FROM DE-RISKING TO DIVERSIFICATION: MAKING STRUCTURAL CHANGE WORK FOR CLIMATE ADAPTATION

IV

A. Introduction

As discussed in the previous chapter, growth prospects in many developing countries are already under threat from climate shocks, with worse to come. Adapting to these shocks is a major policy challenge. The favoured approach has so far emphasised "de-risking" development through a variety of market-based coping measures and relying on the public sector as a benevolent insurer of existing assets. While these may help address some of the immediate consequences of climate shocks, in particular for vulnerable populations, the only lasting solution is to reduce the dependence of developing countries on a small number of climate sensitive activities through a process of structural transformation that can establish more resilient economies.

The success of today's advanced economies, as well as in the catch-up economies of East Asia, rests on sustained economic growth closely tied to structural transformation. At its core, this involves two sets of combined and cumulative processes: a vertical shift in the production structure from the primary sector to manufacturing (and on to high-end services) on the one hand, and a more horizontal move of resources from lower- to higher-productivity and more capital-intensive activities within and across sectors. Together, these processes have, in almost all successful development experiences, facilitated a more diversified pattern of economic activity, raised productivity and led to an improvement across a broad set of social indicators, including poverty reduction.

More diversified economies are also less vulnerable to external shocks which are likely to disrupt the growth and transformation process (OECD/WTO, 2019). This has, in recent years, been apparent with the heightened vulnerability of primary export dependent economies to economic shocks that originate elsewhere in the global economy but it is also the case with climate shocks. Indeed, in many developing countries, particularly those located in tropical and sub-tropical regions, vulnerability to economic and climate shocks are compounding each other, locking countries into an eco-development trap of permanent disruption, economic precarity and slow productivity growth. Breaking out of that trap implies that the climate adaptation challenge in the developing world needs to be approached from a developmental perspective.

Not all past experiences, no matter how attractive, can be easily adapted to contemporary realities. The main problem with turning to history for successful growth experiences is their reliance on fossil fuel-based development paths. Today, developing countries confront the dilemma of having to pursue economic development while keeping emissions and resource consumption within the ecological limits of the planet.

This challenge, in turn, necessitates new strategies that pursue structural transformation in a climate constrained world. As that world wakes up to rebuilding economies after the Covid-19 shock, an opportunity to formulate, agree and implement a set of new policy choices that combine developmental and ecological concerns should not be missed.

Developing country policymakers face this challenge from a position of disadvantage in terms of their

ability to mobilise domestic resources, the structural constraints on expanding those resources and their weak or missing institutional capacities and skills, many of which only emerge along with a successful development process. One possible countervailing advantage of economic latecomers is being able to draw on technologies already developed in more advanced economies to help speed up their transformation. This, however, is easier said than done, and an extensive literature has discussed the obstacles to technology transfer facing developing countries, obstacles that are becoming more pronounced in the face of binding environmental constraints.

At one level, many developing countries are less locked-in to fossil fuel-based technologies and to vested interests in public decision-making that may hamper change. Instead, they can build their urban environments, manufacturing industries, energy and transport systems in less carbon-intensive and more environmentally sustainable ways. At the same time, the fragmentation of production processes through the spread of global value chains along with the tightening of intellectual property rights over recent decades are posing even greater obstacles for developing countries in accessing the technologies needed to make that transition, at the same time as they are becoming more exposed to the adverse consequences of a warming climate and the threat of the eco-development trap.

Policy strategies associated with the East Asian development experience – often summarised as the "developmental state" model (e.g., UNCTAD 2016; Wade 2018) – can provide useful guidance in this regard (Poon and Kozul-Wright 2019). Those strategies, which yielded rapid industrialisation and productivity growth in East Asia in the 1980s and 1990s (and earlier, but more ephemerally, in Latin America), include elements of economic planning and targeted industrial policies, as well as the space required to establish a well-defined national interest, experiment with different policy options and define and negotiate economic priorities across a variety of stakeholders (UNCTAD 2003; Beeson 2006). At the same time, it is clear that today, not only has that space narrowed under the pressures and constraints of hyperglobalization, but the priorities and related trade-offs introduced by adding the environmental dimension of development further complicate efforts to emulate the developmental state model.

This chapter analyses the challenge of structural transformation in the climate-constrained world. It is organized under two broad headings. The initial sections discuss developmental challenges in a historical and comparative setting, using the dual economy model of Sir Arthur Lewis (1954) as a heuristic device to examine how achieving economic development through structural transformation in a climate-constrained world may work, identifying some of the limitations of the original idea. The second examines in more depth how such limitations may be overcome today. It distils policy experiences from successful industrializations and identifies a set of policies (industrial, food and energy security) that can help guide structural transformation while addressing the climate crisis. Taken together, such policies form part of a green developmental state agenda that can respond to developing country priorities in the climate constrained, post-Covid global economic system.

B. The Lewis model of development for a climate-constrained world

One of the best-known models of economic development was provided by Arthur Lewis (1954). Lewis argued that the driver of economic development was capital accumulation, conditioned by a movement of labour - the abundant production factor in a typical developing country - from the "traditional" or "non-capitalist," low-productivity sector, to the "modern" or "capitalist" sector, characterized by higher productivity, higher wages, and the use of reproducible capital (essentially machines and equipment).

The key condition for this mechanism to work is the existence of surplus labour in the traditional or non-capitalist sector. This surplus ensures that, during an extended period of labour migration, wages in the capitalist sector remain constant because the inflow of workers exceeds demand at the prevailing wage in this sector, determined by the subsistence wage in the traditional sector plus a fixed margin. The resulting surplus of output over wages in the modern sector is captured by the capitalists as profits. The capitalist sector grows, as with ongoing labour migration and constant wages the share of profits in national income rises and parts of the profits are re-invested in the modern sector. This profit-investment nexus gives rise to a virtuous circle of rapid productivity

growth, more and better paid jobs, higher household incomes and expanded markets, leading, in turn, to higher levels of investment and thus helping to further boost productivity (Akyüz and Gore, 1996). Once the labour surplus disappears,[1] i.e., an integrated labour market and an integrated economy emerge, rising wages lead to declining returns to investment, and slower growth. The rise in wages may be contained without lowering workers' living standards, by maintaining the availability of wage goods, especially food, at affordable prices which in most cases presupposes productivity and output growth also in agriculture.

A number of the assumptions underlying the Lewis model generated theoretical controversy.[2] In response, Lewis argued that the main objective of his work was not a refinement of abstract models, but an indication of how development, understood as a multidimensional process of economic, social and institutional change, could be tackled in a problem-solving way through instruments of public policy. [3]

A more serious criticism was the view of agriculture as a backward and inherently stagnant sector which ignited interest in a more positive and active role for agriculture development in structural transformation, including through rural institutions and incentives that would spur productivity growth.[4] Timmer (1988) considers that structural transformation starts with rising productivity in agriculture, leading to declining food prices, in turn enabling productivity growth and the development of internationally competitive activities in manufacturing. In other words, this perspective holds that structural transformation depends on rising productivity in both agricultural and non-agricultural sectors, and that the two are connected through backward and forward linkages.

Notwithstanding these criticisms, the Lewis model "remains relevant as an 'ideal type' or heuristic device for the study of economic development through which contemporary patterns of structural transformation and their implications for inclusive growth, wages, profits, employment and productivity can be examined" (Sumner 2018: 2).

One such examination relates to the use of the main elements of the Lewis model in the analysis of the successful development experiences in East Asia over the past four decades and their potential lessons for current developmental challenges. Although each country needs to tailor its development strategy to its own specific conditions, including historical, cultural and institutional background, certain key elements in the Lewis model, and reflected in the East Asian experience, remain of wider validity. Two of these - the role of capital investment and the capacities of the state – are particularly relevant for the discussion of development challenges in the climate-constrained world today. A third element, the concept of linkages, which was developed, in part, in response to its absence in the original Lewis model, can further enrich that discussion.[5]

1. Capital investment

Perhaps the most important feature of the East Asian development experience is the importance of capital investment as a driver of growth-enhancing structural transformation. An expanding modern sector can gradually absorb the labour surplus, while its higher level of productivity supports economic growth. Mobilizing sufficient capital in the initial stages of industrialization may require foreign finance but will increasingly be replaced by a reinvestment of profits into the expanding modern sector, creating a dynamic profit-investment nexus (Akyüz and Gore, 1996). When agriculture is brought into the analysis, it too can become a source of structural transformation as a potential (and often the only) sector to induce growth. Ranis and Fei (1961), argued that agriculture can serve industrialization by generating much-needed foreign exchange to finance imports of capital and intermediate goods, provide a stable domestic market for manufacturing output, and keep the cost of wage goods low (thereby boosting industrial profits and investment).

Capital investment in the modern sector is closely associated with productivity growth: due to scale economies in the modern sector, labour productivity growth is a positive function of the pace of output growth.[6] The positive relationship between capital investment and productivity growth can be boosted further by exports, an element not considered in the Lewis model. This is because increasing investment in sectors that export to developed countries allows production to shift towards products with high income elasticity, while expanding the modern sector requires a large volume of intermediate and capital goods whose imports must be financed with foreign exchange earned through exports. Otherwise, increased external borrowing would raise debt-service ratios which could, in turn, act as a constraint on the growth process.[7]

Similar to the assumption in Lewis (1954) that developing countries can draw on an ever-increasing stock of technologies for the purpose of catching-up with other countries, these mechanisms also imply that productivity growth through technological upgrading largely relies on the transfer, imitation and adaptation of foreign technology that has been successfully used in more advanced economies and whose effective use in developing countries are facilitated by building up domestic technological capacities, local R&D, and better skilled labour. This leads us to the second key element in the Lewis model: the role of the state.

2. State Capacity

In addition to market mechanisms, Lewis (1954) emphasizes the role of government policies as instrumental to solving a set of successive coordination problems that arise with a process of structural transformation. Specifically, the crucial question in dualistic economies is how to manage the relation between the traditional and the modern sector of the economy.[8] The ability of a government to conceive of and implement policy is defined as state capacity. In the developmental context, and specifically in the case of East Asia, the notion of state capacity includes "precise circumstances, tools, strategies and relationships that distinguish and effectively constitute different national approaches to successful economic development" (Beeson 2006: 444–445). Successful development outcomes, in turn, depend on the state's ability to institutionalise channels for continual negotiation of economic policies. These channels need to be, on the one hand, aligned with the national interest, but on the other, designed so that the state is not captured by vested economic interests.

Macroeconomic priorities of a developmental state are based on the proactive, pro-investment set of policies, as well as strategic collaboration and coordination between the private sector and the government. The latter is needed to monitor the interdependence between investment and production decisions. These decisions concern identifying the areas where the most significant constraints to investment are; how effectively to channel public and private investment to the high-productivity activities; and monitor whether these investments are managed in such a way as to sustain a high-wage future for citizens and to increase long-term productivity. Such disciplining of investment is ensured through monitorable performance standards and a withdrawal of governmental support that fails to achieve its objective within a given period of time, as well as through checks on rent-seeking of government officials and entrepreneurs.

While capital formation and stronger state capacity are key pillars of a development state model, there is not one but many variants, of the model, reflecting specific regional, historical and socio-economic factors (Haggard, 2018). And although the 1997–98 crisis in East Asia tarnished the model in some respects, it remains the case that "government signaled the direction, cleared the way, set up the path and – when needed – provided the means" to help countries in the region successfully transition to a sophisticated industrial economy with the active support of a developmental state (Cohen and de Long, 2016: 2).

Even in the agricultural sector, higher productivity is only achievable through significant state support in the form of agricultural extension programmes, such as R&D, and through providing physical infrastructure for water management and irrigation systems, construction of roads for market access, and stabilizing input and output markets through price support schemes (Ranis and Fei, 1961; Johnston and Mellor, 1961). State intervention also targets small to medium farms because of their higher effective demand for domestic production, as opposed to larger and more mechanized farms. These farms tend to use imported inputs for more capital-intensive production technology, which not only depletes foreign reserves but also breaks the forward-backward linkages that are a necessary feature of a cumulative growth process (Adelman, 1984).

Most importantly, state machinery is needed for reallocating the surplus created in the agricultural sector through taxation and manipulating the domestic terms of trade (i.e., to get the prices wrong) in favour of industry. In the absence of the strategic reallocation of the surplus by the state, there is no guarantee of mobilizing the privately owned agrarian surplus coming from millions of separate small and medium-sized producers to strategic sectors for structural transformation.

Externally too, pressures of global economic integration require enhanced state capacity to manage economic integration and protect vulnerable sectors of the economy (Beeson, 2006). While there are potentially strong synergies between investment, exports and productivity growth, particularly with respect to manufacturing activities, positive outcomes are not predetermined; when there is surplus labour, strong import competition, or the exit of less

productive firms, trade liberalization can result in declines in aggregate (economy-wide) productivity even as it raises productivity in the industrial sector or among trading firms (McMillan and Rodrik, 2011). The net impact ultimately depends on wider employment dynamics and on whether the productivity growth in industry is outweighed by a larger shift of labour and resources into low productivity work outside the sector. Evidence of such shifts underlie concerns about weak industrialization (including premature de-industrialization) in the developing world in recent decades (UNCTAD, 2003, 2016; Tregenna, 2009).

With the structure of the economy continuously changing under technological and external market pressures building a network of robust linkages, both domestically and internationally, becomes an even greater economic development challenge to which active industrial and trade policy must adapt accordingly.

3. Linkages

The immense appeal of the manufacturing sector lies in its potential to generate productivity and income growth, and because such gains can spread across the economy through production, investment, knowledge, and income linkages. As noted above, a strong link between profits and investment was assumed by the Lewis model and has certainly been key to the success of East Asian later industrializers. Such a link was, however, as much the outcome of active state policies as automatic market forces (Akyüz and Gore, 1996).

Several other linkages that can play an important role in establishing a virtuous pattern of growth and structural transformation deserve mention here. To begin with, expanding production can help build 'backward' linkages (to source inputs for production), and 'forward' linkages in so far as the produced goods are used in other economic activities (Hirschman, 1958). This relates, for instance, to domestically produced pesticides and simple agricultural equipment, as well as agricultural raw materials as inputs for domestic production. Intersectoral linkages emerge as knowledge and efficiency gains spread beyond manufacturing to other sectors of the economy, including primary and service activities (Tregenna, 2010). There also are additional benefits to be gained from adaptability linkages: in manufacturing, which lends itself more to the division of labour, there is a high degree of adaptability towards the use of inputs beyond the immediate industrial niche.

Investment linkages are created when investments in productive capacity, new entrepreneurial ventures, and the related extensions of manufacturing activities in one enterprise or subsector trigger additional investments in other firms or sectors, which otherwise would not occur because the profitability of a specific investment project in a certain area of manufacturing activity often depends on prior or simultaneous investments in a related activity (Rodrik, 2004). In turn, the coordination problem that may result from these interdependencies can be resolved by strategic collaboration between the government and business organizations or between the government and state-owned enterprises.

Income linkages emerge from rising wage incomes generated from industrial expansion; these add to the virtuous cycle through 'consumption linkages', when higher wages trigger higher food demand which, in turn, causes rising demand for domestic inputs to agriculture. Income linkages also operate through supplementary government revenues (i.e., 'fiscal linkages'), which may therefore expand public expenditure. The creation of such income linkages can strengthen the self-reinforcing aspect of industrialization through increasing domestic demand and therefore GDP growth.

The expansion of manufacturing activities and the diversification process more generally as key to successful transformation can be interpreted as the complex intertwining of these linkages and related feedback loops through a process of "cumulative causation" (Myrdal, 1957; Kaldor, 1957). However, one obvious caveat should be pointed out: historically the expansion of manufacturing has tended to rely on patterns of production that damage the environment through pollution and lead to degradation and overexploitation of natural resources and excessive carbon emissions associated with climate change. Indeed, a shift to services-based growth could be advocated precisely in order to avoid the environmental problems that have emerged in some rapidly industrializing countries. However, there are both strong analytical and empirical grounds to assume that the services sector needs to rely on strong intersectoral linkages and interdependencies with a mature manufacturing sector to itself upgrade (UNCTAD, 2016; Cherif and Hasanov, 2019). In any case, such problems are not intrinsic to the industrialization process: they depend crucially on the choice of technologies, policies and regulations.

C. Climate change, development and post-Covid recovery

The need for effective state capacity and active policy to manage structural transformation is amplified further by climate change, and so are the challenges of policymaking. A climate-conscious developmental state today must be able to balance the threat of climate change along with the longstanding goals of achieving economic growth and closing the economic and technological gaps with more advanced economies. At the most basic level, addressing climate change makes structural transformation a global task, in which the advanced economies must take the lead in undertaking profound changes in their patterns of production and consumption but where significant structural and technological changes are also necessary even in the least developed countries. But while climate-related structural transformation is needed to address the degradation of the global commons, targeted national policies (and resources) are needed to address the adaptation challenge countries are facing from the rising temperature already baked into current patterns of growth. Aligning these global and national challenges is neither straightforward nor automatic but requires strategic planning and policy intervention. In line with the discussion in the previous section, the integrated policy framework that is required can build around efforts to achieve more diversified economies.

The divergence between global climate objectives and immediate national interests is most evident for countries with large fossil-fuel sectors, as policies to reduce emissions will inevitably depress fossil fuel demand. Political short-termism in the wake of the pandemic can also lead some countries to attract polluting industries from countries with more stringent environmental standards and regulations, with the resulting proceeds providing income that could be used to reduce pollution later. Such a "grow-now-clean-up-later" suggests an environmental Kuznets curve, along which indicators of environmental degradation first rise, and then fall, with increasing per capita income (Stern, 2004). Such an approach may seem particularly attractive considering high uncertainty and considerable up-front investment related to pioneering green technologies that may be shouldered more easily by more advanced economies, as well as a way to force early industrializers to pay their historic debt for past pollution (UNCTAD, 2020a).

At the same time, the urgency to preclude the risk of catastrophic tipping points, combined with the more proactive policies that have been adopted to combat the Covid-19 pandemic, open up an accommodative terrain for action. As this Report argues in preceding chapters, responses to the Covid-19 pandemic offer an ideal opportunity for fresh thinking about the public policy agenda and for using stimulus and recovery measures in order to accelerate structural change towards a low-carbon economy. The big policy challenge lies in ensuring that these measures trigger more virtuous growth circles, initiating cumulative technological changes in low-carbon growth sectors, supporting economic diversification, and creating employment opportunities that will be maintained even as temperatures rise.

To examine how this more accommodative terrain may be used for these purposes, we extend the guiding principles of the Lewis model in relation to the climate adaptation challenges and outline possible policy impacts on structural transformation in three scenarios: (i) continuing with business as usual; (ii) focusing climate-adaptation action on changes in consumer behaviour and other factors affecting trade; and (iii) approaching climate adaptation in a cohesive, integrated manner.

Scenarios 1 and 2 are not mutually exclusive. They each contain a series of risks to development and equitable growth, which we analyse below. Our analysis suggests that only a cohesive, integrated strategy towards climate-oriented structural transformation will deliver the type of development sustainable in a climate-constrained world. Given that climate constraints require structural transformation to include a shift from high- to low-carbon technologies as a further crucial step, structural transformation in a climate-constrained world can only succeed when it is approached in an integrated, cohesive manner, with a universal shift towards low-carbon technology occurring alongside productivity growth, expanding employment opportunities, and rising living standards for all citizens throughout the world.

(a) Scenario 1. Business as usual as a constraint on structural transformation: the case of agriculture

Many developing countries are already experiencing the constraint of a changing climate on structural transformation and income growth. This is most

clearly the case where agricultural activity is still a major source of income, and where the dependence on temperature, precipitation and other climate variables is uniquely significant among economic sectors. These factors combine to undermine resource bases and cause a global loss of agricultural production (FAO, 2021a).

While great uncertainty about the net impact of climate change on global agriculture remains, evidence suggests that the agricultural and forestry sectors in developing countries are particularly vulnerable to climate change. Part of this results from within the agricultural sector. Due to significant emissions from fertilizer application, intensive livestock and manure management, and the burning of agricultural residuals and savanna for land clearing, industrial agriculture has contributed to soil overexploitation and degradation, as well as to desertification, deforestation, and water pollution.

At the same time, the greater importance of agriculture for their economies, and the smaller size of their farms, often occupying marginal land areas, can limit the ability of developing countries to cope with even small changes in temperature and precipitation. As a result, many developing regions will be exposed to significant reductions in agricultural output and in average yields of food items, as well as an erosion of arable land. Model simulations indicate that, depending on crop adaptability, climate change could cause yield losses of 5–25 per cent in food production that could trigger an increase in projected levels of average aggregated world crop commodity prices by 12–18 percent by 2050 (Rosegrant et al., 2021).

Especially in places where these features occur in situations of high or rising population density, climate change will impair economic activities in agriculture and forestry and increase the likelihood of social conflict, with both factors incentivizing large-scale migration from rural to urban areas. Contrary to the Lewis model, where rural-urban migration is voluntary and driven by sectoral differences in labour-market outcomes, this migration is involuntary. It may also be "pre-mature" (Godfrey, 1979) in the sense that labour migration is decoupled from productivity growth and instead results from degrading agricultural areas ocurring before the industrial sector is able to gainfully absorb the migrants, i.e., before migrants can find employment in activities with substantial profit and re-investment opportunities (e.g., Barrett, Ortiz-Bobea and Pham, 2021). Such pre-mature migration also can cause rising food prices, with adverse consequences on the purchasing power of urban workers and the international competitiveness of manufacturing firms. As a result, climate-change related labour migration causes a risk of swelling urban informal sectors with employment and income precarity and little potential for productivity growth.[9]

Some of these developments are already apparent in recent structural transformation experiences in Africa. Regarding agriculture, there is great heterogeneity across developing countries and the absolute climate-related loss of agricultural production over the period 2008–2018 was particularly high in Asia, with China accounting for more than half of the global loss. However, the severity of agricultural production losses is most evident when expressed in terms of the share of potential production: on this measure, African economies have lost up to 8 per cent, considerably higher than losses at the global level (FAO, 2021a). Moreover, agricultural development in Africa was driven not by productivity increases but mainly by area expansion and intensification that have resulted in widespread land degradation and soil nutrient depletion (Badiane, Diao and Jayne, 2021).[10]

Both these developments have contributed to people leaving farming. Yet the resulting decline of labour in agriculture as a share of total employment has not been accompanied by a meaningful growth of well-paying jobs in large-scale manufacturing activity. Rather, it has been accompanied by fast growth in occupations related to construction, food trade and personal care services, often in the form of informal urban activities. This means that premature labour migration from agriculture has been related to the rise of what Lewis (1979) had called an "in-between" urban sector (Diao and McMillan, 2018; Kruse et al., 2021).

In addition to persistent high inflation related to food price increases (Alper, Hobdari and Uppal, 2016) – including from lower-than-expected food production, the non-tradability of major food staples, and generally fragile agricultural sectors – an important reason why a large-scale modern manufacturing sector has not emerged in sub-Saharan Africa may be the nature of technologies available to African firms.[11] Recent evidence for Ethiopia and the United Republic of Tanzania indicates that the few large-scale manufacturing firms that exist in these countries have adopted significantly more capital-intensive technologies than would be expected in terms of these countries' income levels or relative factor endowments (Diao et al., 2021). This bias towards capital-intensive technology

may result from the spread of global value chains and the resulting homogenising effect on technology adoption around the world. To compete with production in much richer countries it became indispensable for African firms to adopt the capital-intensive technologies developed in advanced economies that allowed them to boost productivity but not to expand employment opportunities that could have absorbed labour migration from agriculture.

The existence of an "in-between" urban sector raises more general questions regarding the relationship between the informal sector and climate mitigation. Literature suggests that informal sectors facilitate a green economy, for example, in terms of waste management, recycling and processing waste into new products; agri-food markets by encouraging the use of local green technologies in smallholder farming and by providing better affordable food, which in turn may allow consumers to undertake green investments; use of biomass energy; the upgrading of housing and infrastructure where achieving greater energy efficiency often requires labour-intensive works; and in the form of home-based work that compared to formal employment requires less transport, space and utilities, including electricity (e.g., Benson, 2014; Chen and Raveendran, 2014; Özgür, Elgin and Elveren, 2021).

At the same time, the diffused and unorganized character of informal sectors make it more onerous for authorities to track and enforce environmental regulations. Given this circumvention of environmental regulation and the finding of an inverse relationship between environmental pollution and the intensity of government regulations, most informal economic activities intensify environmental degradation (Brown, McGranahan and Dodman, 2014). Moreover, informal manufacturing sectors are usually made up of small-scale firms that lack the capital base for investment in clean or energy-efficient technologies (e.g., Timilsana and Malla, 2021). But depending on the linkages between formal and informal enterprises, the circumvention of environmental regulation may sometimes be intentional, perhaps even enabled by the authorities, with formal enterprises outsourcing environmentally burdensome activities to informal enterprises to cut production costs and, in some cases, maintain international competitiveness.[12] Urban informality also tends to encourage informal settlements or slums. These areas suffer from the lack of decent sanitation services and facilities and their locations both create and expose their inhabitants to climate-related hazards, especially flooding and landslides.

Taken together, measures designed to achieve economic development through structural transformation in a climate-constrained world will need to achieve sufficiently productive agriculture to ensure food security at affordable prices. Such measures include, but are not confined to, halting deforestation and land degradation, and, at the same time, improving access to technology in manufacturing and in agriculture that would enable productivity growth and employment generation.

(b) Scenario 2. Environmental sustainability vs. structural transformation: the case of consumer behaviour and trade

Growing environmental concerns have increasingly been reflected, particularly in advanced economies, in consumer demands that firms prioritize social and environmental sustainability along their supply chains. Recent evidence indicates an increasing scrutiny from consumers and regulators regarding firms' environmental standards but also that most firms have yet to achieve sufficient visibility of their supply chains and put processes in place that would allow them to undertake meaningful action commensurate to their mission or purpose statements (Villena and Gioia, 2020).

A strengthening of environmental sustainability measures could adversely affect structural transformation in developing countries to the extent that, over the next three years, lead firms refocus on the manufacturing links in their supply chains, and, in particular, on improving environmental sustainability by moving some of those links onshore or make more localized as part of their general objective of reducing overall shipping miles (Oxford Economics, 2021). The likely extent of reshoring, in both the short and the long run, is still unclear (Barbieri et al., 2020). However, such measures are likely to hamper structural transformation through export-oriented manufacturing that has played an important role in the successful experiences in East Asia particularly because the supply chains with the highest end-to-end emissions include sectors such as textiles and garments, plastics, electronics, and automobiles (WEF, 2021).

Structural change through export-oriented manufacturing may also be harmed once it is realized that it is erroneous to believe that services is a low-emissions sector and that the increasing shift in consumption patterns of developed countries towards services is a means of decoupling economic growth from environmental damages. Emission accounts which

include upstream value-chain emissions in the form of inputs procured by service providers for five developed economies reveal that their services sector accounts for around one fifth of these economies' total emissions. This is because service provision requires inputs from manufacturing – electronics, pharmaceutics, materials and machinery – sectors that produce emissions and that often take the form of imported inputs and intermediates (Roberts et al., 2021).

While such trade-related consumer-based accounts are gaining importance, there is little evidence to suggest that global maritime transport is a main contributor to CO2-emissions. Indeed, other modes of transport, and in particular road transport, are significantly more polluting, with international maritime transport generating less than 10 per cent of the emissions of the transport sector (IEA, 2019).

Climate change can also hamper developing countries' manufactured exports by the damage that natural hazard events (such as sea level change, increased storm intensities and rising temperatures) cause to ports and maritime supply chains, which enable global commerce. Even though prospective damages are sizeable,[13] only a few countries have implemented required adaptation strategies. Uncertainties in climate projections, high upfront costs, and often unquantifiable benefits of adaptation measures imply that such investment can make a port more attractive for some time but eventually will prove to be no more than stop-gap measures because they do not solve the underlying cause of climate change (Becker et al., 2018). Nevertheless, many developing countries may be at a disadvantage as smaller ports are likely to have the least resources for required investments and may lose their local port functions in a process towards consolidation of port infrastructure at the regional level.

Structural transformation through export-oriented manufacturing will also become more challenging if developed countries establish carbon border adjustment mechanisms (CBAMs), i.e., tax imported goods based on domestic carbon prices and the greenhouse gases emitted abroad to make them.[14] By imposing the same price on carbon emissions from domestic and foreign production, such mechanisms would set limits on the carbon content in traded goods. As such, they would be particularly onerous for the many developing countries that rely on coal-based electricity as an energy source for their manufacturing activities.

One major objective of CBAM is to avoid so-called "carbon leakage", i.e., a shift of polluting industries to jurisdictions with less stringent emission regulations that might occur with an increase in domestic carbon prices. Such increases are generally considered to be required to attain recently set tighter climate objectives – such as reducing emissions by 2030 from 40 per cent to 55 per cent, as adopted by the EU (European Commission, 2021a) – while not causing further de-industrialization in developed countries. This objective also indicates that securing manufacturing employment and activity play a central role in the climate measures of developed countries.

But should carbon border adjustment mechanisms be implemented, much of their impact on structural transformation in developing countries will depend on their detailed technical specifications, with one of the major legal challenges being to make these mechanisms compatible with WTO rules. However, independent of these details, the principle of these mechanisms is to impose on developing countries the environmental standards that developed countries are choosing. This goes against the principle of common but differentiated responsibility enshrined in the Paris Agreement. Moreover, should the revenues from these mechanisms be used in developed countries, rather than be invested in climate adaption in developing countries, they would turn basic principles of climate finance on their head.[15]

(c) Scenario 3. Low-carbon technology and structural change: the need for a cohesive approach

It has traditionally been considered that latecomers to structural transformation have an advantage over early industrializers because they can quickly and less riskily adopt technologies, methods of production, and management techniques that have been developed in advanced countries. The hypothesis of an "advantage of backwardness" postulates that the more distant a country is from the world's technology frontiers, the greater the potential benefits it can reap from this advantage (Gerschenkron, 1962). This is because adopting existing technology is easier and faster than relying on innovation, which is costlier, more uncertain and highly-knowledge intensive.[16]

However, a strategy of relying on the adoption of technology from advanced economies has become much less attractive because many of these technologies are related to burning fossil fuels. Developing countries that rely on importing carbon-rich technologies risk

getting locked into unsustainable production patterns and may have to face very high costs of switching to low-carbon technologies in the future, as the urgency of climate adaptation only increases.

Engaging in low-carbon technologies early in the process of structural transformation avoids the building of high-emission production structures and associated high switching costs in the future. Policy frameworks that mutually reinforce structural change and the adoption of low-carbon technologies reduce the risk of a technological lock-in, especially where low-carbon solutions allow for easy retrofit options and ensure interoperability with existing structures. Moreover, early engagement in low-carbon solutions provides opportunities for augmenting fixed assets in economic activities that can provide and rapidly scale up advantages in international production directed towards new and expanding markets, which either require compliance with high environmental standards or where consumers are willing to pay higher prices for products that emanate from environmentally sustainable production (UNCTAD, 2020a).

This means that, in a climate-constrained world, latecomers to structural transformation might enjoy an "advantage of backwardness" not because they can access proven technologies from advanced countries but because they face less switching costs from their lower level of stranded assets and locked-in carbon-intensive technologies. As a result, their technological challenge is less the gainful appropriation of technologies from advanced economies and retracing the steps taken by already-industrialized countries, than to raise the pace of capital formation by leapfrogging into new low-carbon technologies that are appropriate for their specific economic and ecological conditions.

One way to accelerate capital formation and leapfrog to carbon-low technologies relates to international technology transfer. However, literature suggests that the transfer of low-carbon technology on commercial terms works well among developed countries, while developing countries continue to be exposed to a range of economic, financial, and technical barriers – such as subsidies to fossil-fuel technologies, lacking access to appropriate finance, and an absence of energy efficiency regulations or other incentives for the adoption of low-carbon technology – that prevent private commercial transactions to take place between developed and developing countries (Trærup, Greersen and Knudsen, 2018). These findings are supported by evidence from trade data. While trade in low-carbon technologies (LCTs) has increased more than global trade over the past three decades, developed countries continue to account for most of both exports and imports of LCTs, even though China has become the world's largest importer and exporter of LCTs. China has also become the leader in foreign direct investment in renewable energy technology, i.e., the only category for which comprehensive FDI-data are available (Pigato et al., 2020).

An analysis of recent patent data (e.g., Corrocher, Malerba and Morrison, 2021) indicates a remarkable process of growth in green patenting in successful latecomer countries – especially China, but also the Republic of Korea, and Taiwan Province of China. Perhaps most importantly, the recent literature suggests that intellectual property rights (IPRs) do not have a positive impact on technology transfer to developing countries in recent years (e.g., Kirchherr and Urban, 2018). Indeed, a report on LCT transfer concludes that the "analysis presented in this report finds that strong IPR protections have no significant effect on LCT transfer from either high-income or developing countries" (Pigato et al., 2020: xxiii). This finding undermines the traditional case for strong patent protection, based on the argument that strong protection of IPRs promotes the transfer and dissemination of technology. Combined with the general need of a global sharing of the intellectual property that underpins LCT to achieve climate objectives, this finding supports calls for a general waiver of IPRs on LCT like that for Covid-19 vaccines, as further discussed below.

Leapfrogging to low-carbon technologies based on domestic efforts has the potential to yield important benefits in the long run. This is partly because improved environmental performance enhances the attractiveness of suppliers in supply chains, and because it provides opportunities to exploit early mover advantages, at least relative to other latecomers, as markets are not yet taken by incumbents and market entry barriers are lower because technologies are not yet protected by patents.

Many low-carbon technologies are intrinsically local because the nature of their energy source depends on an economy's specific ecological conditions. This implies that new low-carbon technologies have less of a need for retrofitting than new versions of fossil fuel-based technologies would have. Building structural change on fossil fuel-technologies now would be particularly exposed to the risk of asset stranding.

Technological leapfrogging as part of an integrated strategy that combines structural transformation and climate adaptation may rely on what has been called "green windows of opportunity" with features that markedly differ from traditional windows of opportunity for rapid structural change (e.g., Lee and Malherba, 2017). Considering that windows of opportunity for rapid structural transformation may result from "changes to the prevailing techno-economic paradigm, changes in market demand or major modifications to government regulations or policy interventions" (Lema, Fu and Rabellotti, 2020: 1195), case-study evidence indicates that, compared to traditional windows of opportunity, green windows of opportunities stand out due to a relatively more important role of government policies, strong knock-on effects on new market demand (e.g., through government procurement) and technological change (e.g., by inducing mission-guided public R&D programmes), and a relatively greater importance of local conditions and domestic markets (e.g., because of the intrinsically local character of related energy sources, mentioned above) even when the external environment and external market opportunities play an important role.

The greater role of government policies has been reflected in the well-known Porter hypothesis, which states that "properly designed environmental standards can trigger innovation that may partially or more than fully offset the costs of complying with them" (Porter and van der Linde, 1995: 98). Some studies have found only mixed support for this hypothesis in that environmental regulations induce innovation activity in cleaner technologies but that the direct benefits from these innovations do not appear to be large enough to outweigh the costs of regulations. It is important to note that this finding comes from analyses that study the impact of environmental regulations on firm competitiveness in isolation (Dechezleprêtre and Sato, 2018).

By contrast, a recent review of the literature on the impact of investment in clean technologies on sectoral production costs and productivity growth concludes that "most studies examining the relationships between green/clean technologies and productivity show a positive relation", that this is true especially for the manufacturing sector, that large firms have a greater capacity to make such investments, and that the "primary factors behind the growth of green/clean investment are policies and measures introduced by the government in response to environmental concerns, particularly global climate change" (Timilsina and Malla, 2021: 3, 39).

Leapfrogging towards low-carbon technologies also faces important challenges. Apart from building the required technological capabilities, an important challenge for public policies is to ensure that public investment crowds-in private investment in a way that capital accumulation supports structural transformation and employment generation. In other words, policy coherence – combining clear climate commitments with policy measures that demonstrate decisive following through on those commitments – is probably the most important single factor that supports an integrated approach to structural transformation and climate adaptation.

This poses questions as to what a pandemic-related greater permissiveness of proactive policies and the important role that government policy plays in the promotion of green paths to structural transformation imply for concrete policy measures and how these measures can be financed. This is the focus of the second part of this Chapter.

D. Policies to combine structural transformation and climate adaptation strategies

Neither climate mitigation, nor climate adaptation, are necessarily a drag on economic development. Instead, they can become cylinders in a new engine of growth, which emphasizes the simultaneous achievement of structural transformation (productivity growth, technological upgrading, more and better paid jobs) and the benefits of environmental preservation (avoiding the negative effects of global warming). The preceding discussion has also shown that, much like industrialization, addressing climate constraints requires far-reaching structural transformation of productive activities, where a climate-conscious structural transformation must include a shift from high- to low-carbon intensive activities. As such, diversification, not de-risking, needs to be put at the centre of the climate adaptation agenda.

This part of the chapter first discusses the impact of climate constraints on industrial policies. It then looks at complementary national policies, with an emphasis on fiscal policy and the role of central banks, and ends on discussing the role of the State in moving towards a low-carbon economy. International policy issues related to trade and finance are the subject of the next chapter.

1. Industrial policy revisited

The debate on industrial policy has a long history both in terms of theoretical background and forms of application.[17] Its recent return to prominence in policy discussions is less the result of new analytical insights, and more related to a reassessment of policies that were guided by the Washington Consensus. The lop-sided emphasis on government failures that allegedly cause proactive policies to harm rather than support development, has produced outcomes that have not only fallen short of their own promises but also of successful development experiences that relied on more interventionist policies, leading to a more generalized reappreciation of the role of the state and a related inspection of how industrial policy can be used best. Another reason is the growing recognition that the urgent large-scale transformations related to climate change adaptation cannot be achieved without active government support (e.g., Gallagher and Kozul-Wright, 2019; European Commission, 2021b). Given that moving towards a low-carbon economy implies a reshaping of economic structures, applying key principles of successful industrial policymaking can provide valuable insights for climate change adaptation policies.

Industrial policy may be defined in numerous ways, but most definitions refer to "targeted and selective government policies to shift the production structure towards activities and sectors with higher productivity, better paid jobs and greater technological potential" (UNCTAD, 2016: 176). Green industrial policy has a wider scope. It aims not only at shifting the economic structure towards higher-productivity activities, but at aligning productivity-enhancing structural transformation with shifts from high carbon-intensive to low carbon-intensive resource-efficient activities, and particularly at exploiting the synergies between these two processes of structural transformation.[18]

The greening of industrial policies comes with additional challenges. Of greatest importance among these additional challenges are that green industrial policy (i) provides a clear normative direction towards "good" technologies that can guide a conscious steering of investment and technological change towards low-carbon activities; and (ii) has significantly greater ambition. This greater ambition is reflected not only in aiming at transforming the entire economy and doing so with considerable urgency in a short period of time to avoid environmental tipping points, but also in its need for broader economic and societal support in the face of higher global temperatures and a more disruptive climate, as further discussed below.

The traditional challenges related to structural transformation combined with these two additional challenges call for a results-driven framework and an approach to industrial policy where policymakers aim at shaping markets and "have the opportunity to determine the *direction* of growth by making strategic investments, coordinating actions across many different sectors, and nurturing new industrial landscapes that the private sector can develop further" (Mazzucato and Kattel, 2020: 312; emphasis in original). In this approach, transformations that unlock the synergies of industrialization and shifts towards low-carbon activities may be considered a global public good, which is generated collectively by a range of actors and in whose generation both the state and the private sector, as well as ordinary citizens, have active roles to play.

The remainder of this section discusses the implications of this perspective of green industrial policy for the objectives of policymakers and for basic principles of effective policymaking aimed at these objectives.

(a) Selected objectives of green industrial policies

i. Energy security

Avoiding the worst effects of climate change makes it imperative to succeed in a large-scale transition to clean and renewable energy. It has been estimated that reaching net-zero carbon emissions by 2050 will involve a reduction of fossil fuel-based energy from almost four-fifths of total energy supply today to around one-fifth. In its stead, wind, solar, geothermal, hydro and bioenergy would have to provide two-thirds of the total (IEA, 2021). The clean-energy transition will arguably have the biggest impact on structural transformation because fossil fuel-based energy has been the backbone of industrial activities.

Most technologies needed to achieve the transition to clean energy and the resulting deep cuts in global emissions by 2030 are today commercially available (Pollin, 2020) and their adoption has already contributed to a large reduction in the cost of energy production over the last decade. According to IRENA (2021), costs of electricity from utility-scale solar photovoltaics (PV) fell 85 per cent between 2010 and 2020, and most of new wind and solar projects produced cheaper energy than coal plants in 2020. Lazard (2020) estimates that onshore wind and utility-scale solar energy became cost-competitive with conventional generation of energy several years ago on a new-built basis, and that the cost of storage of renewable energy has also diminished rapidly. Based on recent trends, further reductions of costs can be expected regarding renewable energy production and storage. In the same vein, Mathews (2020) argues that the costs of solar PV have been falling by 28.5 percent for every doubling of production.

Obstacles to achieving further transformation have been mainly social and political (Pollin, 2020). Especially in developed countries, these obstacles include the high cost in the form of stranded assets that would be implied by disrupting environmentally unsustainable technological pathways. One result of attempts to avoid such costs may be the continued large subsidies for fossil fuels. Recent estimates indicate that, over the period 2017–2019, G20 governments provided an annual average support of $584 billion to the production and consumption of fossil fuels at home and abroad, in the form of direct budgetary transfers and tax expenditure, price support, public finance, and SOE investment (IISD, 2020), with coal and petroleum together account for 85 percent of global fossil-fuel subsidies (Coady et al., 2019).

Removing these obstacles in developing countries will not only foster structural transformation towards a low-carbon economy but also support industrial development. The equipment to generate renewable energy (wind turbines, solar photovoltaic cells, batteries) are products of manufacturing and, just as traditional manufactures, are likely to enjoy increasing returns to scale from learning by doing and, especially as the turn towards renewable energy accelerates, expanding markets (Mathews, 2020). As such, the switch to renewable energy can help foster industrialization, while advancing the energy transition (initially through the diversification of energy sources), reducing the vulnerability of energy security to changes in global fuel prices, and freeing scarce foreign exchange for imports of capital goods and technologies that will further support industrialization.

Morocco is one example of a developing country that has adopted a comprehensive strategy aimed at industrialization based on low-carbon, resource efficient technologies.[19] Starting from the desire to diversify the energy mix and reduce the share of imported fossil fuels in energy supply, Morocco adopted ambitious renewable energy targets in 2008 and created a favourable legal framework, training and research programmes, a project development and implementation agency, and dedicated public funds to finance required investment. While initially targeting use of renewable energy in housing and agriculture, the government also began providing tax reductions and other investment incentives for manufacturers to adopt domestic renewable energy sources and to manufacture parts and components for renewable energy and energy-efficiency technologies, with a view to creating a market for renewables and foster the development of a local industry. While the strategy has supported employment creation and domestic manufacturing, insufficient coordination of individual policy measures has hampered a scaling-up of the initiatives and their outcomes (Auktor, 2017).

China's engagement in renewable energy production has also initially aimed at building energy security. But the judicious coordination of a wide range of industrial policy measures (such as tax incentives, domestic capability formation and standard setting, and the provision by development banks of finance at discounted rates in priority activities) has propelled China to a globally leading provider of manufactured low-carbon energy devices (Mathews, 2020). This has been the case particularly for solar photovoltaic products, which can be mass manufactured and provide an easier entry point for developing countries into emerging low-carbon technologies than, for example, wind power equipment where the high transport cost of some components, or the requirement for local maintenance and servicing of specific turbine models, require rapidly growing domestic demand to support the development of manufacturing activities (Binz et al., 2020).

China's rapid development of low-carbon energy sources has also supported the country's technological shift from internal combustion engines to electric automobile technology, with an emphasis on cars and two-wheelers. Proactively engaging in this shift has been considered an opportunity for

catching-up in global automotive technology and production, in addition to addressing urban air pollution. The government has supported this shift on the demand side through generous purchase subsidies, tax exemptions, public procurement and the creation of a public electric grid company tasked to build an infrastructure of charging stations for electric vehicles, as well as on the supply side through dedicated research programme on lithium-ion batteries, electric vehicle quotas for carmakers, stricter fuel economy requirements, new technological and environmental regulations, etc. These measures have made China a leading global market for electric vehicles. While Chinese manufacturers have so far mainly covered the low-end product range, the government's stronger emphasis on research, stricter technology standards, and consolidation of the fragmented auto and battery industries are set to result in rapid upgrading (Altenburg, Feng and Shen, 2017). Particularly the recycling and reuse of batteries will provide further manufacturing opportunities, as discussed in the following section.

ii. Resource security

Achieving resource security relates to the concept of a "circular economy", which relies on the insight that resource use must be decoupled from output growth to ensure that the global economy can grow, and the growing global population be fed without an ever-increasing demand on Earth's finite resources. This decoupling can be achieved by replacing the traditional linear path of resource use with a circular economy that can be characterized by 3Rs – reduce, reuse, recycle.

The linear path of resource use relies on extracting resources from nature at one end of the process and dumping the residues back into the natural world at the other end. Doing so creates the threat of unmanageable waste and shortages of key resources, including water and rare minerals and metals.[20] A circular economy aims to slow the depletion of non-renewable natural resources, reduce environmental damage from their extraction and processing, and reduce pollution from their use and disposal. It seeks to do this by increasing the efficiency and productivity of resource use and by reducing the share of material that is not reused. It also aims to change product design to foster reuse, refurbishing and repair, rather than their disposal.

Moving to a circular economy may be defined as representing "a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of resources, close energy and material loops, and facilitate sustainable development" (Prieto-Sandoval, Jaca and Ormazabal, 2017: 610). In this definition, geographic proximity is a key component of the circular economy. As such, it provides a new entry point for industrialization as the circular use of resources is based on disassembling and re-manufacturing resources which, like more traditional manufacturing processes, may be subject to increasing economies of scale and result in a decline of the costs of recirculated materials to below the cost of newly extracted materials (Mathews, 2020).

The reuse of resource waste from domestic manufacturing processes can be enhanced by the promotion of a global circular economy that provides opportunities for developing countries to export re-manufactured products. However, such support can materialize only if an emerging global circular economy is not one where developed economies reduce their carbon footprints by dumping their waste and scrap on developing countries or by outsourcing carbon-intensive recycling and re-manufacturing stages of the circular economy to developing countries and tax resulting re-imports through carbon border adjustment mechanisms, or where they themselves undertake recycling and re-manufacturing activities and export to developing countries production inputs or final consumer goods at prices that make developing country producers of new goods and materials uncompetitive. Avoiding such outcomes requires appropriate trade policy measures to provide a developmental frame for a global circular economy, as addressed in chapter 5 of this Report.

iii. Low-carbon agriculture and food security

Current modes of food production, which are based on intensive industrial agriculture that rely on high inputs of fertilizers and pesticides and dominated by large-scale specialized farms – cause substantial environmental burden, in addition to being characterized by a lack of secured access to food and the widespread occurrence of forms of malnutrition (FAO et al., 2021). Agri-food systems (including crops, livestock, fisheries, aquaculture, agroforestry and forestry) account for about one-third of total anthropogenic greenhouse gas emissions (Crippa et al., 2021). Moreover, industrial agriculture, fish farming and forestry is often related to export-oriented global value chains, with product demands imperfectly suited to local soil conditions, resulting in soil degradation,

overfishing and the replacement of natural wildlife systems with food crops or animal feed.

One approach to adapting agriculture to climate constraints is through climate-smart agriculture. This approach builds on sustainable agriculture approaches, using principles of ecosystem and sustainable land and water management and landscape analysis, and assessments of the use of resources and energy in agricultural production systems and food systems. It does not rely on a set of practices that can be universally applied, but rather involves different elements that are embedded in specific contexts and tailored to meet local needs.[21]

This comprehensive approach will bring benefits in terms of adapting agriculture to climate change but may not be sufficient. In an analysis of different scenarios for reducing emissions from agriculture by 2030 to limit warming in 2100 to 2 degrees Celsius above pre-industrial levels, Wollenberg et al. (2016) find that plausible development pathways fall far short of that goal, and that more transformative technical and policy options would be needed.

More radical approaches include the production of food from microbes. The resulting microbial biomass is rich in proteins and other nutrients. One huge benefit of this method, which is still in its infancy, is that brewing microbes through precision fermentation can move production of food from fields to factories and thus reduce the need for farmland and intensive agriculture, reducing the environmental impact of food production and allowing land use for other purposes in the process. Another is higher efficiency than in traditional agriculture. In terms of caloric and protein yields per land area, microbial production can reach an over 10-fold higher protein yield and at least twice the caloric yield compared to any staple crop (Leger et al., 2021). Moreover, as with other manufacturing activities, the costs decline as producers move along the learning curve and productivity increases.

It remains uncertain which, if any, of these innovations will eventually make strides into global agricultural production in the decades to come. But if they do, the environmental sustainability of food production is very likely to increase drastically at the global scale. However, it is concerning that these innovations will further detract from the universal availability of affordable nutritious food in developing countries. These innovations tend to be owned and applied in developed countries, with likely adverse impacts on developing countries' net food import balances. And if these shifts to less carbon-intensive modes of food production cause food price increase in developing countries, they will also have an adverse impact on their low-carbon industrialization pathways.

Most importantly, these changes would largely eliminate farmers and hand food production and food security over to large digital and agro-industrial corporations that mostly reside in developed countries. This further expansion of corporate power would be made worse by using the land that has been freed-up by moving food production to labs as carbon sinks in which global financial capital can invest to reduce their net carbon footprint by offsetting their own emissions without actually reducing them (e.g., Oxfam, 2021). What is needed instead are agroecological approaches that can tackle climate change and ensure food security while at the same time ensure decent income of local farming communities.

(b) Lessons for effective industrial policymaking

Critics of industrial policy query the practical implementation of industrial policy, typically pointing to information asymmetries between government officials and entrepreneurs, as well as rent seeking by government officials and industry lobbyists (Oqubay et al., 2020). Here, the lessons of successful structural transformation in developed countries and in the East Asian developing economies provide useful insights (see also UNCTAD, 2006, 2016, 2018).

A first such lesson is the need for *strong administrative and institutional capacities* for the government to formulate industrial policy and lead structural transformation. Experience with the Covid-19 pandemic and the uncertainties associated with climate adaptation suggest that governments should also possess dynamic capabilities to be able to anticipate and learn from events. One recent suggestion (Mazzucato and Kattel, 2020) applies such dynamic capabilities to five areas: foresight and anticipatory governance; handling partial and at times contradictory evidence; mechanisms for "mesh governance" (governance which includes multiple tiers); quickly repurpose existing infrastructure; and learning from other governments.

A second lesson is about *mechanisms of accountability* of policymakers and implementation agencies, such as through reporting requirements and other obligations to disclose information, combined with more general checks through auditing, independent

courts and the press. As noted by Altenburg and Rodrik (2017: 10), "[a]ccountability serves not only to prevent corruption, favouritism and other forms of collusive behaviour but also helps to legitimize appropriate industrial policies." Combined, the second and third lessons constitute reciprocal control mechanisms.

A third lesson involves embeddedness – the *close relationships between entrepreneurs and government officials* that can ensure a mutual exchange of information and common understandings. Embeddedness will be particularly important for green industrial policies because climate adaptation involves a grand societal transition to new economic pathways. This societal transition involves a broader set of stakeholders and tends to create a larger number of disadvantaged parts of the population, especially those affected by disruptive energy policies in sectors, such as the scrapping of fossil-fuel subsidies. Given the already large income and wealth inequalities across and within many developed and developing countries, targeting, designing and phasing-in of green industrial policies must avoid further increases of inequality and, instead, reflect broad societal consensus.

A final, and related, lesson concerns disciplining devices that the State uses to *sanction abuse* of its support and to *discontinue* failing projects and activities. Disciplining abuse requires clearly defined objectives, measurable performance indicators, appropriate monitoring and evaluation routines, and government autonomy in deciding where and when to apply disciplining devices, as well as where and what experimental approaches to apply, and where and when to change course if something goes wrong.

2. Fiscal policy

The accelerated investment in green infrastructure and low-carbon technologies that climate adaptation requires will not be possible without fiscal expansion and a rebalancing of the structure of public expenditure towards an emphasis on low-carbon activities. In this context public procurement, which has always been a major part of public policy, is a powerful policy tool governments can use strategically as a major purchaser (UNCTAD, 2016, Chapter 6).

Expanded and restructured public spending will need to aim both at an increase in public investment, such as to foster the transition to renewable energy sources, and an increase in government transfers, required to address the adverse effects of the shift away from fossil fuel-based production modes and ensure that a low-carbon economy is more inclusive than the fossil fuel-based economy of the past few decades. One important distinctive factor of transitions to low-carbon paths of structural transformations is that expansionary fiscal policies that include green stimulus measures tend to have higher fiscal multipliers (UNCTAD, 2019). This is the case particularly in developing countries where the stock of public capital as a share of GDP is generally low, so that the higher direct output effect of increased public investment combines with a larger crowding-in effect on private investment to result in larger fiscal multipliers (Izquieredo et al., 2019).

Fiscal multipliers will also be higher where fiscal expansion is accompanied by an increasing role of public banking. The mandates of development and other public banks that value long-term development outcomes and sustainable economic transformations facilitate crowding-in of private investment (UNCTAD, 2019). This is the case, for example, because the broad range of activities that require investment for climate adaptation requires strategic collaboration between the government and private investors that aims at coordinating investment activities, where the interdependence of individual investment decisions makes the investments and profits of one entrepreneur partly dependent on the investment decisions of others.

Another distinctive benefit of green fiscal expansion is higher employment benefits. This is because expanding low-carbon sectors tend to be more labour intensive than shrinking high-carbon sectors. A recent study estimated that renewable energy, energy efficiency and grid enhancement will create around 19 million new jobs worldwide by 2050. As the job losses in the fossil fuel sector will be around 7.4 million, the net addition will be 11.6 million jobs (Gielen et al., 2019; see also IMF, 2020). The greater job-generation capacity of a green path towards structural transformation may be of particular importance for economies where labour migration resulted in an expanding urban informal sector, including because existing technologies were too capital intensive for these economies' structural conditions, as for instance, in parts of Africa.

3. The role of central banks

Central banks around the world have been gradually adapting their operations, and in some cases,

their mandates, to better reflect the financial risks related to climate change and reduce the threat of a "Minsky climate moment" (e.g., UNCTAD, 2019). A global Network for Greening the Financial System has brought together more than 80 central banks and financial institutions to explore various means by which central banks can play their role as both leaders of the financial system and also investors. These include integrating climate risks into prudential and monetary frameworks and insisting on regular climate stress tests and disclosure across the financial system.

However, as UNCTAD and others have noted before, this is encouraging but not sufficient. Helping to mitigate risk is the minimum that is needed to encourage positive investment in transformative activities and processes that will assist countries adapt to climate change and reduce emissions overall. Others have also argued that central banks need to align their current Covid-19 responses to avoid locking-in to high carbon recovery as they attempt to maintain financial stability (Dikau, Robins, and Volz, 2020; McDonald et al., 2020). Liquidity enhancing stimulus measures that are not aligned with the ambitions of the Paris Agreement can exacerbate already existing climate-related risks in the portfolios of financial institutions and across the financial system as a whole. Moreover, as governments around the world think about easing off the stimulus put in place since Covid-19, care will be needed to ensure this does not further increase climate related risks, nor the costs of capital for already struggling developing countries.

Some central banks have gone further, by putting in place macro prudential policies and positively guiding capital in a more carbon-sensitive way. A number of developing countries have been very active in this new direction for several years already (Campiglio et. al., 2017; Dikau et al., 2020; UNCTAD, 2019; Volz 2017). The People's Bank of China, in particular, has long used financial policies and directed credit to support green industrial policies, but banks in much smaller economies have also been experimental and innovative in terms of capital creation and direction. These are, however, more related to providing finance for climate mitigation than adaptation, reflecting the fact that even when interest rates are low the funds are still given as a loan not a grant. Banks are in the business of banking; even when offering loans at concessional terms, they are not normally seen as grant giving bodies nor philanthropists. This is not to say that they cannot be the engine of finance for other institutions that are grant giving bodies and philanthropists, especially in advanced economies.

Given the scale of adaptation needs and the fact that those who suffer the most are the least able to pay for them, it is clear that advanced and more resilient economies will be the main source of finance. As central banks around the world were able to help support governments directly during the Covid pandemic, post-Covid recovery period presents an opportunity to consider to what extent central banks could also follow this path to supporting government development ministries, aid agencies and development banks.

At the very least, central banks could do more to ensure they do not continue to support carbon-intensive and maladaptive activities – which means a change in the current programme. While governments around the world have reduced sharply their financing flows to the fossil fuel and petrochemical industries since the Copenhagen COP, central banks remain the primary conduit for that finance – accounting for some $26 billion out of a total $38 billion of public funding that began since 2009 and remains active today, in the sense that transactions and bonds have yet to mature (Barrowclough and Finkill, 2021). This sends the wrong signal to the markets and to society.

This has continued during the recent Covid-19 period when central banks purchased corporate bonds on an unprecedented scale as part of their emergency operations to increase liquidity and avoid economic paralysis. Surveys of central bank Covid-19 recovery packages find that many are biased towards fossil fuel finance and did not attempt to tilt away from the sector (Oil Change International, 2021), even though several have active research and policy interests raising awareness of the contradiction.

UNCTAD and Lund University research similarly finds that Covid-19 recovery purchases by major central banks are often at odds with their governments' green ambition.[22] In extending the supportive public function of the central banks to climate needs, BoE (2021) notes that incentives could be used to influence companies to achieve net zero, and these could be ratcheted up over time. At the same time, the Bank also notes that disinvesting out of high-carbon companies means it would lose an opportunity to influence its policy; and recent Covid-19 recovery support schemes suggest that this needs to be an explicit goal or it might not happen. Support to the fossil fuel industry was typically given without any conditions but the opposite occurred when funds were

given to firms in the renewables sector (Tearfund, 2021). The growing awareness of these issues is encouraging, but going the further step - to consider how central banks in advanced economies could help finance adaptation in less developed ones - has not been high on the radar screen.

In addition to properly regulating the financial sector, central banks should use a fuller range of tools to create and guide finance to green activities. More specifically, they should stop implicitly supporting high carbon emitters and penalising low-carbon activities. Collateral policy is one of the main tools towards greener central banking: central banks should also adjust their collateral regulations and accept financial institutions' green bonds as collateral.

4. Towards a green developmental state

While there is broad agreement on the need to widen economic policy objectives to include environmental adaptation, disagreements continue as to the role and scope of the State in attaining these objectives. Taking its cue from framing the adaptation challenge as one of risk management, one school of thought argues that most of the heavy lifting should be done by the private sector, with the role of the State focussed on distilling environmental objectives into bankable projects and de-risking these projects such that global private financial capital invests in them. In addition to long-standing beliefs that State involvement creates, rather than resolves, economic problems, this approach assumes that efficient resource allocation and maximizing economic welfare is supported best by the creative forces of markets. In this view, pro-active State action comes in as a last resort, when de-risking fails to produce investable projects (see also Chapter III of this Report).

An alternative view of the role of the State starts from the recognition that climate adaptation requires *transformation,* rather than the preservation of existing assets, i.e., the core of the risk-management approach. This is akin to the notion discussed earlier of a "developmental State" in East Asia's rapid industrialization and economic catch-up. To be applicable to the challenges of climate adaptation, policymakers need to recognize changes in the development agenda. This especially concerns the ways structural transformation and rapid economic growth connect with the global challenge of climate change to ensure sustainable low-carbon development. While this agenda continues to see technological and industrial upgrading and raising levels of material prosperity as key development objectives, these objectives need to be reconciled with environmental sustainability goals.

As a result, the traditional concept of the East Asian developmental State has evolved and been adapted for several reasons. In East Asia itself, the successful industrialization strategy and the economies' moving up to middle- or even high-income status reduced the importance of capital accumulation and increased the role of innovation and technological advance for economic growth. At the same time, rising household incomes made constraints on consumption more difficult to maintain, while strengthening the desire of citizens for greater participation in society not least because of the environmental degradation associated with rapid industrial growth.[23] Internationally, the reorganisation of global production around global value chains made domestic firms increasingly beholden to the guidance of MNCs, in the process becoming detached from agreements with the state. The tightening of rules and regulations in international trade and investment agreements reduced the policy space for some of the industrial policy measures East Asian economies had applied, while the increased financialization of the global economy made achieving macroeconomic and financial stability more complex (UNCTAD 2006, 2014).

Domestically and internationally, beginning in the 1990s, these changes prompted traditional East Asian developmental States into a set of liberalization measures and regulatory changes which helped to usher in the 1997-98 financial crisis in the region (UNCTAD, 1998). Despite the origins of the crisis, the response in international policy circles, including the international financial institutions, was to further demonise the developmental State and promote the idea "of doing business" properly. This perspective is not only premised on questionable assumptions about market dynamics but also equates the developmental State with specific policy measures and freezes the concept in space and time. It fails to recognize that at its core "is not the existence of intervention per se but rather the *developmental ambition and elite consensus that* frames that intervention and the existence of institutional capacities that help translate ambition into more or less effective policy outcomes", and while, with regard to the Republic of Korea, "the type of conditions placed by the government on industry support has evolved in tandem with changing objectives, there is little evidence to suggest that the Korean state has abandoned such practices in science-based industries" (Thurbon 2014: XI, XIV; emphasis in original). [24]

Indeed, the Green Growth Strategy that the Republic of Korea adopted in 2008 may be characterized as "an eco-oriented development strategy with an activist industrial policy dimension" (Dent, 2018: 1200). It has allowed, *inter alia*, for the development of world-class smart-grid systems based on local technologies and the assumption by the Republic of Korea of global leadership in key energy storage technologies, including lithium-ion batteries and hydrogen fuel cells (e.g., Dent, 2018; Kim, 2021). This means that, rather than dismissing the role of the developmental State, these changes have made the concept evolve to what may be called an "East Asian eco-development state" (Harrell and Haddad, 2021) or, more generally, a "green developmental state".

This re-orientation towards a green developmental State maintains the core elements of the traditional developmental state model (see UNCTAD, 1996; Wade, 2018), such as: (i) the developmental mindset of the political leadership centred on structural differences between economic sectors and targeted at long-term economic catch-up as a powerful shaper of the state's development strategy; (ii) a policy approach that emphasizes an active and coordinating role of the State in structural transformation applied through regulation and an incentive structure where state support is conditioned on performance requirements and an industrial policy aimed at technological upgrading and the creation of well-paying jobs – i.e., where the quality and modalities of interventions matter, not their quantity; and (iii) an institutional architecture that relies on a competent and mission-oriented bureaucracy that is independent from special-interest pressures while being in close contact with the private sector.

There are also important departures from the traditional model of state dirigisme. Perhaps the most important distinction is that policymakers must succeed in the *creation* of green industrial activities while simultaneously achieving the *destruction* of incumbent fossil fuel-intensive activities. Navigating these distinct but interrelated objectives will require a broader range of policy measures, based on the recognition that the industrial structure of developing countries in today's technology-induced global economy cannot flourish without a knowledge- and innovation-based development strategy.

Policymakers will also require societal support that goes far beyond the industrial elite. The combination of the constructive and the destructive elements of structural transformation towards a low-carbon economy requires an alliance between the state and society that extends to workers, who the traditional developmental State co-opted by creating high-wage jobs, and that pays greater attention to the spatial dimension of development and consequently a larger focus on rural areas and the role of agricultural development. Only such more balanced socio-economic alliances can defeat the influence of certain elite and interest groups that are heavily linked to carbon-intensive growth whose perpetuation would make it impossible for governments to apply a long-term green development-oriented approach (Oatley and Blyth, 2021).

Better balanced socio-economic alliances are also necessary because civil society has become a more proactive and empowered form of agency in the development process. As noted by Dent (2014: 1204), "[l]ow-carbon development is as much a societal process as an economic one, encompassing individual lifestyle and choice issues at the micro level as well as macro-level industrial and infrastructural strategies." This means that a green developmental State must explicitly aim to build state-society networks that are based on social participation, deliberation, and consensus and at the same time cover wide parts of the society. Building this new and broader legitimacy base complicates the move towards a green developmental State, even though these wider groups may share the common interests more than the corporate elite where vested interests and financial losses related to stranded assets may prevail.

Another important difference between the traditional and green developmental State lies in its international dimension. The developmental State has been a strategic political choice of countries aiming to compete in the global economy, but this has mainly been in the form of export targets and attracting FDI. By contrast, given today's hyper-globalization, policymakers also need to put in place capital-account management measures to insulate the domestic financial system from global financial instability. Moreover, the goals of today's developmentalism derive ultimately from the global agenda of decarbonising economic activity and international efforts to tackle climate change. Therefore, linking nationally devised and implemented strategies is part of a much larger international climate action project, and national strategies will need to reference their contribution to wider international endeavours on low-carbon development, such as the Paris Agreement (UNCTAD, 2019).

It is also important to note that a State focusing on de-risking will narrow the policy space of a green developmental State, as de-risking often implies a constraint on the very policy instruments that a green developmental State would apply. For example, regulatory de-risking would make it more difficult to maintain vertically integrated, state-owned energy utilities, to redirect subsidies from fossil-fuel to renewable energy providers, such as via feed-in tariffs, or to ensure guaranteed grid access for renewable energy sources. Moreover, financial de-risking would target green-oriented grants, tax relief, or debt-based instruments, while it would promote financial globalization with an emphasis on portfolio flows (rather than FDI as in traditional developmental States), which will tend to hamper macroeconomic and financial stability. It would also divert scarce fiscal resources from public investment towards backstopping public-private partnerships, such as to compensate a private operator for demand shortfalls in the payable use of infrastructure, or if a government introduces regulations, such as higher minimum wages, that might reduce private sector profitability.[25]

These international aspects of climate adaptation policies call for a new multilateralism that is enabled to provide the global public good needed to deliver shared prosperity and a healthy planet and to ensure that no nation's pursuit of its economic and environmental goals infringes on the ability of other nations to pursue them. This is discussed further in the following chapter.

E. Conclusion

Structural transformation, characterized by a shift in the production structure from the primary sector to manufacturing, has traditionally been the most successful way of achieving rapid economic growth. This avenue was followed by the now advanced economies, as well as a few successful late industrializers in East Asia. This traditional fossil fuel-intensive model, however, cannot satisfy the aspirations of the many other developing countries that are trying to upgrade their national incomes through industrialization because it would take emissions and resource consumption beyond the limits of the planet's ecological capacity.

The answer to this problem is not to forsake manufacturing development, and diversification strategies more generally, in developing countries. Rather, it is to build a low-carbon industrial system, powered by renewable energy sources and green technologies, and where economic activities within and across sectors are interconnected through resource-efficient linkages. Such a solution maintains manufacturing as a central objective because important elements of structural transformation towards a low-carbon economy are closely inter-related with industrialization. The energy transition and an emergent circular economy provide opportunities for a reduction of the carbon footprint of traditional manufacturing, as well as for the manufacturing of devices for a low-carbon economy themselves.

The transition to renewable energy and engagement with the circular economy can increase the scope for industrialization for a broad range of developing economies because they decouple economic activities from natural resource use. Sources of renewable energy – such as sunshine, wind and water – are more equally distributed than economically exploitable deposits of fossil fuels, and the circular economy allows extracting resources from used products and waste, thereby reducing the required quantity of new resources. Many activities related to renewable energy production and the circular economy can economically operate at low scale, opening business opportunities for small firms and rural areas. This will not only help to diversify economic production structures and reduce many countries' dependence on the production of a narrow range of primary commodities, but it can enlarge developing countries' tax bases and foster domestic resource mobilization as a source of development finance. These activities can also help to relax countries' balance-of-payments constraints. Relying on domestic production of energy and food requirements, thereby reducing the import of virgin raw materials, may allow for a sizable reduction of imports, which will liberate scarce foreign exchange for imports of capital goods for industrialization and economic catch-up.

None of these transformations are likely to occur without a developmental State. Successful structural transformations have generally relied on proactive government policies. Climate change adaptation implies system-wide changes that cannot occur without an integrated policy approach that addresses the multiple challenges

of industrialization in a climate-constrained world, synchronously and cohesively. In addition to undertaking large-scale public investment and financing the investment push required for green structural transformation through green financial instruments, it will involve green industrial policy and state-society relations that not only break existing fossil-fuel interests but also establish clear rules, the enforcement of which can govern the new green investment trajectories and ensure a legitimacy base that can rely on a wide range of societal groups.

Notes

1 Or, in other words, the economy attains the so-called "Lewis turning point".

2 Much of the criticism relates to Lewis' questioning of the neoclassical approach to labour and its focus on homogeneous one-sector economies, and his explicit reference to classical economics and historical experience (Sumner 2018).

3 Lewis (1979) extended his original approach by adding an "in-between" sector to the dual economy model. This sector includes a heterogenous range of small-scale enterprises in urban areas that operate in manufacturing, transportation, construction, and a wide range of services. They often are unregistered and constitute part of the informal sector. While these enterprises provide valuable employment, their capital base and levels of technology and productivity are generally lower than in the modern sector.

4 Lewis (1954) had, in fact, stressed that the traditional, non-capitalist sector should not only be identified with agriculture or rural areas, but includes all those economic activities that do not use reproducible capital. This criticism also gave rise to the so-called "urban bias" hypothesis (Lipton, 1977; Bates, 1988) that sees poverty in developing countries as concentrated in rural areas and as a direct result of how government policy manages the relationship between traditional and modern sectors, further discussed below.

5 The concept is closely associated with the contribution to development economics of Albert Hirschman.

6 This relationship is known as the "Verdoorn law" which is based on the observation that a key characteristic of manufacturing is its greater potential for the division of labour, which gives rise to scale economies.

7 Primary exports can also be an initial source of foreign-exchange earnings. However, in addition to issues related to the availability of affordable food, mentioned above, this mechanism may be constrained by the non-tradability of major food staples.

8 The failure of African economies to achieve structural transformation to a similar extent as East Asian economies has often been related to differences in managing the relation between the two sectors. Post-independence African governments were said to have an "urban bias" by concentrating infrastructure in urban areas, over-taxing rural areas, and tilting relative prices in favour of urban pursuits (Lipton, 1977; Bates, 1988). But see Karshenas (2001) who concludes that the major policy failure in Africa during the 1970s and 1980s was not the rate of agricultural taxation per se, but rather the failure to put money back into agriculture to increase productivity and thus nurture an increase in the net agricultural surplus.

9 In poor economies where the process of industrialization is in its infancy or where the income incentives for migration are low for other reasons, climate change may tighten the liquidity constraints of rural dwellers to the extent that they cannot afford migration (e.g., Selod and Shilpi, 2021). Where this is the case, climate change is likely to abort structural transformation and cause large swaths of rural populations to be trapped in poverty.

10 Land degradation and soil nutrient depletion have also resulted from so-called "land grabbing", where land, with its available water potential, is acquired by private and public actors, including sovereign governments, often with a view to securing their own national food security and biofuel needs. These acquisitions often occur in areas with weak land tenure regulations and with local governments in need of fiscal revenues, accompanied by little compensation for dispossessed local communities and little consideration for sustainable land use (e.g., Batterbury and Ndi, 2018).

11 The continued divergence of structural transformation in Africa from experiences in East Asia is clearly related to a broad of reasons that also include macroeconomic and institutional factors. The account here is limited to main elements of the Lewis model.

12 In a sense, this is the other side of the same coin regarding attempts to transit to low-carbon value chains from end to end, discussed below. See Rani (2020) for a general discussion of informal

employment for cost-cutting reasons, motivated by labour regulations or costly environmental or social protection policies.

13 For recent evidence on the cost of climate-related port disruptions, see, e.g., Verschuur, Koks and Hall 2020. See also UNCTAD, 2020b.

14 For the mechanism envisaged by the United States, see the President's 2021 Trade Policy Agenda and 2020 Annual Report of the President of the United States on the Trade Agreements Program, March 2021, https://ustr.gov/sites/default/files/files/reports/2021/2021%20Trade%20Agenda/Online%20PDF%202021%20Trade%20Policy%20Agenda%20and%202020%20Annual%20Report.pdf; for the European Union, see the proposal for a new Carbon Border Adjustment Mechanism, adopted by the Commission on 14 July 2021, https://ec.europa.eu/taxation_customs/green-taxation-0/carbon-border-adjustment-mechanism_en; for further discussion of this proposal, see UNCTAD, 2021.

15 According to media reports, the European Union plans to use the expected annual revenue of Euro 10bn from its planned carbon border tax mechanisms to repay debt incurred for its recovery measures; see Mehreen Khan "EU carbon border tax will raise nearly Euro10bn annually", Financial Times, 6 July 2021, https://www.ft.com/content/7a812f4d-a093-4f1a-9a2f-877c41811486.

16 The more recent literature argues that the advantage of backwardness can benefit only those countries that are not too far behind because many poorer countries require a level of domestic technological capabilities that is sufficiently high to gainfully use advanced technologies (e.g., Oqubay and Ohno, 2019). This helps to understand why many least developed countries have not benefitted from their "advantage of backwardness".

17 For a review of this debate see UNCTAD 2006, 2016; Cherif and Hasanov 2019; Oqubay et al., 2020.

18 For detailed discussion of definitions and concepts related to green industrial policy, see Altenburg and Rodrik, 2017; Harrison, Martin and Nataraj, 2017; and Tagliapietra and Veugelers, 2019.

19 For a more general assessment of the potential to link renewable energy and manufacturing in Egypt, Morocco, and Tunisia, see EIB, 2015.

20 See OECD, 2019, for a recent account of the use of material resources since 1970 and projections until 2060.

21 See FAO, 2017, with country-specific examples in FAO, 2021b.

22 'Pathways to Breaking the Fossil Fuel Lock-In'. Sources: Bank of England, Asset Purchase Facility (APF): Additional Corporate Bond Purchases – Market Notice 2 April 2020, https://www.bankofengland.co.uk/markets/market-notices/2020/asset-purchase-facility-additional-corporate-bond-purchases [Accessed 19 July 2021]; European Central Bank. (2021). Pandemic Emergency Purchase Programme, https://www.ecb.europa.eu/mopo/implement/pepp/html/index.en.html [Accessed 15 August 2021]; US FED (2021). Board of Governors of the Federal Reserve System. The Fed - Secondary Market Corporate Credit Facility, https://www.federalreserve.gov/monetarypolicy/smccf.htm [Accessed 23 June 2021].

23 This environmental degradation has a domestic component in the form of polluted cities, soils and rivers, as well as high greenhouse gas emissions, but also an international component in the form of deforestation in those countries that provide wood for the construction and furniture industries, or soybeans for animal feed.

24 For detailed discussion of the alleged death of the developmental State see, for example, Thurbon 2014; Wade 2018.

25 For more detailed discussion of these issues, see Gabor 2021.

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