

Patterns of ‘State-Led Development’ in Brazil and South Korea: The Steel Manufacturing Industries

Nicolas Grinberg

The experiences of Brazil and South Korea have occupied a central place in the field of the comparative political economy of late-industrialisation. Both countries have been considered paradigmatic, since both have arguably enjoyed the strongest and deepest processes of industrial development among Latin America’s and East Asia’s newly industrialising countries. Most scholarship on the countries has settled on different versions of institutionalism that acknowledge the extended role played by the state in Brazil’s and Korea’s development processes, and which focus on the quality of state institutions as the most relevant factor in explaining their divergent experiences (Grinberg 2013a, 2014). Yet, despite their obvious differences, all mainstream accounts on the comparative political economy of Brazilian and South Korean development share one key theoretical starting-point that renders them equally incapable of fully accounting for the underlying forces. In a nutshell, they all regard the process of capitalist

N. Grinberg (✉)
Institute for Advanced Social Studies, National University
of San Martín, Buenos Aires, Argentina

development as a nation-based process and the world market as the context where the national processes of capital accumulation develop with different degrees of politico-economic autonomy.

The goal of this chapter is to offer an alternative account to the mainstream, institutionalist view on the state-led process of economic development in Brazil and South Korea, taking as its starting-point two key insights from the Marxian critique of political economy. First, that the process of capital accumulation is global, rather than national, in terms of its general dynamics and historical potencies; and, second, that inter- and intra-state political processes are forms of realisation of the process of capital accumulation on a global scale, through the specific determination of each national portion of the total capital of world society (see Chap. 2). The chapter is organised as follows. The second section advances a brief explanation of the general trends of the process of capital accumulation in Latin America and East Asia. The third and fourth sections review the main politico-economic forms of the Brazilian and Korean processes of capitalist development since the end of the Second World War (WWII). The fifth and sixth sections analyse the development of the steel industry in both countries. This industry has not only played a central role in the process of industrialisation in both countries, but has also been at the core of state actions to promote the process. For these reasons, the steel industry has figured prominently in studies of Brazilian and Korean comparative development (see Auty 1991; D'Costa 1999a, b). The final section closes the chapter with a summary of its main points and conclusions.

GLOBAL ACCUMULATION OF CAPITAL AND DEVELOPMENT IN LATIN AMERICA AND EAST ASIA¹

The development of labour productivity is the most powerful lever of the accumulation process. It results in the reduction of wages necessary for a given quantity of labour-power, extensively or intensively spent—that is, in the production of relative surplus-value. The mechanisation of large-scale industry is, in turn, the most potent form of increasing labour productivity. This process is centred on the transformation of the productive potencies of individual labour-processes into a scientifically organised, although alienated, social power (Iñigo Carrera 2013: 15–23; Marx 1976: 508–17; Postone 1996: 336–49). Yet capital makes every effort to avoid this expensive and risky process by searching for locations where particular natural or historical conditions allow it to reduce the cost of producing the

commodities that are directly or indirectly consumed by the labour-force and thus increase the mass of surplus-value available for its valorisation. Hence, beyond the formal expansion of markets, the global unity of capital accumulation is only fully developed in the process of the production of relative surplus-value (Iñigo Carrera 2013: 145–51).

Originally this process centred on the search for regions where, due to uncontrollable natural conditions, primary commodities could be produced and, if their production were possible elsewhere, at a lower cost—giving place to the classical international division of labour (CIDL) (Howe 1981, 91–4; Iñigo Carrera 2013: 145–6; Marx 1976: 579–81). This form of integration of portions of the planet into the global circuits of accumulation, however, was riven with structural contradictions that determined the long-term pattern of capitalist development therein. If the total social capital managed to enhance its valorisation capacity by reducing the value of labour-power, this was then partly offset by the drain of surplus-value flowing into the pockets of landowners in the form of ground-rent (see Chap. 3).² Global industrial capital therefore became compelled to overcome this barrier to its own capacity to accumulate by reshaping those spaces of valorisation to recover part of that surplus-value through the establishment of an antagonistic association with local landowners. From being simply a source of cheap raw materials, these spaces of accumulation—among which Latin America figured prominently—also became determined as sources of surplus-value in the form of ground-rent (Iñigo Carrera 2013: 145–50; Grinberg and Starosta 2014: 241–2).

The accumulation of capital through the recovery of ground-rent has taken a variety of economic and political forms; all of them involving the mediation of the national state. Until the 1930s, approximately, the alliance between capital and landowners over the appropriation of ground-rent generally revolved around the production, transport, and international trade of one or more primary commodities. Then the capitals that invested in these and related sectors, as well as foreign creditors to the emerging nation-states, became landowners' main partners in the appropriation of local ground-rent. But then, from the 1930s and crucially after the end of WWII, this position was taken over by industrial capital invested in manufacturing, in whose valorisation cycle originated the bulk of the surplus-value that formed the ground-rent (Iñigo Carrera 2013: 149–52).

The modality of ground-rent recovery by capital invested in manufacturing has determined the long-term development of the process of industrialisation in these parts of the world in a specific form. In general

terms, and in order appropriate ground-rent, industrial capital has had to open and close its valorisation cycle in these countries' domestic markets. With a scale of production below world-market norms, and the use of vanguard technology thus restricted, such markets have had to be protected to a degree conditioned by the amount of ground-rent available to sustain local industrial production (see Chap. 8). Industrial capital's accumulation capacity therefore has been dependent on the evolution of the ground-rent available to compensate for the ever-growing difference between local and world-market production costs resulting from the difference between local and world market scales of production.

The, so-called, process of import substitution industrialisation (ISI)—that was consolidated in most primary-commodity producing countries between the 1930s and 1950s reached its peak during the 'commodities boom' of the 1970s, and was reproduced in a limited form thereafter—has been the paradigmatic form through which this specific modality of capital accumulation has come about. In general terms, two types of indissolubly united policy-created mechanisms have shaped this process. First, state policies—such as exchange-rate overvaluation, commodity-export taxes, and regulations on primary-commodity circulation—have intervened in the turnover cycle of primary-sector capital, separating a portion of ground-rent and interrupting its flow toward landowners' pockets. These policies have channelled that portion of ground-rent to industrial capital profits—lowering the domestic prices of foreign exchange, raw materials, and labour-power—or, in a first instance, to the state. Second, other policies have enabled the effective appropriation of the separated ground-rent by industrial capital when selling in domestic markets. These have included its protection from foreign competition and direct state actions, such as the provision of inputs at below-market prices, the purchase of output at above-market prices, the enlargement of markets through over-staffing, and outright subsidies. In other words, policies associated with ISI and the political processes through which they have come about have been the specific politico-economic forms of realisation of processes of accumulation based on the appropriation/recovery of ground-rent by global industrial capital.

As in all other regions participating in the global economy as primary-commodity producers, the process of capital accumulation in Latin America has, since its origins, revolved around the appropriation of ground-rent by different social subjects, crucially its recovery by industrial capital.³ The Brazilian economy has not been an exception to this general

trend. Conversely, given the relatively large size of the local ground-rent, the process of capital accumulation in Brazil has been paradigmatic of this specific form of capitalist development (Grinberg 2013a, b).

During the last forty years, however, the international division of labour has experienced a profound transformation as a result of the process of computerisation and robotisation of large-scale industry and, especially since the mid-1970s, of the microelectronics revolution (see Chap. 4; also Iñigo Carrera 2013: 66–70; Grinberg 2013a). This leap forward in the process of automation of labour's productive attributes has greatly accelerated the internal differentiation of the collective worker in large-scale industry. On the one hand, technological transformations have involved the further expansion of the productive attributes, and hence cost, of wage-labourers performing the more complex parts of the work process. On the other hand, automation has simplified the productive functions, and hence cost, of most manual labourers remaining on the shop-floor as operators or appendages of increasingly self-calibrating and self-adjusting machines. Moreover, the new technological conditions have themselves generated a multitude of production processes still subject to manual intervention by low-skilled labourers, like the assembly, testing, and packaging of electronic micro-components and appliances (Balconi 2002; Coriat 1992; Grinberg 2013a: 180–2).

In terms of their general dynamics, those transformations in the productive attributes of the collective worker in large-scale industry have been global. Yet they have resulted in a novel differentiation of national spaces of accumulation and in the reconfiguration of the international division of labour, and hence of the production of surplus-value on a global scale. Based on those transformations in the labour process, and the associated revolution in communication and transportation methods, industrial capital has been increasingly able to disperse spatially the different parts of the labour-process according to the most profitable combinations of costs and productive attributes of the different national fragments of the global labour-force, thus giving birth to the NIDL (Iñigo Carrera 2013: Chap. 2; Grinberg and Starosta 2009; Grinberg 2013b).

As a general trend, the NIDL has revolved around the relocation of simplified labour-processes to places where industrial capital had access to labour-forces that are not only *relatively* cheap, but also whose specific productive attributes include the disciplined subordination to centrally and hierarchically organised collective labour-processes, as in the wet-rice cultivating societies of East Asia (Bray 1986: 67). Those characteristics have

made the East Asian labour-force particularly productive as an appendage of increasingly automated machinery systems or in manual assembly operations; hence the region's ubiquitous participation in the NIDL and its consolidation as a global industrial power (Iñigo Carrera 2013: 63–70, 74–80; Grinberg and Starosta 2009; Grinberg 2013a).

Initially, the NIDL manifested itself in the spatial relocation of 'labour-intensive' productions, like clothing manufacturing—in which, due to the early introduction of skill-replacing technical changes the labour-force functioned as an incipient appendix of the machinery—and the electronics industries—which worked with manual-assembly operations (as identified by Fröbel et al. 1980). Through the mid-1960s, however, skill-replacing technical changes began to affect 'capital-intensive', continuous-flow production in the heavy and chemical industries, transforming manual workers in those sectors into an appendix of the machinery. A decade later, as the microelectronics revolution took hold of large-scale industry—crucially through the robotisation of assembly operations—skill-replacing technical changes began to increasingly affect 'technology-intensive', serial mechanical production in the consumer durables and capital goods industries (Balconi 2002; Brown and Campbell 2001; Coriat 1992; Ernst 2005; Hasegawa 1996). As this occurred, production in those sectors tended to move to Japan and the, so-called, East Asian Tigers—the original participants of the NIDL—and labour-power therein increased in quality and cost. Industrial capital then sought out new spaces, in the region and beyond, where it could gain access to cheaper, and equally disciplined and acquiescent, workforces for lower-skill production in the light industries and subsequently, as the dynamics of technical change allowed, in durable and capital goods production (Grinberg 2014: 719–21).

As in any other form of realisation of the process of capital accumulation on a global scale, the NIDL has come about through specific nation-level political developments. The, so-called, developmental state has been the most characteristic political form mediating the development of East Asian processes of capital accumulation as an expression of the NIDL. Despite different national singularities, all East Asian developmental states not only facilitated the outward orientation of industrial capital while nurturing infant industry. But they have also decisively pursued the political repression of the working class, thus allowing capital to purchase labour-power below its value and to differentiate the conditions of reproduction of the various parts of national workforces according to their productive attributes. Due to its sizable labour-force and early participation in the

process, the experience of South Korea has been paradigmatic of this specific modality of capitalist development, through which the production of relative surplus-value on a global scale has come about (Grinberg and Starosta 2009; Grinberg 2013a, 2014).

This modality of capital accumulation has shown a remarkable developmental potency, especially in the cases of Japan and the East Asian Tigers. Yet it is not free of contradictions. Not only has the dynamism of skill-replacing technical changes resulted in an ever-deeper 'race to the bottom'. More importantly, the productive attributes upon which this specific modality of capital accumulation has rested (discipline and acquiescence) are at odds with those required from wage-labourers performing vanguard scientific research and technology/product development. This high-value creating part of the labour process, in which the development of society's productive forces comes about, has thus been relatively undeveloped in those countries participating in the global economy in this specific form.

BRAZILIAN CAPITALIST DEVELOPMENT SINCE WORLD WAR II⁴

When WWII ended, the Brazilian process of ISI was at least half a century old. The industrial sector was then populated by a myriad of small, nationally owned capitals and a few relatively large, foreign-invested firms which had been established between the end of WWI and the Great Depression. Both types of industrial capital had grown, initially, thanks to a combination of market protection and exchange-rate overvaluation allowing them to appropriate ground-rent and, subsequently, to the collapse of international trade. Between the end of WWII and the mid-1950s, Brazilian ground-rent experienced a substantial recovery and the process of capital accumulation manifested itself in the strong expansion of local industrial production, crucially by indigenous private capital. Yet, in contrast to the pre-WWII experience, it also came about through the creation of a large number of state-owned enterprises (SOEs) and developmental banks, in some cases through the nationalisation of public utility and transport companies into which most foreign investment had previously flowed. SOE activities, combined with market-protection reinforcement and exchange-rate overvaluation, shaped the 'state-led', or 'statist', ISI process through which the appropriation of ground-rent by social subjects other than landowners, notably industrial capital, would come about (on the genesis of statist ISI, see Kohli 2004: 177–82; de Paiva Abreu 2008:

320–33). Though both types of capitals—small-private and state-owned—would subsequently support the valorisation processes of foreign-capital subsidiaries, those developments were realised through the consolidation of a nationalist state backed by the, so-called, populist alliance between the local bourgeoisie and the urban working class, especially during the commodities boom associated with the Korean War, when the ground-rent available to support the process of capital accumulation grew strongly (Grinberg 2013a).

Through the mid-1950s, however, some of the features of Brazilian capitalist development started to change when large flows of foreign-owned capital, then pursuing a new phase of global expansion, began to invest in the most dynamic parts of the local industrial sector, attracted by the substantial growth of domestic markets that enlarged ground-rent had given rise to. Unlike in the previous period of ISI, a nationalist government with an anti-foreign capital rhetoric could not politically mediate this process. Populism therefore gave way to ‘developmentalism’, and economic growth revived strongly (Anglade 1985: 56–7; Avelãs Nunes 1990: 188–93; Kohli 2004: 183–4; Skidmore 2007: 146–9).

Yet, despite robust growth and rapid industrial development occurring in the period to the late 1950s, the limited and contradictory dynamics of the Brazilian process of capital accumulation soon led to a crisis as the ground-rent available for appropriation contracted while primary-commodity prices collapsed in the aftermath of the Korean War. Initially, a new source of extraordinary surplus-value in the form of loanable-capital inflows began to complement ground-rent in sustaining the process of capital accumulation through ISI. Foreign credit, however, soon proved to be insufficient and unreliable (Avelãs Nunes 1990: 210–11; Frieden 1987: 99) and a third source of extraordinary surplus-value thus developed; that arising from the payment of manual workers’ labour-power below its value (Zurron Ocio 1986: 8–11). This new transformation in the forms of a realisation of the Brazilian process of capitalist development did not come about smoothly. Rather, it was realised through an economic crisis that expressed the intrinsic limits of the Brazilian process of capital accumulation and the replacement of the populist alliance with a military dictatorship as its general political form of realisation (Kohli 2004: 190–210; de Paiva Abreu 2008: 349–59; Skidmore 2007: 187–302).

During the 1970s Brazilian ground-rent, and the inflow of loanable capital complementing it, experienced a strong, though irregular, expansion. The production of industrial goods advanced to include complex

durable-consumer goods, as well as various types of equipment and basic inputs (Batista 1992; Barros de Castro and Souza 1985). The expansion and deepening of the ISI process was manifest in sharp increases in employment and real wages in the manufacturing sector. The authoritarian regime in charge of the political representation of the process of capital accumulation thus softened its grip over the working class, while economic policies regained their developmental features through the implementation of a series of industry-wide and sector-specific promotion plans aimed at boosting private domestic capital and SEOs (Anglade 1985; Corrêa do Lago et al. 1979; Skidmore 1988) as a form of transferring ground-rent, and loanable-capital inflows, to industrial capital. The mass of surplus-value appropriated by industrial capital increased strongly and economic growth thus accelerated.

Despite these developments, through the early 1980s the Brazilian economy entered a long period of weak growth, deindustrialisation, and recurrent economic crises. Primary-commodity prices then began a process of long-term decline, only partly reversed after the commodities boom of the late-2000s, which negatively affected the growth of local ground-rent. And, although credit supply expanded on a global scale thereafter, as 'developed-country' states have increasingly attempted to sustain consumption through easy-credit policies, loanable-capital inflows to Brazil have been irregular. To begin with, these were only re-established in the early-1990s, when the global supply of credit had grown sufficiently to, once again, reach non-'core' economies. Secondly, the expansion of global credit itself has not been constant. On the contrary, it has proceeded in a succession of periods when easy-credit policies resulted in loose monetary conditions that fuelled global growth, punctuated by periods when credit policies became more stringent as a means of addressing ensuing inflationary pressures (Brenner 2006: 143–63, 267–343; Iñigo Carrera 2013: Chap. 6).

The relatively slow growth of the combined mass of ground-rent and loanable-capital inflows led to a partial reversal in the process of state-led ISI through which their appropriation by industrial capital had come about. In other words, as these sources of extraordinary surplus-value reduced, relative to the demands placed upon them by industrial capital looking to valorise normally, state policies channelling them were partly or fully withdrawn. Market protection was reduced for some sectors and eliminated for others while SOEs were privatised. Neoliberalism thus replaced developmentalism as the general political and ideological form

of realisation of the Brazilian process of capital accumulation which, nevertheless, continued to revolve around the recovery of ground-rent by global industrial capital.⁵ In the post-1980 period, therefore, the state-led process of ISI became increasingly more limited, and industrial capital began to find a new source of extraordinary surplus-value to complement the ground-rent and loanable-capital inflows, the general payment of labour-power below its value.

The neoliberal restructuring of the ISI process started, incipiently, in the early-1980s, during the last years of the military government, and its deepening became the task of successive post-1990 democratic governments. After a decade-long weak economic performance and worsening labour-market conditions, there was no longer need for capital to rely on—politically expensive—authoritarian solutions to lower wages, deal with unemployment-related unrest, and divest state assets at fire-sale prices—all of which have been forms of realisation of the Brazilian process of capital accumulation during the period of *relatively* low rent.

KOREAN CAPITALIST DEVELOPMENT SINCE WORLD WAR II⁶

During the two decades following the end of WWII, the structure of the Korean economy did not qualitatively differ from Brazil's, where capital accumulated through the recovery of ground-rent. This specific modality of capital accumulation came about, as in Brazil and elsewhere, through a set of state policies 'promoting' ISI. The singularity of the Korean ISI process resided in the fact that the limited available ground-rent was complemented with a portion of small agrarian capital's profits and foreign-aid inflows. The limited character of the Korean ISI process, especially *vis-à-vis* the Brazilian experience, thus resulted from the relatively small size of extraordinary surplus-value available to support industrial capital's valorisation process (on the Korean ISI process, see Frank et al. 1975; Krueger 1979: Chap. 2).

Through the mid-1960s, however, the Korean process of capitalist development began to experience a structural change, as a result of the aforementioned transformation in the production of relative surplus-value on a global scale leading to the NIDL. Between the mid-1960s and the mid-1970s changes in the Korean economy resulted largely from the continuous appreciation of the Japanese industrial workforce as the global process of capital accumulation transformed Japan into a producer of

consumer-durable goods, industrial inputs, and equipment. The Japanese labour-force was then increasingly replaced by new sources of relatively cheap and disciplined labour-power available in East Asia, which was capable of performing simple manual labour-processes in the textile, apparel, and electronics industries. After the mid-1970s, the transformations experienced by the Korean economy resulted not only from the further appreciation of the Japanese labour-force, but also, and crucially, from the direct impact of the contemporary processes of skill-replacing technical change, initially in process industries like steel and chemicals and subsequently, especially after the microelectronics revolution, in such serial production sectors as motor-vehicles, home appliances, and consumer electronics. Moreover, the Korean labour-force thereafter became itself a direct product of the process of capital accumulation; its quality was, thus, continuously improving through on-the-job experience and, increasingly, state mediation. As economic activity moved into higher value-adding sectors, the production of surplus-value expanded and the process of economic growth accelerated (Iñigo Carrera 2013: 76–82).

Three types of policy sets thus mediated the structural transformation of the Korean process of capitalist development throughout the 1960s and 1970s. First, some policies enhanced the export orientation of local industrial capital; second, other policies accelerated both the concentration of industrial capitals and the extent to which they became capable of normal world-market production; and, third, some policies mediated the reproduction of the local workforce with the characteristics and price needed for such activities. In general terms, the degree of direct state regulation of the Korean economy increased as the process of capital accumulation on a global scale changed the conditions of valorisation of capital in Korea in the direction of 'fixed-capital-intensive' industries like durable-consumer and heavy-industry goods. A relatively economically 'liberal', yet politically repressive, state mediated the emergence and initial development of the Korean export-oriented industrialisation (EOI) process during the 1960s. This process required large amounts of low-cost, unskilled labour-power and relatively low-cost fixed-capital investments. The provision of state guarantees for local firms' international-borrowing activities (for example, in the textile industry) and the establishment of foreign-capital subsidiaries (for example, in the microelectronics industry) were then sufficient to develop industrial capital for world-market production. In contrast, the emergence and subsequent development of durable-consumer goods and heavy-industry sectors came about through the consolidation of a

nationalist ‘developmental state’ that not only disciplined while upgrading labour, but also accelerated the concentration of industrial capital to reach world-market scales, either through the provision of credit to private firms by state-owned banks or, as in the case of the steel industry, the centralisation of capital under direct public ownership. Moreover, policies protecting the long-maturing industries replaced the more liberal trade regime prevailing during the initial, light-industry-based stages of the Korean EOI process (for policy analyses, see Kohli 2004: 87–122; Krueger 1979: 99–138; Michell 1988: 61–8).

As in many other ‘developing’ countries, the early-1980s global recession triggered a process of financial sector and foreign trade liberalisation in Korea. However, unlike in Brazil and Latin America generally, this was not a political expression of the inability of the local ground-rent to sustain a diversified, domestic market-oriented industrial capital (Grinberg 2010). The strong growth and development of the Korean EOI process continued after the 1980–1982 recession, even in the context of raising wages. Liberalising reforms in Korea were, in the main, an expression of two other trends. First, the maturation of parts of its industrial sector which no longer required extended market protection and state support for their normal reproduction (for example, light industries). Second, the phasing out of other parts that proved to have had limited commercial potential (for example, aluminium and heavy-machinery industries) and of excessive productive capacity in potentially viable sectors (for example, shipbuilding). Meanwhile, during the 1980s, ‘nascent’ industrial sectors (for example, microelectronics and motor-vehicles) continued to be strongly supported by the state (Chang et al. 1998: 740; Green 1992: 416; Mathews and Cho 2000: 119–35), while, at the same time, developing the capacity to compete in world markets on the same basis as the large-scale heavy and chemical industries—namely, through the use of a *relatively* cheap and disciplined labour-force for simplified productive processes (Bello and Rosenfeld 1992: 113–18; Williams et al. 1994: 61–3).

Neoliberal reforms in Korea also contrasted with contemporary OECD country experiences, where they mediated the differentiation in the conditions of reproduction of the various fragments of the local industrial labour-force (see also Chap. 7). During most of the 1980s, wage differentials among Korean industrial workers declined, albeit from a highly unequal base (Lee and Lindauer 1997: 60–4). Manual workers’ wages increased strongly across the board as the industrial base ‘deepened’, and so did the

demand for more skilled labour-power that could no longer reproduce itself normally under wage conditions corresponding to its peasant origin. This process came about through a period of political opening up and the sharp, though short-lived (1987–1990), increase in working-class activism, crucially by core manual workers (Koo 2001: 153–87).

During the 1990s the Korean economy continued its growth process and its path of 'upgrading' to high-technology industries (Mathews and Cho 2000: 135–47), as a form of realising the production of relative surplus-value on a global scale through the NIDL. Though this new deepening of Korea's industrial sector resulted from the same global-scale economic forces as the previous development of light and heavy industries, it required a lower degree of direct state regulation of productive activities. As industrial capital matured, reaching world market standards, both market protection and the state's support of private-firm funding activities were no longer necessary. On the contrary, capital-account liberalisation became necessary to capture a portion of the expanding global credit supply, which was vital in funding the rapid upgrading of Korean industrial firms in light of emerging competition in world markets from firms located in countries with large supplies of cheaper and, arguably, equally disciplined labour-power (such as in China and Southeast Asia). As an expression of the economic transformations at stake, the 'neoliberal state' replaced the developmental state as the general political representative of the South Korean process of capital accumulation (Shin 2003: 136–70).

Although economic growth remained strong during the 1990s, these developments—that is, the surge of new competitors in global markets and the increasing reliance on external debts to fund investments—expressed the inherent limitations of the Korean process of capital accumulation. Indeed, when in the late 1990s the global process of overproduction of capital became manifest in the East Asian crisis, and demand for Korean exports slowed markedly, while the supply of credit to 'emerging markets' retrenched sharply, the South Korean economy entered its most severe crisis since the end of the 1950–1953 Civil War (Grinberg 2015). And, though in the post-crisis decade the Korean economy underwent a strong export-led recovery that was manifest in further industrial deepening, this process was, unlike in previous periods, supported with a strongly undervalued currency and an increasing, rather than decreasing, degree of labour-market fragmentation and precariousness (Chang and Chae 2004; Moon and Rhee 2009).

THE BRAZILIAN STEEL INDUSTRY⁷

Brazil has a long history of large-scale integrated production of steel. Import substitution efforts in the sector began in the 1930s and expanded significantly during the 1940s under active state promotion. In 1941, after plans for the creation of a privately run project with foreign capital participation failed, the state-owned Companhia Siderúrgica Nacional (CSN) was finally incorporated. Five years later, Latin America's first fully integrated steel mill was completed in Volta Redonda, Rio de Janeiro, close to the country's major industrial areas and iron ore mines (Baer 1969: 68–79; Dahlman 1978: 34–9, 94–5; Fisher et al. 1988: 166–8).

State intervention in the industry increased during the 1950s developmentalist drive with the creation, and subsequent expansion, of a number of companies and plants, including Cosipa in Sao Paulo and Usiminas in Minas Gerais. Though controlled and partly funded by regional governments, these, as with CSN before, received substantial amounts of federal resources channelled through the National Development Bank (BNDE). Usiminas also incorporated the participation of Japan's Nippon Steel (Amarante de Andrade and da Silva Cunha 2003: 5; Dahlman 1978: 40–9).

As in many other developing countries, the declared goal of Brazilian steel SOEs was not only to achieve self-sufficiency in such a critical product for industrial development and national defence, but also to support downstream industries, like machinery, motor-vehicles, shipbuilding, construction, and railways; all of them key sectors in the ISI programme (Amann et al. 2004: 9; Baer 1969: 83; Fisher et al. 1988: 226). The economic content of that policy, however, differed from its ideological forms of realisation. State-owned steel mills in Brazil would act, as all other SOEs, as a medium for the transfer of ground-rent from landowners to industrial capital, crucially by selling subsidised outputs, buying inflated inputs, and by employing an overextended workforce. Moreover, but in contrast to other SOEs, they would also become an active medium for the transfer of ground-rent to industrial capital materialised in the price of iron ore, which was substantial given the country's large availability of low-cost, high-grade mineral deposits. A dual structure thus developed in the Brazilian steel industry, with state-owned integrated mills specialised in flat products, and private firms, mostly operating electric-arc furnaces, specialised in long products and using low-cost raw steel supplied by the former as their main input (Amann et al. 2004: 10). Under these

structural conditions, the industry's development depended thereafter on the evolution of ground-rent, complemented by foreign credit, available to support the limited process of capital accumulation.

After growing rapidly for almost two decades, in the early 1960s the Brazilian steel industry, and in particular the state-controlled sector, entered a period of sluggish growth, as did most of manufacturing. As explained above, the growth of ground-rent then stagnated while external credits dried up. The downturn, however, was short-lived. By the end of the decade, the, so-called, Brazilian economic miracle was underway and the steel industry thrived again while resources to fund state investment were enlarging. In 1971 the long-delayed National Steel Plan was launched to coordinate investment and consolidate the sector to take advantage of economies of scale. To this end, it intended to create a holding company to embrace all SOEs and the National Steel Fund to finance the sector's expansion, although this never fully materialised. The Plan also reaffirmed the market division between state and private firms, and aimed to use 20 per cent of local capacity for export production (Amarante de Andrade and da Silva Cunha 2003: 5–6; Dahlman 1978: 95–8).

By the mid-1970s, the sector's recovery gained momentum and entered a second period of heavy investment. With ground-rent and credit inflows growing strongly again, steel companies received substantial state support under the auspices of the Second National Development Plan (NDP II 1975–1979) that aimed to promote further substitution of industrial inputs and capital-goods imports. In 1975 all steel SOEs finally came under the control of the holding company Sidebras, which, subsequently, also absorbed a number of small privately owned firms manufacturing specialty products (Dahlman 1978: 98–103). Large investments in productive facilities were thereafter undertaken by both state-owned and private-sector firms (Amarante de Andrade and da Silva Cunha 2003: 9). In the state sector the 1970s saw not only the further expansion of CSN, Usiminas, and Cosipa, but also the establishment of two new large mills, Tubarão Steel Company (CST) and Açominas. The former, a joint venture between the Brazilian state, Japan's Kawasaki Steel and Italy's Finsider, was constructed following the Japanese/Korean model in the coastal city of Vitoria with the purpose of exporting semi-finished slabs (D'Costa 1999b: 6–8). The latter was to produce finished and semi-finished products for both domestic and export markets. During this period, several wholly privately-owned firms also emerged, while others expanded their operations (Amann et al. 2004: 10; Dahlman 1978).

The Brazilian steel industry suffered in the debt crisis of the early 1980s, along with the rest of the manufacturing sector. Yet, by the mid-1980s, it was at the forefront of a short-lived export-led economic recovery that prompted several commentators to claim that the investments undertaken through the NDP II had finally succeeded in transforming the structure of the Brazilian economy by creating a self-sufficient, internationally competitive industrial sector (see Barros de Castro and Souza 1985). The reality of the Brazilian economy, however, could have not been more different, as the case of the steel industry makes clear. Labour productivity remained low by world-market standards and thus labour costs remained high, partly due to the low level of equipment automation and partly due to overstaffing in state-owned mills. Though the industry's expansion under the auspices of, and massive funding received from, the NDP II had allowed Brazilian steel SOEs to attain the lower end of the theoretical minimum efficient scale of production, this was well below the scale of Japanese and Korean plants with which they were competing (D'Costa 1999a: 89, 97; Fisher et al. 1988: 300). International markets could only be conquered thanks to a strong undervaluation of the national currency prevailing in the mid-1980s, the low local cost of iron ore and hydroelectricity, and the export subsidies that remained in place.

As can be observed in Table 9.1, in 1985 Brazilian average operational costs for the production of steel were, at exchange rates that reflected the relative evolution of the local currency to reflect value, substantially above those in Japan, Germany, and Korea. When depreciation expenses are considered, this cost disadvantage worsened further as Brazilian integrated mills had been purchasing equipment and contracting construction services from local companies at substantially inflated prices (Mendes de Paula 1993: 46). During the late 1960s, and crucially the 1970s, the local supply of highly-priced industrial equipment increased substantially under the auspices of various programmes implemented to deepen the ISI process, including the market reserve granted to local manufacturers (Amann 1999: 338–9). While construction costs of Korea's POSCO plant averaged USD500 per 1000 tons of annual production capacity, they reached USD1000 in Açominas and USD3000 in CST (D'Costa 1999b: 99).

The combination of high fixed-capital costs, overstaffing, and low-priced output affected the profitability of Brazilian steel SOEs. In 1985 the profit rate was –3.5 per cent for Açominas, producing a mixed output mainly for the domestic market, and –0.83 per cent for CST, producing slabs mostly for external customers. Their profit rates in the mid-1980s

Table 9.1 Cost of producing cold-rolled coil (USD per ton of finished product)

	Korea					Japan					Brazil					
	1985	1991	1996	2003	2003 ^a	1985	1985 ^b	1991	1996	2003	1985	1985 ^b	1991	1996	2003	2003 ^a
Labour costs	25	67	89	59	106	63	40	145	167	116	26	42	82	70	44	52
Main raw materials	103	153	148	124	124	96	96	141	142	113	92	148	150	148	105	123
Other materials	142	156	156	137	137	127	127	189	201	149	156	156	186	160	114	133
Total	270	376	393	320	367	286	263	475	510	378	274	346	418	378	263	308
operational cost																
<i>Efficiency indicators</i>																
Man hour/ton	8.2			3.9		5.4	3.5			3.1	9.0					
Continuous casting (%)	63.3	96.4	98.5	98.5		91.1	100	94.4	96.2	97.7	43.7		56.0	72.8	91.9	

^aParity exchange rates

^bState-of-the-art facilities

Sources: data from Barnett and Crandall (1986); *World Steel Dynamics* (various issues)

would have been around 16.3 per cent and 6.8 per cent, respectively, were these companies paying international prices for their fixed-capital investments.⁸

During the late 1980s and early 1990s, the Brazilian process of capital accumulation through ground-rent recovery underwent a structural crisis and would begin to reproduce itself under new politico-economic forms—namely, a limited or neoliberal ISI process. As part of that transformation, steel SOEs were privatised or shut down. They would no longer mediate the appropriation of ground-rent by industrial capital.

The 1990–1992 privatisation process gave way to the partial consolidation of the steel industry and, consequently, the rationalisation of employment practices and the upgrading of productive facilities (Amann and Nixon 1999: 76–8; de Andrade and da Silva Cunha 2003: 16). Labour productivity strongly increased, yet remained well below world-market norms, as most plants continued producing on a suboptimal scale and technological level. Hence, while through the mid-1990s the Brazilian steel industry became a global low-cost producer of low technology-intensive hot-rolled steel, its international competitiveness was based on the low local cost of iron ore, energy, and labour-power, and the relatively lax local environmental regulations (Amann and Nixon 1999: 69–79; McKinsey 1998: 28).

Moreover, despite early gains in international competitiveness, throughout the 1990s the Brazilian steel industry became, once more, increasingly oriented to the domestic market. As the decade progressed, exports fell below 30 per cent of total output, and became concentrated in semi-finished products, like slabs produced by CST and Açominas, and/or directed to protected regional markets (Instituto Brasileiro de Siderurgia 1995, 2000). The increasingly high overvaluation of the national currency, together with the high cost of local transport and port facilities, hurt the profitability of exported goods, other than raw or semi-processed materials (Mendes de Paula 1993: 52–3; McKinsey 1998: 13, 27, 34). In the steel industry, exports of high value-added products were only possible because of tax credits and subsidised loans made through the BNDE's modernisation fund for equipment acquisitions, which compensated for the negative impact of exchange-rate overvaluation on local costs other than raw materials (Amann and Nixon 1999: 81; Amarante de Andrade and da Silva Cunha 2003: 14–6). Exchange-rate overvaluation, nevertheless, reduced the domestic price of iron ore and imported equipment, largely possible after the 1990–1994 trade-opening reforms, and thus

allowed, now privately-owned, steel producers to appropriate ground-rent when selling their output in the domestic market.

Unsurprisingly, the sector's profitability improved significantly in the post-privatisation period. First, employment in the steel industry was reduced by as much as 37.6 per cent during the 1989–1994 privatisation process and subsequent adjustment. Secondly, steel SOEs were purchased at prices far below the real value of their assets (Amann et al. 2004: 15, 31). In 1995, the return on capital invested in Brazilian steel producers was 3.6 per cent, 10.2 per cent and 23.4 per cent when calculated at, respectively, 'replacement cost', 'current market value' and 'privatisation values' (McKinsey 1998: 29).

After the 1999–2002 global and local economy slowdown, the Brazilian steel industry went through another process of consolidation, which included the entrance of major global leaders, like ArcelorMittal that bought CST and other smaller plants, and the fusion of domestically owned firms (for example, the consolidation of the Gerdau Group to take over Açominas, among others). This process resulted in significant investments in technological upgrading and the expansion of production capacities, both heavily supported by BNDE subsidised loans (Amarante de Andrade and da Silva Cunha 2003: 17–20). Yet despite these developments, no integrated mill in Brazil managed to achieve world-market scales of operation and, arguably, technological/environmental standards. Furthermore, the post-2004 increasing exchange-rate overvaluation—the general form of ground-rent transfer to industrial capital—significantly hurt export growth, notably of high value-added products, maintaining structural limitations on the expansion of the market and therefore on the introduction of vanguard technology (McKinsey and Co. 2013: 15). In 2008, Brazil's indirect trade in steel became negative for the first time since the mid-1970s, while locally owned firms took advantage of the strong exchange rate overvaluation to invest in facilities in industrially advanced countries (World Steel Association 2013).

In sum, before they were privatised in the early 1990s, steel SOEs, controlling almost all integrated facilities and the manufacture of flat products, played a central role in the promotion of the ISI process (that is, in the accumulation of capital through ground-rent recovery). They supplied steel products to their clients at subsidised values, purchased equipment and machinery from domestic producers at inflated prices, and employed an overextended workforce. The resources used to provide these subsidies originated not only in the profits of these companies but also in the

ground-rent appropriated, and the foreign capital borrowed, by the state. In the post-privatisation period, steel companies no longer channelled a portion of the agrarian rent and external credits to their suppliers and clients. They continued, however, to mediate the appropriation of the rent materialised in the price of iron ore and hydroelectricity to steel producers and consumers (that is industrial capital, notably the automobile and white-goods sectors). Moreover, capitals invested in integrated steel mills themselves began, along with any other private capital in Brazil, to participate in the appropriation of local ground-rent and its complementary sources of extraordinary social wealth.

THE KOREAN STEEL INDUSTRY

In the mid-1960s, the Korean steel industry was practically non-existent. Private domestically owned firms, utilising obsolete facilities and a large amount of imported pig iron and scrap steel, satisfied around one-third of a limited domestic demand. Despite the ambitions of the Korean military government, there was not a single large-scale integrated mill, let alone an internationally efficient plant or quality steel producer. There were already three in Brazil at that time (Amsden 1989: 295; Cohen 1978: 422; D'Costa 1994: 52; Fisher et al. 1988: 168; Hogan 2001: 39).

The shape of the Korean steel industry, however, would soon change dramatically. In an import-substitution effort, and against the advice of foreign governments and international development agencies, the Korean state began to plan for the construction of a large-scale fully-integrated steel mill. This was allegedly necessary to help develop a 'balanced' industrial base, including the military industry needed to protect the nation from the security threat permanently posed by North Korea, and crucially after the change in US security policy on East Asia (Amsden 1989: 295; Clifford 1998: 67–71; Haggard 1994: 33–4).

In late-1960s Korea, however, such an enterprise was not a straightforward project. To begin with, it was a project that required an amount of capital that no local private company could then hope to raise. And, even if this were otherwise, the local private sector was unwilling to risk resources in an industry that, given its importance for the process of industrialisation and national defence, could easily fall under strong government regulations (Park 2003: 67–8). Moreover, despite the government's efforts, foreign companies were not prepared to undertake such a supposedly unviable project (D'Costa 1994: 56; Hogan 2001: 3–10).

As in most other 'developing' countries, and many 'developed' ones, the state as the political representative of Korean social capital therefore took charge of the project and, in 1968, created POSCO (Pohang Iron and Steel Company) using its own and externally borrowed resources (including funds from Japanese war reparations). Later on, the company received a strong boost as part of the 1973 Heavy and Chemical Industries Plan. POSCO has since been the main Korean producer of high value-added flat products and, until recently, the only one with integrated facilities. All privately-owned mills have used electric-arc furnaces to finish the raw steel mainly bought from POSCO (D'Costa 1999b: 84).

The construction of POSCO's first plant in the deep-water, southeast coastal city of Pohang was completed in five stages between 1970 and 1984. For this project, POSCO contracted most technology and technical assistance from global market leader Japan's Nippon Steel, though it also sourced key parts of its equipment in Europe. The low cost of the local labour-force and the militaristic discipline used in the process maintained construction costs at internationally low levels (Amsden 1989: 297; Auty 1991: 19–20; D'Costa 1994: 58–60; Hogan 2001: 15–25). In contrast to the Brazilian experience, POSCO has always sought to purchase its fixed capital at the lowest prices possible, regardless of national origin. Production capacity in 1985, when POSCO's first plant was finally completed, reached 9.6 million tons per year, well above the theoretical minimum efficient scale of 3.5 and almost equal to the average of the Japanese industry (Barnett and Schorsch 1983: 57–9). During the first stages of its history, POSCO concentrated on the production of heavy plates and hot-rolled coils used in the rapidly expanding shipbuilding, automobile, and machinery industries. More skill-intensive products, like cold-rolled coils and specialty steels, were relatively unimportant in the initial stages of POSCO's development (Park 1997: 14–16).

POSCO's fast ascent has strengthened those scholarly positions which point at state institutions as the main factor accounting for Korea's late-industrialisation (see, for example, Amsden 1989; Kohli 2004). This, however, is only a superficial part of the story. Often forgotten in those analyses is the fact that during the 1970s and 1980s the steel industry was being affected by the continual introduction of skill-replacing technical changes,⁹ and that Korea had access to a low-cost, highly-disciplined and easily-trainable workforce—crucially after a two-year long compulsory military instruction for male workers and extended state repressive activities and indoctrination campaigns (Bello and Rosenfeld 1992; Grievés and

Saul 1986: Chap. 2). Moreover, existing labour market institutions, such as the extended use of subcontracting and null or weak trade-union representation, have been particularly propitious in reproducing a workforce with the combination of productive attributes and cost required by capital in the industry (D'Costa 1994: 68–9, 1999b: 105–6).

By the early 1980s, with the completion of the third expansion stage, the company was successfully competing with Japanese integrated mills, the contemporary lowest-cost producers, in world markets for finished steel—at least in non-specialty products (Auty 1991: 20). In sharp contrast to the Brazilian experience, during the 1970s and 1980s POSCO sold about half its output in the world market and most of the remainder to local, export-oriented sectors, such as the shipbuilding, machine-tools, and automobile industries (Hogan 2001: 37–61). Through the sale of steel to local consumers at subsidised prices, POSCO transferred a portion of its profits to these privately-owned downstream industries, helping them to strengthen their international competitiveness (Auty 1991: 24; D'Costa 1994: 69–70, 1999b: 87; Park 2003: 55). Hence, the alleged private-style management of this SOE cannot be held up as the reason behind its long-term commercial success, as argued elsewhere (see, for example, D'Costa 1994; Park 2003: 68–9). Nor can it be the quality of state institutions—the largely state-owned Korea Aluminium Company, for instance, was unable to replicate POSCO's success (Stern et al. 1995: 140–2).

Skill-replacing technological developments resulted in changes in the international competitiveness of capitals located in different countries, and hence in the international division of labour in steel production. As can be observed in Table 9.2, in the mid-1980s POSCO's operational costs for hot-rolled coils were lower than the average Japanese producer and roughly the same as those of a state-of-the-art Japanese plant. POSCO compensated for the lower productivity of its workforce, which was largely

Table 9.2 Cost of producing hot-rolled coil (USD per ton of finished product in 1985)

	<i>Japan</i>	<i>Korea</i>
Major raw materials	94	84
Labour costs	41	18
Non-major raw materials	54	47
Total operating costs	189	149

Note: administrative and financial costs not included

Source: Data from Grieves and Saul (1986)

attributable to its relative inexperience and the less efficient technology used for casting processes, with lower wages (see Table 9.1). Japanese leading firms retained, at least for a period, a marginal cost advantage in the more technology-intensive cold-rolled coil production. POSCO's competition eroded some of Japanese firms' external markets, contributing to their excess capacity, as had happened a decade earlier to US mills when Japanese capital appeared in the global market for steel. This further increased their total average production costs, undermining their long-running international competitiveness. While POSCO attained 99 per cent capacity utilisation during the mid-1980s, the largest Japanese steel companies averaged only 52 per cent (Park 1997: 14).

These transformations in the global steel industry manifested themselves in differences in the valorisation and growth capacities of capitals invested in large-scale integrated mills in both countries. While the rate of profit for an average steel mill in 1985 Japan was about 8.45 per cent, POSCO's pre-tax profit rate would have been around 20 per cent had it not sold part of its output in the domestic market at substantially subsidised prices. Conversely, the pre-tax rate of return on capital advanced for valorisation for a representative Japanese steel mill that year would have been around 26 per cent had they worked at full capacity and thus spread fixed costs more thinly. More importantly, POSCO's rate of profit (at export rather than domestic market prices) in 1985 would have been around -2.3 per cent had it paid Japanese wages to its relatively low-productivity production workers.

As can be observed in Table 9.1 the slight advantage enjoyed by Japan's most efficient steel mills disappeared throughout the second half of the 1980s, when POSCO installed its third continuous caster at the Pohang works, thereby attaining a 100 per cent continuous casting process, when it also built its state-of-the-art, fully automated and computerised plant in the southern coastal town of Gwangyang (Hogan 2001: 25-35; Park 2003: 61-2). Nevertheless, despite becoming one of the largest and most efficient steelmaking companies in the world, POSCO has not been at the forefront of technological developments in the sector. Rather, the company has concentrated on the introduction of incremental rather than radical innovations (Hogan 2001: 63-73; Park 2003: 56-60).

During the 1990s POSCO consolidated its world leadership and managed to out-compete the most efficient Japanese producers in almost every sector of the market (see Table 9.1 for the case of cold-rolled coils). As the new technological base was consolidated and worker experience matured,

labour productivity in Korea as good as reached Japanese levels, while wages remained substantially lower (Park 1997: 14). Moreover, even after the revival of the US steel industry led by the mini-mill sector, POSCO could, unlike most of its Japanese counterparts, continue to compete successfully in world markets for non-speciality steel (Park 2003: 53–4). The company's rate of profit, when output is valued at world market prices, remained at around 25 per cent in 1995 despite the emergence of a new global steel crisis.

With POSCO's global leadership consolidated, the Korean state initiated its divestment from the company as part of an economy-wide liberalisation programme. The firm had by then already attained an efficient scale of operation and had become one of the world's largest and lowest-cost steel producers. Moreover, downstream industries were no longer in need of heavily subsidised steel products as they had also substantially improved their international competitiveness. On both sides, there was no longer a need for public ownership of the company. Yet, POSCO's sale was, unlike that of its Brazilian counterparts, a slow process; it only ended in 2001, when the state sold its remaining 20 per cent to 25 per cent of the company's equity. By the mid-2000s at least two thirds of the company's shares were owned by foreign investors (D'Costa 1999b: 101; Hogan 2001: 16).

Although POSCO's cost competitiveness in global markets remained strong during its post-1998, privately run era, it has not been as comfortable as before. As wages in South Korea increased, while local workforce skills expanded further, the cost gap with producers in both higher-wage/productivity and lower-wage/productivity countries narrowed. As Table 9.1 shows, in 2003 operational costs for the production of cold-rolled coils at parity exchange rates—that is, discounting the post-crisis undervaluation of the Korean currency—were still lower than in industrially advanced countries but already higher than in China where, nevertheless, steel products are arguably of a lower quality. This, however, might be misleading because the Chinese *yuan* was also widely considered to have been strongly undervalued (Grinberg 2014). At market exchange rates, POSCO's operational costs were still lower than Chinese costs.

In sum, the emergence and long-term development of the South Korean steel industry was not simply a product of bold state policies, as is often argued. Rather, it resulted from the development of the autonomously regulated process of capital accumulation on a global scale, whose contradictory motion has been necessarily *mediated* by the actions of the Korean state. In effect, the Korean state's long-term efforts in the promotion of

the sector only began to pay-off after the mid-1970s, when the development of the NIDL created the conditions for capital to take advantage of the large availability in Korea of relatively cheap, highly disciplined, and easily trainable labour-power. More specifically, automated and computerised technologies had by then significantly simplified production processes and thus made possible the use of relatively low-skilled workforces. Before the mid-1970s state policies had been as ineffective in building an internationally competitive steel industry as in many other developing countries.

CONCLUSION

This chapter has compared the processes of 'state-led' industrialisation in Brazil and South Korea. It claimed that the specific form of participation of each economy in the production of relative surplus-value on a global scale has determined the pattern of industrialisation that followed and the political processes through which it came about. In Brazil industrial capital accumulated through the state mediated recovery of ground-rent, which implied small-scale production for protected domestic markets. By contrast, in South Korea, industrial capital accumulated through the exploitation of a *relatively* cheap and disciplined workforce performing simplified activities for world market production in increasingly complex sectors. These claims were substantiated with the analysis of the differentiated development of these countries' steel industries.

NOTES

1. This section draws upon on Iñigo Carrera (2013), Grinberg and Starosta (2009, 2014), and Grinberg (2013b).
2. Ground-rent is surplus-value appropriated by landowners due to their differential and absolute *monopoly* over uncontrollable natural conditions of production that, respectively, increase labour productivity or make production possible (Marx 1981: 779–823).
3. The structure of the process of capital accumulation in Mexico and Central America was transformed in the 1980s as a result of the same economic forces that accounted for the emergence of East Asia as a global industrial powerhouse (Grinberg 2010).
4. This section is based upon Grinberg (2016).
5. As in the industrially advanced economies, neoliberalism has also been the politico-economic form through which capital realised the differentiation of the conditions of reproduction of the different portions of the workforce

- according to their, increasingly distinctive, productive attributes (Iñigo Carrera 2013).
6. This section is based on Grinberg (2013b and 2016).
 7. The following two sections draw upon Grinberg (2011: 115–33).
 8. See Iñigo Carrera (1996) for the theoretical and methodological foundations of the model used to measure the profitability of individual industrial capitals; and Grinberg (2011: 181–3) for the sources used to pursue the computations of representative capitals in the Brazilian and Korean steel industries.
 9. Skill-replacing technical changes in the steel industry centred, initially, on the computerisation of the control of the physicochemical processes required to transform raw materials into final products and, subsequently, on the automation of the regulation and interconnection of such processes (Balconi 2002; Coriat 1992; Hasegawa 1996).

REFERENCES

- Amann, E. 1999. Technological Self-reliance in Brazil: Achievements and Prospects—Some Evidence from the Non-serial Capital Goods Sector. *Journal of Development Studies* 27(3): 329–57.
- Amann, E., G. Mendes de Paula, and J.C. Ferraz. 2004. Ownership Structure in the Post-privatized Brazilian Steel Industry: Complexity, Instability and the Lingering Role of the State. Working Paper 75, Centre on Regulation and Competition, University of Manchester, June.
- Amann, E., and F. Nixson. 1999. Globalisation and the Brazilian Steel Industry: 1988–97. *Journal of Development Studies* 35(6): 59–88.
- Amsden, A. 1989. *Asia's Next Giant: South Korea and Late Industrialization*. New York: Oxford University Press.
- Anglade, C. 1985. The State and Capital Accumulation in Contemporary Brazil. In *The State and Capital Accumulation in Latin America*, vol. 1, ed. C. Anglade and C. Fortin. London: Macmillan.
- Auty, R. 1991. Creating Competitive Advantage: South Korean Steel and Petrochemicals. *Tijdschrift voor Economische en Sociale Geografie* 82(1): 15–29.
- Avelãs Nunes, A.J. 1990. *Industrialización y desarrollo: La economía política del modelo brasileño de desarrollo*. México: F.C.E.
- Baer, W. 1969. *The Development of the Brazilian Steel Industry*. Nashville, TN: Vanderbilt University Press.
- Balconi, M. 2002. Tacitness, Codification of Technological Knowledge and the Organisation of Industry. *Research Policy* 31: 357–79.
- Barnett, D., and R. Crandall. 1986. *Up from the Ashes: The Rise of the Steel Minimill in the United States*. Washington, DC: The Brookings Institution.

- Barnett, D., and L. Schorsch. 1983. *Steel: Upheaval in a Basic Industry*. Cambridge: Ballinger.
- Barros de Castro, A., and F. Souza. 1985. *Economia brasileira em marcha Forçada*. Rio de Janeiro: Paz e Terra.
- Batista, J. 1992. *Debt and Adjustment Policies in Brazil*. Boulder: Westview Press.
- Bello, W.F., and S. Rosenfeld. 1992. *Dragons in Distress: Asia's Miracle Economies in Crisis*. London: Penguin Books.
- Bray, F. 1986. *The Rice Economies: Technology and Development in Asian Societies*. Oxford: Basil Blackwell.
- Brenner, R. 2006. *The Economics of Global Turbulence*. London: Verso Books.
- Brown, C., and B. Campbell. 2001. Technical Change, Wages, and Employment in Semiconductor Manufacturing. *Industrial and Labor Relations Review* 54(2A): 450–65.
- Chang, D., and J. Chae. 2004. The Transformation of Korean Labour Relations since 1997. *Journal of Contemporary Asia* 34(4): 427–88.
- Chang, H.-J., H.-J. Park, and C.G. Yoo. 1998. Interpreting the Korean Crisis: Financial Liberalisation, Industrial Policy and Corporate Governance. *Cambridge Journal of Economics* 22(6): 735–46.
- Clifford, M. 1998. *Troubled Tiger: Businessmen, Bureaucrats, and Generals in South Korea*. Armonk: M. E. Sharpe.
- Cohen, S. 1978. Industrial Performance in South Korea: A Descriptive Analysis of a Remarkable Success. *The Developing Economies* 16(4): 408–33.
- Coriat, B. 1992. *El taller y el robot*. Madrid: Siglo XXI.
- D'Costa, A. 1994. State, Steel and Strength: Structural Competitiveness and Development in South Korea. *Journal of Development Studies* 31(1): 44–81.
- D'Costa, A. 1999a. Overcoming Structural Barriers Steel Industries in Brazil, India and Korea. *Economic and Political Weekly*, February: 2–16.
- D'Costa, A. 1999b. *The Global Restructuring of the Steel Industry: Innovations, Institutions and Industrial Change*. New York: Routledge.
- Dahlman, C.J. 1978. From Technological Dependence to Technological Development: The Case of the USIMINAS Steel Plant in Brazil. Working Paper 21, IDB/ECLA Research Programme in Science and Technology, Buenos Aires, October.
- Amarante de Andrade, M.L., and L.M. da Silva Cunha. 2003. O Setor Siderurgico. O Banco Nacional do Desenvolvimento (BNDES) Sector History report. http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Publicacoes/Consulta_Expressa/Setor/Mineracao_e_Metalurgia/200212_18.html. Accessed 9 Aug 2015.
- de Paiva Abreu, M. 2008. The Brazilian Economy, 1930–1980. In *The Cambridge History of Latin America Volume IX, Brazil since 1930*, ed. L. Bethell. Cambridge: Cambridge University Press.

- Ernst, D. 2005. Complexity and Internationalisation of Innovation - Why is Chip Design Moving to Asia? *Innovation Managements* 9(1): 47–73.
- Fisher, B., et al. 1988. *Capital-Intensive Industries in Newly Industrializing Countries: The Case of the Brazilian Automobile and Steel Industries*. Tübingen: J. C. B. Mohr.
- Frank, C., K.S. Kim, and L. Westphal. 1975. *Foreign Trade Regimes and Economic Development: South Korea*. New York: NBER/Columbia University Press.
- Frieden, J. 1987. The Brazilian Borrowing Experience: From Miracle to Debacle and Back. *Latin American Research Review* 22(1): 95–131.
- Fröbel, F., J. Heinrichs, and O. Kreye. 1980. *The New International Division of Labour: Structural Unemployment in Industrialised Countries and Industrialisation in Developing Countries*. Cambridge: Cambridge University Press.
- Green, A. 1992. South Korea's Automobile Industry: Development and Prospects. *Asian Survey* 32(5): 411–28.
- Grieves, D., and G.D. Saul. 1986. 'POSCO', British Steel Engineers' Report, December 1985, mimeo.
- Grinberg, N. 2010. Where Is Latin America Going? FTAA or "Twenty-first-Century Socialism"? *Latin American Perspectives* 30(1): 185–202.
- Grinberg, N. 2011. Transformations in the Korean and Brazilian Processes of Capitalist Development between the mid-1950s and the mid-2000s: The Political Economy of Late Industrialisation. Unpublished PhD diss. London School of Economics and Political Science.
- Grinberg, N. 2013a. The Political Economy of Brazilian (Latin American) and Korean (East Asian) Long-term Development: Moving beyond Nation-centred Approaches. *New Political Economy* 18(2): 171–97.
- Grinberg, N. 2013b. Capital Accumulation and Ground-rent in Brazil: 1953–2008. *International Review of Applied Economics* 27(4): 449–71.
- Grinberg, N. 2014. From the Miracle to Crisis and Back: The Political Economy of Korean Long-term Development. *Journal of Contemporary Asia* 44(4): 711–34.
- Grinberg, N. 2015. On the Brazilian Ground-rent Appropriated by Landowners: 1955–2005. *Brazilian Journal of Political Economy* 35(4): 799–824.
- Grinberg, N. 2016. From Populist Developmentalism to Liberal Neo-Developmentalism: Contradictions and Historical Development of the Brazilian Process of Capital Accumulation. *Critical Historical Studies* (forthcoming).
- Grinberg, N., and G. Starosta. 2009. The Limits of Studies in Comparative Development of East Asia and Latin America: The Case of Land Reform and Agrarian Policies. *Third World Quarterly* 30(4): 761–77.
- Grinberg, N., and G. Starosta. 2014. From Global Capital Accumulation to Varieties of Centre-Leftism in South America: The Cases of Brazil and Argentina. In *Crisis and Contradiction: Marxist Perspectives on Latin American*

- in the Global Economy*, ed. S. Spronk and J.R. Webber. Leiden: Brill Academic Publishers.
- Haggard, S. 1994. From the Heavy Industry Plan to Stabilization: Macroeconomic Policy, 1976-1980. In *Macroeconomic Policy and Adjustment in Korea, 1970-1990*, ed. S. Haggard et al. Cambridge: Harvard University Press.
- Hasegawa, H. 1996. *The Steel Industry in Japan: a Comparison with Britain*. London: Routledge.
- Hogan, W. 2001. *The POSCO Strategy: A Blueprint for World Steel's Future*. Maryland: Lexington Books.
- Howe, G.N. 1981. Dependency Theory, Imperialism, and the Production of Surplus Value On a World Scale. *Latin American Perspectives* 8(3-4): 82-102.
- Íñigo Carrera, J. 1996. A Model to Measure the Profitability of Specific Industrial Capitals by Computing their Turnover Circuits. Working paper, CICP, Buenos Aires.
- Íñigo Carrera, J. 2013. *El capital: razón histórica, sujeto revolucionario y conciencia*, 2nd ed. Buenos Aires: Imago Mundi.
- Instituto Brasileiro de Siderurgia. 1995 and 2000. *Anuário Estatístico da Indústria Siderúrgica Brasileira*. Rio de Janeiro: Instituto Brasileiro de Siderurgia.
- Kohli, A. 2004. *State-directed Development: Political Power and Industrialization in the Global Periphery*. Cambridge: Cambridge University Press.
- Koo, H. 2001. *Korean Workers: The Culture and Politics of Class Formation*. Ithaca: Cornell University Press.
- Krueger, A. 1979. *The Developmental Role of the Foreign Sector and Aid*. Cambridge: Council on East Asian Studies, Harvard University.
- Corrêa do Lago, L.A., et al. 1979. *A indústria brasileira de bens de capital: Origens, situação recente e perspectivas*. Estudos Especiais IBRE No 1. Rio de Janeiro: FGV.
- Lee, J.W., and D.L. Lindauer. 1997. Relative Deprivation and the Distribution of Wages. In *The Strains of Economic Growth: Labor Unrest and Social Dissatisfaction in Korea*, ed. D.L. Lindauer et al. Cambridge: Harvard University Press.
- Marx, K. 1976. *Capital*, vol. 1. Harmondsworth: Penguin.
- Marx, K. 1981. *Capital*, vol. 3. London: Penguin.
- Mathews, J., and D. Cho. 2000. *Tiger Technology: The Creation of a Semiconductor Industry in East Asia*. Cambridge: Cambridge University Press.
- McKinsey. 1998. *Productivity - The Key to an Accelerated Development Path for Brazil*. São Paulo: McKinsey Global Institute Brazil Office.
- McKinsey and Co. 2013. Competitiveness and challenges in the steel industry. OECD Steel committee 74th session. Paris, 1 July.
- Mendes de Paula, G. 1993. *Estudo da competitividade da indústria brasileira: competitividade da indústria siderúrgica*. Campinas: Fundação Economia de Campinas.

- Michell, T. 1988. *From a Developing to a Newly Industrialised Country: The Republic of Korea, 1962–82*. Geneva: International Labour Office.
- Moon, W., and Y. Rhee. 2009. Financial Integration and Exchange-Rate Coordination. In *Fostering Monetary and Financial Cooperation in East Asia*, ed. D.K. Chung and B. Eichengreen. Singapore: World Scientific.
- Park, E.Y. 1997. Role of Government, Technological Capability and Development of Steel Industry: The Case of POSCO. Occasional Paper No 6, International Development Research Institute, Tokyo.
- Park, E.Y. 2003. Behind POSCO's Success: the Role of Government in Technology Capability Building. In *Manufacturing Competitiveness in Asia*, ed. K.S. Jomo. London: Routledge Curzon.
- Postone, M. 1996. *Time, Labor, and Social Domination: A Reinterpretation of Marx's Critical Theory*. Cambridge: Cambridge University Press.
- Shin, D.M. 2003. *Social and Economic Policies in Korea: Ideas, Networks and Linkages*. London: Routledge Curzon.
- Skidmore, T. 1988. *The Politics of Military Rule in Brazil, 1964–1985*. Oxford: Oxford University Press.
- Skidmore, T. 2007. *Politics in Brazil, 1930–1964: An Experiment in Democracy*. Oxford: Oxford University Press.
- Stern, J.J., et al. 1995. *Industrialization and the State: The Korea Heavy and Chemical Industry Drive*. Cambridge: Harvard Institute for International Development.
- Williams, K., et al. 1994. *Cars: Analysis, History, Cases*. Providence: Berghahn Books.
- World Steel Association. 2013. Brazilian Indirect Trade in Steel in 1970-2011. Working Paper, World Steel Association, Brussels, November.
- Zurron Ocio, D. 1986. Salarios e politica salarial. *Revista de Economia Política* 6(2): 5–26.