX project required an annual workforce of 3,320 and involved approximately 1 billion dollars in R&D costs (Choung et al. 2016). With its capital tightly committed to the national market and constraint to provide fixed line services, KT failed to gain a strong foothold in mobile telephony and sold its mobile subsidiary to the SK group in 1993. KT also failed to expand internationally until the 2010s. Expansion took the form of network construction projects financed by the Korea Development Bank.

KT’s support of manufacturing entailed a loss of managerial autonomy, caused delays in internal restructuration, and created a climate of impunity. In 1996, KT underwent a workforce restructuration, but there was little change in the company’s hierarchical, seniority-based structure, bureaucratic procedures, compartmentalised divisional organisation, or in its traditional culture of conformity (Mark and Birkinshaw 2012). KT’s market share and profitability declined for a decade after liberalisation in 1998. Since then, KT has been mired in senior-level corruption scandals that have forced out the company’s last three CEOs (Reuters 2008, Kim 2013, Investor 2018, Yonhap 2018).

On the bright side, Korea’s coordination model did not delay network development and modernisation or hinder competition. Between 1985 and 1989 alone, Korea installed 5.2 million new lines – almost twice as many as Spain (ITU 2010). Korea accelerated network deployment by simultaneously installing the TDX in rural areas and importing high-capacity switching systems for urban areas (Kim 1993). Infrastructure overhaul has remained a signature component of Korea’s ICT strategy through two additional plans: the Korea Information Infrastructure (KII) (1995–2005) and the Broadband Convergence Network (BcN) (2005–10).

# Conclusions

This paper began with two premises: (1) that attaining sustainable economic development at high levels of complexity and reaching advanced-economy status depends on the ability of countries to host local, globally competitive firms with market power in skill-, capital-, and technology-intensive industries; and (2) that achieving this goal depends on the ability of firms to upgrade. Next, the paper asked whether state activism is necessary to foster upgrading and if so, what types of state activism can be effective. Last, the paper addressed the issue of equifinality.

Using evidence from Spain’s and Korea’s ICT industries, the paper argued that globalisation and GVCs discourage latecomer firms based in less advanced countries from attempting to reach the efficiency frontier in complex industries characterised by high market concentration. In the presence of institutional voids, firms require public support to overcome negative cost–benefit calculations and develop the stock of resources and capabilities they need to upgrade. The Spanish and Korean cases show that despite globalisation and partly as a result of it, states are able to deploy competences in the areas of infrastructure design, standard setting, license and spectrum allocation, public procurement, labour contracts, skill formation, investment brokerage, and research coordination and dissemination to support upgrading.

Ultimately, Spain and Korea pursued different strategies that prioritised telecommunications services and electronics manufacturing respectively. National choices were based on two factors: (1) the characteristics, specialisation, and orientation of firms and of the government; and (2) external linkages to other countries, especially advanced economies. Spain’s government’s generalist orientation, its lack of a civil service specialised in telecommunications, the presence of a large local telecommunications operator, and the country’s connection to Europe led the country to prioritise upgrading in telecommunications services. Korea’s dense and technically oriented public infrastructure, the existence of large local manufacturers, and the market opportunities derived from the country’s relationship with the US and Japan provided Korea with an incentive to prioritise upgrading in manufacturing.

Spain and Korea managed to host local firms that are global leaders in their respective segments. However, their models differed in terms of the types of complex advantages they supported and their externalities. Spain upgraded on the basis of improved processes and more efficient organisational structures. The Spanish strategy delivered one of Europe’s most advanced telecommunications networks, and Telefonica’s successful internationalisation raised the country’s profile, provided an example for other firms to follow, and may have generated benefits in terms of profit repatriation. However, Spain’s prioritisation of services deprived manufacturers of patient capital and stable demand, leading to a sharp decline in Spain’s manufacturing capacity. Given the high concentration of the industry, Spain may have given up its chance to support a world-class competitive manufacturing industry in ICT.

Korea upgraded on the basis of higher product complexity driven by R&D investment and technical skills. The Korean strategy delivered one of the world’s most advanced telecommunications networks and some of the world’s most competitive electronics manufacturers. However, the instrumentalisation of the telecommunications incumbent left it riddled with major organisational inefficiencies and corruption scandals. Furthermore, despite their evident progress in product complexity, cost-competitiveness and technological followership are still important components of Korean manufacturers’ strategies.

The paper’s research design leaves important questions open. The focus on a single industry raises questions as to whether Spain’s and Korea’s models of coordination are applicable across industries and whether they constitute the central core of the growth models that shaped the two countries’ entire political economies. The context-based nature of case studies, and the timing of Spain’s and Korea’s transformation, raises questions about the extent to which these experiences are applicable to today’s emerging economies. Despite these limitations, it seems clear that reaching the highest echelons of GVCs in complex industries in the era of globalisation requires a degree of central strategic coordination involving the state.

# Notes

1. Henceforth Korea
2. For fiscal year 2019, the World Bank defined lower middle-income economies as those with a GNI per capita (calculated using the World Bank Atlas method) between $996 and $3,895; upper middle-income economies as those with a GNI per capita between $3,896 and $12,055, and high-income economies as those with a GNI per capita of $12,056 or more. The United States’ GNI per capita for 2017, the latest year available at the time, was $58,270.

# Acknowledgements

The author would like to thank Saul Estrin, Robert Hancké, and Stephan Haggard for their comments and stimulating discussions, and Peter Hall and Cornelia Storz for their comments on earlier versions of the document. Any remaining errors are my own.

**Disclosure statement**

No potential conflict of interest was reported by the author.

# Funding

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 747943.

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