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New industrial policy and the extractive industries

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Abstract: Industrial policy is back. Advocates for industrial policy argue that the important question is not *whether* such policies should be applied at all, but *how* to design and implement them. For the extractive industries this development poses a challenge. First, there is the argument that host countries should reduce their dependence on the extractive resources sector and diversify their economies. But there is little consensus over how countries should go about this. Second, there is the universal climate agreement reached at the Paris COP21 in November 2015 which mandates that all economies have to move towards more sustainable and resource-efficient growth, with (green) industrial policy playing a critical part in achieving this structural transformation. Third, the liberal capitalist system underpinning the current global economy is under pressure with some political forces now making the case for more inward-looking economic policies and protectionism. This paper explores the new debate on industrial policy in relation to the extractive industries and the extractives-led development agenda.

Keywords: natural resources, extractive industries, industrial policy, governance

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1 Introduction

Industrial policy is back. Many development economists are now arguing for a new approach to industrial policy to achieve economic and social development in low- and middle-income countries.¹ This revival has been prompted by several developments. First, the pro-poor development agenda of the 2000s, has been criticized for failing to develop a sustainable private sector. For example, Whitfield (2012) has argued that this agenda has had ‘little to do with creating transformative capitalist systems’. Accordingly, and in contrast to the more poverty-focused agenda of the preceding Millennium Development Goals, the Sustainable Development Goals, launched in 2015, place greater emphasis on economic transformation and sustainable development (UN 2015a).

Second, international climate policy is an impetus for a new approach to industrial policy. The climate agreement reached in Paris at the UNFCCC’s Conference of the Parties (Paris COP21) in November 2015 mandated all signatories to change course, and accelerate their move to more sustainable and greener growth (UN 2015b). This means not only cleaner energy, but also better resource and material efficiency more generally (OECD 2015). In a carbon-constrained world, the fossil fuel sector is exposed to the risk of ‘unburnable carbon’ and ‘stranded assets’ (Lahn and Bradley 2016; Mitchell et al. 2015). ‘Green’ industrial policy is central to driving the structural transformation towards a more sustainable and greener economic system (Aiginger 2015; Hallegatte et al. 2013; Lütkenhorst et al. 2014; Rodrik 2014). And minerals and metals are critical for a low carbon future (World Bank 2017).

Third, there is rising disappointment with economic liberalism and globalization, and its social outcomes, on both sides of the Atlantic (Bailey et al. 2015; Rodrik 2016a, 2016b, 2017; Smart 2017). State action to re-shape and re-balance national economies, including restricting trade and the movement of people, are on the political agenda.

Yet, opinions on industrial policy are deeply divided. Some still associate the term with the interventionist import-substitution policies that were widely applied in the post-World War II and post-independence era. Re-introducing industrial policy into economic policy and development debates is seen to encourage unproductive rent-seeking by politically favoured companies thriving under protectionism.

However, proponents of new approaches to industrial policy maintain that investing in productive knowledge and technological capabilities is the key to achieving sustainable economic and social development. They define industrial policy in broader terms than either the old import-substitution policies, or the inward-looking policy ideas of the new national populism: Felipe (2015) associates industrial policy with structural transformation characterized by diversification, increased product and service sophistication, and the transfer of resources towards more productive economic activities. This fits well with one of the key messages of the UNU-WIDER project on ‘Extractives for Development’, that diversification is the key to a successful strategy for extractives.² Similarly, Stiglitz (2015) suggests including any policy that affects the sector composition and the technological choices of an economy, including corporate governance,

¹ The literature is very large, with recent contributions including Altenburg (2011), Esteban and Stieglitz (2013), Felipe (2015), Guigale (2013), IDB (2014), Lin (2012), Moran (2015), ODI (2016), Oqubay (2015), Rodrik (2007), Salazar-Xirinachs et al. (2014), Stiglitz (2015), and Whitfield et al. (2015).

² See UNU-WIDER (n.d.).

antitrust and competition policy, monetary and bankruptcy policy, and tax and expenditure policy. Lütkenhorst et al. (2014) describe industrial policy as any intentional measure taken by public authorities to steer the structure of an economy into a desired direction, irrespective of what that direction may be. Aiginger (2015) proposes that to achieve greater resource and energy efficiency will require an integrated ‘systemic’ industrial policy that can deliver ‘beyond GDP’ goals—in contrast to the current unsustainable growth path that relies on exploiting low energy prices. Lastly, there is the view that industrial policy consists of governments skilfully leading a process of deciding on difficult political-economic trade-offs to build and exploit comparative *institutional* advantages (Singh 2011).

In summary, the new industrial policy constitutes a ‘broad church’ of ideas and people. The question asked here is what does this imply for the extractive industries and their potential to contribute to inclusive (and sustainable) development? And, what policies and institutions might be needed? As part of the UNU-WIDER project on ‘Extractives for Development’, Lahn and Stevens (2017) have emphasized that host countries should pay more attention to the potential developmental role that the extractive industries might play: helping diversify national economies and building cross-sector linkages from extractives to other sectors. This points to a broad focus on what happens *around* the sector, as opposed to focusing more narrowly on what happens *in* the sector.³ Under the same UNU-WIDER project, Dietsche (2017) has argued that the extractives sector can transform economies (and societies), if their institutions succeed in providing public goods and services that increase productivity across the *non-extractive* sectors. Building on these two contributions, this paper explores further the nexus between new industrial policy and the extractive industries.

The paper takes a two-step approach. First, section 2 sets out the case for intervening in markets and applying industrial policy more generally. It highlights several themes and argues that the consensus on new industrial policy is, at best, very high level. Section 3 then discusses the nexus between the extractive industries and industrial policy over time and where it has got to in terms of the extractives-led development agenda. Section 4 sets out four forward-looking observations on new industrial policy and extractive industries, and section 5 concludes.

2 The case for industrial policy

The theoretical case for industrial policy arises from the problem of transaction costs and how these should be dealt with. Transaction costs arise whenever economic agents interact.⁴ Broadly speaking, they are the costs associated with market participation, such as searching for the desired goods and services, gathering and processing information about potential exchanges, bargaining over prices, coordinating with other economic agents, enforcing the exchanges of goods, services and means of payment, and addressing positive and negative externalities of all sorts (such as appropriating the benefits of learning or preventing free-riding). Transaction costs increase in scale

³ To avoid any misunderstandings: this argument does not suggest that what happens in the sector is not important.

⁴ This paper does not provide the space to cover the subject of transaction costs in any greater detail. See instead the institutional economics literature, notably Williamson (2000, 2008).

when people interact beyond the small group of their shared personal relationships.⁵ They are inherent to all markets in which unrelated individuals exchange goods and services.

A fundamental economic question has been how transaction costs can be reduced to encourage economic exchanges over distance and across time. Economic historians and institutional economists have spelt out the critical role that ‘institutions’ play in reducing transaction costs and, therefore, the role they play in establishing markets (Dietsche 2017). From the mid-1990s onwards, a growing number of these scholars underlined the problem of transaction costs and their fundamental importance to how humans cooperate and coordinate their economic activities. They recognized that institutions are key for reducing these costs. As Douglass North summarized the issue: ‘... when it is costly to transact, institutions matter’ (North 1990: 12).

This leads to another fundamental question: *who makes and shapes the institutions that reduce transaction costs to support sophisticated market transactions over distance and across time?* To create such institutions takes not only collaboration and collective action, but also collective entities with monopoly power over the use of force. As, in the modern world, this power is held by nation-states, their public authorities play a critical role in providing the institutions that allow the private sector to thrive and, in the best case scenario, produce broadly acceptable economic and social outcomes.⁶

The general case for industrial policy is built on the argument that there are situations in which markets rely on the public sector to achieve broadly desirable economic and social outcomes. These situations are, but are not limited to, those cases where clear ‘market failures’ can be identified. Therefore, industrial policy sits at the heart of the relationship between markets and states, and it also shapes economies and the social outcomes they produce.

In summary, there are many calls for industrial policy, but no consensus on what such policy should entail. To clarify matters, we can consider the basic assumptions that have justified public authorities intervening in markets. First, we consider the ideal-type situation where transaction costs are assumed to be zero (in the following sub-section 2.1, with more detail in Annex A). Then, we consider the real-life situation that transaction costs are always positive (sub-section 2.2).

2.1 Industrial policy in a world of zero transaction costs

Traditionally, and until the rise of institutional economics, much of neo-classical economics assumed that transaction costs are zero. This assumption allowed economists to focus on three specific types of goods considered ‘special’, because they have been recognized to pose a challenge even under this assumption.

The assumption of zero transaction costs is underpinned by the Coase (1960) theorem. It states that, as long as there are no transaction costs, self-interest will guide people to establish political structures and property rights that maximize national wealth. Adopting this postulate in more general terms allowed economists to pay little attention to the role institutions play in reducing transaction costs. Thus, many economists have simply assumed that people have enough incentive to negotiate amongst themselves to establish the set of economically most efficient institutions.

⁵ This issue has been explored by Mancur Olson’s work on the ‘logic of collective action’ and subsequently in the work of game theorists and others (Olson 1965). More fundamentally, it has also been investigated by behavioural and evolutionary psychologists.

⁶ See Dietsche (2017) for an introduction to some of the relevant literature and a discussion of the role that public authorities play in providing the formal institutions commonly associated with the institutional environment (level 2) and governance (level 3) of market economies.

Furthermore, the Coase theorem was drawn upon to support the widely held view that public authorities should only intervene in markets when there are clearly identifiable cases of ‘market failures’.⁷ This directed attention to ‘policy interventions’ and away from institution building.

In a zero transaction cost world, there are three special cases where market failures warrant ‘policy intervention’ (Table 1). Each pertains to those goods (and services) which are *non-rival* and/or *non-excludable*. These characteristics are independent of whether transaction costs are zero or not. Importantly, the two characteristics are not strictly binary, but instead sit on a spectrum ranging from ‘low’ to ‘high’.

Table 1: Special cases of market failure

		Rivalry	
		Low	High
Excludability	Low	Public goods	Common pool resources
	High	Club goods	Private goods

Source: Author’s graph, based on standard economic theory.

The first case comprises **public goods**, characterized by both *non-rivalry* and *non-excludability*. This means that one party’s consumption of such goods does not prevent another party’s consumption of the same goods. At the same time, one party cannot exclude another party from consuming such goods. An example is the ‘rule of law’: protecting one person’s legal rights does not negatively impact another person’s legal rights. Another example is the air we breathe, where we cannot prevent others from using it, nor can we engage in physical rivalry over its consumption. Instead, we rely on a symbiotic relationship with the plant world (and some appropriate public regulation) to produce fresh air for us.

The second case is **common pool resources**. They are *rival*, but a party faces the challenge of *how to enforce excludability*. Such resources include, for example, forests with their trees and wildlife; land with its biodiversity; and oceans, lakes and rivers with their fish and other animal stocks and resources underground. Although humans can engage in physical rivalry over the use of these resources, it is more difficult and costly to exclude others from using (or catching) them.

The third case is **club goods**. They are *non-rival*, but are characterized by *high excludability*. This means that access can be limited, but those who have access are not negatively affected by fellow members of the club of users, as long as the number of members is restricted. An example would be a toll road, where users pay an entrance fee to use it, but once they are on the road, all users get to their destinations faster than if they were to use alternative routes. Club goods include *natural monopolies*, which are characterized by high barriers to entry, thus giving the largest (or first) supplier an overwhelming advantage over potential competitors. Natural monopolies typically include the infrastructure required to provide utilities, such as water, electricity, and transportation.

Finally, the fourth case, shown in the bottom right-hand corner of Table 1, is that of **private goods**. They present the ‘normal’ case, where *non-rivalry* and *non-excludability* do not apply and therefore markets are assumed to take care of the production of respective types of goods and services.

⁷ See Yalcintas (2013) for a discussion on the (mis-)interpretation of Coase’s original work and the subsequent lock-in of the ‘Coase theorem’.

For those readers who are not familiar with these three ‘special’ cases, Annex A summarizes and discusses real-life examples of policy recommendations and interventions aimed at designing policies and establishing institutions that address *non-rivalry* and *non-excludability*. The examples in Annex A have been chosen for their contemporary relevance to extractive resources, climate change, and environmental policy. They demonstrate that the production and use of extractive resources is heavily and fundamentally entangled with the characteristics of *non-rivalry* and *non-excludability*. This means that the markets associated with extractive resources are contingent on how institutions have shaped them, not just over the past couple of decades, but at least since the era of the industrial revolution and even before then.⁸ Equally important is how these markets will work in the future, as not only governments but also social organizations challenge and seek to re-shape existing institutions.

2.2 Industrial policy in the real world

The second situation takes us to the real world, where transaction costs are always positive. A critical initial proposition is that the case for collective authorities to provide institutions whenever economic agents interact with each other beyond personal relationships is well established at the philosophical level.⁹ Today, nation-states and their public authorities have become the key collective entities that shape and maintain the institutions underpinning economic systems and their economic, social, and political outcomes. In this context, the proponents of industrial policy take the position that public authorities not only *can*, but effectively *do* play a fundamental role in how economies are structured and how they perform.

However, those proponents of industrial policy differ over *how* this role should be played. Crucially, this is not merely a technical, but a profoundly political question. Unsurprisingly therefore, proponents of new industrial policy are an eclectic mix of economists and other social scientists, coming from diverse schools of thought. Their common ground is the view that markets and supporting institutions tend to under-deliver. Additionally, the label of industrial policy has been adopted by nationalist narratives that promise to improve economic and social outcomes via the use of protectionism (without much, if any, consideration of the fundamental structural and institutional issues that are at stake). Characterized by opportunism, these narratives serve short-term political expediency.¹⁰

The remainder of this sub-section sets out several themes that run across the ongoing debate on new industrial policy.

Theme 1: the risk of ‘state failure’

‘Neoliberal’ economists have strong reservations against any type of ‘policy interventions’: ‘state failure’ is seen as a bigger risk than ‘market failure’. This concern stems from their interpretation of some of the negative experiences with interventionist policies prevalent in Latin America as well as newly independent states in the 1960s and 1970s, which were then referred to as ‘industrial

⁸ Relevant here are resource property rights and associated sector legal regimes. On this subject, see also Daintith (2010), Dietsche (2017), and Scott (2008).

⁹ There are historical analyses explaining how non-state collective authorities have helped members of non-territorially organized societies overcome transaction costs. Thus Greif (2006) defines an institution as ‘a system of rules, beliefs, norms, and organizations that together generate a regularity of (social) behavior’. (Greif 2006: 30).

¹⁰ See Smart (2017) and Stiglitz (2017) for a discussion on this development.

policy'.¹¹ The aim was to accumulate capital, develop nascent private sectors, and diversify economies away from the colonial legacy of exporting unprocessed commodities. State ownership was inspired by the socialist economic model of the Soviet Union, as well as by Western Europe's experiences with large state-owned enterprises and extensive state ownership in strategic sectors such as energy, infrastructure, and utilities.

While some countries found success through intervention—notably South Korea and Taiwan (China)—many did not, and by 1980 much of Latin America and many newly independent countries in Africa and Asia were in serious crisis. Neoliberal economists concluded that the risks of state failure arising from import-substituting industrialization outweighed any gains from reducing market failures. Industrial policy was then seen through the ideological lens of socialism's failure and market liberalism's triumph. This was reinforced by economic decline in the Soviet Union and Eastern Europe leading to their transition from planned to market economies in the early 1990s, and the success of China's own transition and its turn towards the global economy (Fukuyama 1992).

Industrial policy came to be seen as a means for creating rents for the benefit of political and economic elites, without delivering much, if any, of the expected economic and social returns. These ideas and experiences were reflected in some new economic theory focusing on rational individuals exploiting their power over public policies to seek unproductive 'rents', thereby maximizing their self-interest.¹² Against the background of these theories, governments were advised to avoid unproductive 'rent-seeking' by keeping their hands away from industrial policy, and instead to open up to foreign investment and trade: the private sector should decide which economic activities are worth pursuing in line with a country's given comparative advantages. Accordingly, as far as much international policy advice was concerned, the question of how to use pro-active policies to diversify economies fell by the wayside.

To date, 'state failure' and 'rent-seeking' remain two contentious subjects that proponents of the new industrial policy must confront. Yet, neo-liberals must also recognize historical successes in industrial policy such as that of South Korea, in which the economic rents created by state controls were successfully reinvested to create new manufacturing sectors that achieved great success in the global economy. And, while China has increasingly liberalized its economy, new forms of state intervention have marked its success in the global economy and its creation of dynamic new sectors.

Theme 2: industrial policy as a discovery and learning process

Discovering and learning is a core theme in the new approach to industrial policy. This approach argues that industrial policy should create a network of linkages between public and private sector representatives and institutions, where processes guide information flows and joint learning. In order to shape the structure of an economy, bureaucrats need to be closer to business. At the same time, it is stressed that the public sector should not simply end up serving particular companies or exclusive business elites, but must retain its independence from individual private interests and focus on the provision of public goods and services that benefit the private sector more broadly.

But what role should public authorities play in leading a discovery and learning process that identifies where transaction costs are high and pose a hindrance to productive entrepreneurial

¹¹ Specifically associated with such interventionist policies is the concept of 'import substitution industrialization' (ISI), which advocates that trade policy should aim to support domestic manufacturing, in order to reduce imports.

¹² See Congleton et al. (2008) for a review of research on rent-seeking.

activities? There are many views on the specifics. One argument is that the public sector carries a responsibility for coordinating and aligning stakeholders' interests towards reducing transaction costs—and enhancing positive externalities so that the private sector can develop, thrive, and diversify. For example, Rodrik (2007) has proposed framing industrial policy as a discovery process 'where firms and the government learn about underlying costs and opportunities and engage in strategic coordination' (Rodrik 2007: 101). Industrial policy should serve to elicit information from the private sector on the externalities that impede productive entrepreneurship, and which need to be removed.

In Rodrik's view, successfully identifying the true cost structure of an economy takes public policy makers one step closer to removing impediments to 'doing business' and enhancing positive externalities. This view suggests a corporatist approach, in which the public sector brings together and aligns multiple interests across different levels of policy, thereby improving the environment for private sector activities. Industrial policy is not then the sole responsibility of a separate ministry or department, but is instead shared across the public sector. Essentially, a country's industrial strategy provides the umbrella for ensuring the coherence and complementarity of public sector policies, based on clear objectives and without shying away from institutional change.

This view also speaks to encouraging (or nudging) private sector interests to organize and identify common constraints and impediments that (only) the public sector can address. Rather than taking a top-down public sector-led approach aimed at correcting specific market failures (or trying to pick winning industries), industrial policy as a discovery and learning process seeks to find practical ways to make markets work better for economic development, by networking organized economic and social interest groups and encouraging them to collaborate.

There is significant congruence between this view of industrial policy and the proposals by international mining companies to partner with governments, local enterprises, and third parties to enhance mining's positive contributions to development, and minimize any negative impacts on host countries and communities (ICMM 2011; McPhail 2017). Similarly, proponents of the notion of 'shared value'—a concept that has emerged within the debate on extractives-led development—argue that governments, companies, and third parties need to work together to remove impediments that hinder local companies from participating in project supply chains (e.g. bureaucratic, financial sector related, etc.) and to encourage positive externalities by providing training and support to local entrepreneurs and workers (e.g. skills, management, HSE compliance, etc.).¹³

Industrial policy as a discovery and learning process is also relevant for the challenge of climate change, because it suggests identifying and addressing the impediments and disincentives that discourage the private sector from developing and investing in cleaner and alternative energy sources.¹⁴

Three observations have supported the case for encouraging collaboration for joined-up discovery and learning. First, many Western industrialized countries look back on a long history of experimenting with decentralized approaches to industrial policy, where the development of particular sectors and industries has been supported by fostering innovation and competitiveness through networking across private and public sector entities (Keller and Block 2015; Streeck and

¹³ For example, see OECD (2016) and Östensson (2017).

¹⁴ This differs from the perspective of the zero transaction costs world, which proposes to define emission controls as a 'public good' and then impose limits on emissions (see Annex A).

Thelen 2005; Warwick and Nolan 2015).

Second, there are the Asian latecomers to the industrial revolution that successfully supported the structural transformation of their agrarian economies and societies during the second half of the 20th century. It is now generally accepted that East Asia caught up with the West by actively supporting and networking the export-oriented sectors, industries, and firms—contrary to mainstream policy advice to keep the public sector’s hands off the private sector (Amsden 1989; Khan and Jomo 2000; Lin 2012; Lin and Chang 2009; Strom 2017; Wade 1990). Opinions differ, however, on how well active support has been conducted and *how*, as well as *if*, the governments of East Asian countries have contained the risks of unproductive rent-seeking and state failure.¹⁵

Third, there is the observation that, as countries get richer, so their economies typically diversify (Imbs and Wacziarg 2003). They get richer not by producing more of the same using what resources they already have, but by learning how to produce more of an increasingly diverse range of goods and services. This contradicts the standard economic argument, dating back to David Ricardo, who in the early 19th century proposed that countries should specialize in producing the goods and services that make the best use of their comparative advantages using their most abundant productive factors. In addition, more diversified economies have not seen a withdrawal of the public sector: ‘learning to produce a more diverse range of goods and services’ has often been supported by a higher level of public goods and service provision supplying inputs that have allowed a broader range of economic activities to prosper. Some see this achievement of structural transformation and diversification as the essence of the development process (Mkandawire 2012; Rodrik 2007).

For industrial policy as a discovery and learning process, there is no presumption that the public authorities can always get things right—at least not the first time round. It is expected that mistakes will be made and that, as part of a learning process, these can and will be corrected. What matters is that the incidence of overall successful cases of private–public collaboration eventually exceeds the unsuccessful cases. Indeed, if no mistakes were made it can be taken as a sign that industrial policy is not daring enough and that the country might have missed potential gains.

Moreover, the common juxtaposition of ‘market failures’ versus ‘state failures’ is unhelpful when there is ubiquitous market failure—almost certainly the case in the very underdeveloped economies—and so the risk of potential ‘state failures’ becomes a matter of degree. Repeated state failure points to the persistence of a social order where particular interests are able to continuously re-shape institutions to make markets work in favour of their own narrow interests, to the detriment of advancing broader economic and social objectives. At the same time, leaving market failures unaddressed does not by itself change that order for the better. Thus, Stiglitz (2015) argues that not pursuing *any* industrial policy may also serve special interests, namely those interests that cherish the institutional status quo and benefit from the absence of state support that broadens access to economic opportunities.

Theme 3: setting and pursuing socio-economic objectives

A third theme is setting and pursuing socio-economic objectives. This theme complements the second theme, because it raises awareness that, first, the process of discovery and learning must serve a purpose and, second, that economy theory on its own cannot decide what the desirable outcomes actually are. Instead, objectives must be guided and set by political processes at various levels. Furthermore, this theme also rejects the binary framing of *whether or not* countries should

¹⁵ See also Box 1.

pursue industrial policies. It replaces it with the much more exploratory question of *how* individual countries can go about *designing* industrial policies in support of the objectives that their respective political leadership has set, as well as *how* their respective public sectors can *implement* such policies efficiently and effectively.

For example, in the context of climate change, a green industrial policy for structural transformation and diversification is often seen as paramount to achieving the global objective of limiting greenhouse gases (GHGs). Altenburg (2011) and Lütkenhorst et al. (2014) see green industrial policy as part and parcel of tackling the daunting challenge of transforming economies and the entire global economic system towards greater energy and resource efficiency and 'beyond GDP' objectives. They also see the past as a problematic benchmark by which to judge contemporary strategies: in their view, today's industrialized and diversified economies have failed to achieve ecologically sustainable development. The objective of green industrial policy is to direct economies away from the current energy-intensive and waste-generating economic growth path that is the history of OECD countries.

Theme 4: improving productivity

A fourth theme is focused on the objective of improving productivity. It rests on the argument that, due to positive transaction costs, the private sector is unable to address structural challenges that hold back growth. One example is large-scale investments with high fixed costs, such as the provision of utilities or transport infrastructure, that can serve a wide range of economic activities. For these to be built, it may be necessary to incentivize the simultaneous expansion of upstream and downstream activities. For example, in the context of the extractive industries, public investments in infrastructure may not only raise the productivity of a site where extractive resources are produced, but also that of other industries in adjacent areas, such as agricultural and other land-based natural resources sectors. In the context of the renewable energy sector, the public sector is tasked to lead on investments that support the transformation of energy systems, thereby enabling the decentralized feed-in of electricity by many small and intermittent producers.

More fundamentally, increasing the productivity of the private sector builds on the argument that sustained economic growth is characterized by continuous industrial and technological upgrading and the associated positive externalities. However, while in the presence of positive transaction costs public authorities have a key role to play in supporting the private sector to achieve such upgrading, this role does not equate to the proposition that the economy should be led or actively run by the state. And, nor does it support the proposition that states should own and run industries that are subject to natural monopolies.

Rather, the theme highlights the problem that sometimes the private sector requires the institutionalization of solutions that address structural market failures and enable positive externalities. Industrial policy becomes the medium to identify the nature of structural market failures and to develop and trial institutionalized solutions. For example, one of the industrial policy topics associated with improving productivity is strengthening education and training systems to deliver highly skilled tradespersons, technicians, and technical professionals. Notably, this is not only a key issue for the extractives-led development agenda, but also for the 'greening' of economies to reduce their carbon footprint and achieve greater energy and material efficiency (ILO/CEPEFOD 2011).

Several authors have discussed the role of public authorities in improving productivity with reference to developmentally oriented states, as opposed to 'predatory states' captured by narrow elites (Strom 2017; Wade 2010, 2014). In an earlier UNU-WIDER publication, Auty and Gelb (2001) distinguished between two stylized political-economic models to explain why resource-rich

countries had not kept pace with other countries that had started off with similar productive capabilities. These already suggested that economic transformation and diversification on the back of exploiting natural resources hinges on what happens *around* these sectors, as opposed to what happens more narrowly *in* these sectors. A characteristic of developmentally oriented states would seem to be the presence of political elites that actively pursue structural transformation, manage to avoid possible capture by economic elites, and also exercise self-restraint in using authoritative power for gains that accrue only to themselves. By not solely focusing on their own gains, those in power broaden the tax base and expand the provision and reach of public goods and services, thus ultimately supporting a more diverse and sophisticated economy.¹⁶

But, while proponents of industrial policy agree that improving productivity is a key objective, there is little agreement on how to do it, in particular whether countries should *comply* with, or *defy*, their comparative advantages based on their existing factor endowments (an abundance of cheap but unskilled labour), in the case of most low-income countries. An example of this divergence is the debate between two prominent East Asian economists who hold opposing views about how the state should proceed in industrial policy (Lin and Chang 2009).¹⁷ Box 1 summarizes their discussion.¹⁸ Furthermore, Annex B summarizes scientific approaches aimed at revealing a country's comparative advantages.

¹⁶ Auty and Gelb (2001) argued that developmental states are ones that support *competitive industrialization*, where a virtuous economic cycle is complemented by a cumulatively virtuous social cycle. Meanwhile, resource-rich countries are likely to suffer from an initially skewed distribution of assets and income that locks economies into a *staple trap* hindering economic diversification, reducing competitiveness, and holding back social development. More recently, Melia (2015) has similarly used stylized state models to explain why countries with extractive resources are trapped in negative political-economic configurations. However, this literature has little to say about how resource-rich countries may escape their traps.

¹⁷ For a fundamental critique of Lin's position, see Fine and Van Waeyenberge (2013).

¹⁸ An interesting country example to consider is the case of Ethiopia, where Lin's argument would suggest that this country has the opportunity of proactively grabbing labour-intensive industries (e.g. textiles, leather wear, etc.) from more advanced emerging market economies where rising wage costs are making these industries less competitive. In contrast, Chang would argue that, in addition, focused policy support is required for promising sectors to acquire the technological capabilities and the accumulation of the 'tacit knowledge' that is needed to successfully sustain them. He would not necessarily see only labour-intensive industries as the most promising or the only industries that pro-active public policies might support.

Box 1: Following or defying comparative advantages

Justin Lin, a former Chief Economist and Vice President of the World Bank, argues that countries can best develop their economies by focusing on policy interventions that support companies in exploiting their current comparative advantages.

He starts from the position that a country's optimal industrial structure is endogenous to its endowment structure. Public authorities should focus on encouraging the production of those goods and services in which their countries have abundant input factors so as to ensure that economic growth is well-launched via an endogenous process of upgrading. Public intervention should encourage industries that will make effective use of countries' current comparative advantage, and should focus on interventions that remove barriers to companies and industries that could make use of the country's abundant input factor inputs.

Beyond this, they should take a hands-off approach and let these companies and industries grow and advance at their own pace. The logic is that when respective industries grow and withstand competition from elsewhere, they will generate labour incomes and profits that will be reinvested in the economy. This will then contribute to the accumulation of additional physical and human capital and will eventually contribute to the upgrading of the country's initial endowment structure as well as its industrial structure. Over time, companies in these domestic industries will move into more capital- and skills-intensive industries in which they also can become more competitive.

Lin describes this strategy as the 'comparative advantages following' (CAF) approach: upgrading of the industrial structure follows the upgrading of the endowment structure; that is, the availability and productivity of natural resources in the widest sense (including human resources). The CAF approach rewards fast-followers that learn to quickly adopt technologies already developed by other countries. Lin argues that it is critical to fully expose domestic industries and companies to international markets, as this instils the discipline of competitiveness.

Ha-Joon Chang, an economist at Cambridge University, disagrees with Lin's approach. He argues that countries need to defy their current comparative advantages, at least to some extent, if they want to upgrade their industrial structures. Local companies will be unable to accumulate the technological capabilities that are required to enter an industry prior to the country having achieved the right factor endowments.

Chang argues that the concept of 'comparative advantages' rests on the efficient allocation of resources in the short term, but does not look to the future. Thus, current comparative advantages should merely serve as a baseline on which efforts to upgrade technological capabilities can be built. They are not by themselves enough to achieve upgrading. Technological capabilities should be seen as a country's differential ability to develop and use technologies: rich countries are rich because they can use and develop technologies that other countries cannot use, let alone develop.

Thus, the first step towards improving a country's technological capabilities is to improve the ability of companies and people to use more sophisticated technologies that have already been developed elsewhere. Acquiring such capabilities requires that public authorities get involved in setting up and—at least to some extent—protect industries where their economies do not yet enjoy a comparative advantage. The challenge lies in the difficulty of predicting in advance how long it will take for such capabilities to be acquired and what returns these will ultimately deliver.

For Chang, an important point is that factor accumulation does not happen as an abstract process, but takes very practical forms. He argues that technological capabilities are acquired through experience and in the form of collective knowledge embodied in organizational routines and institutional memories. He believes that the accumulation of additional physical and human capital cannot be left wholly to the private sector; active support by the public sector is essential.

Another fundamental point of contention is that Chang sees a case for restricting the mobility of productive factors so as to protect domestic constituencies for potential losses they might experience in the face of competition. Restrictions could include the use of trade policy and other measures, such as sector-specific fiscal subsidies that the norms of economic liberalism would rule out.

Source: Author, based on Lin and Chang (2009).

Theme 5: building comparative institutional advantages

A fifth theme in industrial policy centres on static versus dynamic comparative advantage. A country's *current* comparative advantages are not only, nor even necessarily, down to its endowments of physical resources, but reflect policies and broader institutional arrangements relative to other countries. These institutions underpin factor productivity and how this is maintained and improved.

This theme emerged from studies tracing the specific characteristics of advanced industrialized countries to their particular institutions and how these have evolved over time as the outcomes of political-economic processes.¹⁹ For countries that have managed to transform and diversify their economies, historically minded social scientists focus on what institutional characteristics are shared. For example, this research has included comparative analyses on the economic structures of OECD countries and the 'varieties of capitalism' that these countries display, even though, comparatively, they are all similarly well off.²⁰ Studies of East Asia's successes have identified strategic state actions that built institutions which encouraged private enterprises to invest in increasingly high-value export activities offering increasing returns to scale (thereby improving upon outcomes just based on East Asia's traditional comparative advantages).²¹

As this research views current comparative advantages as the outcome of the comparative *institutional* advantages that a country has built over time, the focus is on the question of how countries have got to where they are, rather than accepting—as a *fait accompli*—their existing comparative advantages.²² Contrary to a world of zero transaction costs, it is not assumed that these institutional arrangements are a given.

This fifth theme links back to the second and third themes regarding discovering and learning driven by the pursuit of clear socio-economic objectives. They indicate that the task is not merely one of quickly designing and announcing industrial strategies and policies, but one of more slowly and purposefully re-shaping existing institutions and building new ones. In this context, Ethiopia is an interesting example of where the public authorities have pro-actively pursued industrial policies—but where there are differing accounts of *how* they have gone about implementing these policies.²³

Theme 6: the political economy of transaction costs and institutional change

The last theme of the new industrial policy is arguably the most controversial, for at stake is the issue that, if transaction costs are positive (as they are in all real world situations), there is no guarantee that institutional change will in fact reduce these costs. This risk exists because institutions reflect the political-economic interests of those who were able to shape them in the

¹⁹ See Thelen (2004) for a comparative analysis of the vocational and skills training systems in Germany, the UK, the USA, and Japan, and how these relate to the different structures of these countries' economies.

²⁰ This literature includes, amongst others, Eichengreen (2007), Hall and Soskice (2001), Ostrom (2005), and Williamson (1985).

²¹ The respective literature includes, amongst others, Chang (2007), Haggard (2004), Khan (2000), and Lin (2012). Some of these authors have traced the capabilities associated with such interventions to an institutional legacy of more direct colonial rule, as opposed to the indirect colonial rule exercised elsewhere. See Lange (2005) for a fuller discussion.

²² Note that this question is not answered by the approaches developed to reveal comparative advantages set out in Annex B.

²³ See, for instance, Newman et al. (2016) and Oqubay (2015).

past and those who are able to re-shape them in the future. Political powerholders may use industrial policy for their own interests and those of their respective political constituencies. Hence the risks of ‘rent-seeking’ and ‘state failure’ discussed earlier as the first theme.

However, there are signs that the overtly pessimistic view—that ‘state failure’ and ‘rent-seeking’ are the norm, because all public officials and entrepreneurs invariably seek out unproductive rents—is being replaced with an understanding that, in fact, critical to outcomes is the *social order* that underpins how such agents behave, and what they see as their legitimate role in society. This is why the revived debate on industrial policy concludes that what matters is *how* policy makers and state institutions deploy industrial policy, and that positive institutional change can be a possible outcome.

The conclusion is that recommendations on industrial policy should be judged not from an ideological perspective, but on the basis of whether they address systemic challenges that hinder an economy from delivering desired socio-economic outcomes. There is declining support for the narrow position that governments should disengage completely from the pursuit of industrial policy. This is, in part, because few still maintain the view that markets are perfect, but, in part, is also because industrial policy now has such a wide range of interpretations—as illustrated above—that economists of many different persuasions can subscribe to it. In terms of empirics, in future we can expect to see variance in outcomes: in some countries industrial policy will fail while in others it will deliver positive results.

3 Industrial policy and the extractives-led development agenda

This section discusses perspectives on the nexus between the extractive industries and industrial policy since the mid-20th century, with the discussion organized into three periods: the 1950s to late 1970s; the 1980s and 1990s; and the period since the 2000s.

3.1 The 1950s to 1970s: unfulfilled promise of state-led industrialization

In this period the commonly held view was that state-led industrialization could achieve catch-up with the more advanced economies. Foreign companies dominated the resources sectors in the colonial era, and newly independent governments in Asia and Africa took control and transferred the assets of these enterprises to newly created state-owned oil and mining companies. The very first oil nationalization, that of Mexico in 1938, was a powerful inspiration in the post-war era, and ‘resource nationalism’ was often socialist in flavour as well. Governments took control over their soils and sub-soils, in order to use the resulting revenues to finance ambitious industrial development projects as well as the expansion of public provision more broadly.²⁴

The generous concessions granted to foreign companies in the oil and gas sector in the era before 1950 were, from the mid-1970s, replaced with contractual production sharing or service agreements.²⁵ Western-owned oil majors brought low-cost Middle Eastern oil to the global market which gained them market share and pushed down prices. The ensuing battle between the

²⁴ The history of Chile in these respects is discussed in some detail in Solimano and Guajardo (2017).

²⁵ Contractual production sharing or service agreements engage specialist private enterprises to provide services for which they get paid with a share of production, or in cash. These new forms of cooperation allowed state-owned oil companies to draw on the expertise and experience of foreign private enterprises, but supported the political narrative that extractive resources require the command of the state. See Dietsche (2013) for an overview of sector legal regimes.

governments and the companies prompted key producer countries to actively intervene in the pricing mechanism and encouraged further nationalization, notably, for example, in Venezuela. The Organization of Petroleum Exporting Countries (OPEC) was established to tilt market power in favour of the producers. Its strategy to achieve a higher price was to contain excess capacity, which culminated in the oil shocks of the 1970s and prompted the collapse of demand and the rise of non-OPEC supply from the 1980s onward. Following the turbulence of the 1970s, the world experienced a general downturn in commodity prices throughout the 1980s and 1990s, which only ended with the commodity upswing ('super-cycle') that started in the early 2000s, driven especially by Chinese import demand, which only stalled in late 2014.

At the time, some economists raised concerns that it would not be straightforward to industrialize and diversify economies on the back of exploiting and exporting unprocessed commodities.²⁶ The fear was that, although they would be exploiting their current comparative advantages, countries specializing in primary commodity exports would ultimately suffer from declining terms of trade. Taking a long view, economic historians also pointed to a mixed picture referencing the 18th and early 19th centuries.²⁷

Drawing on the work of these economic historians, Hirschman (1977) developed *linkage theory* as an analytical tool to examine the potential connections between the resources-based industries and other economic sectors. He distinguished between three types of linkages. First, *production linkages* include: (a) *backward linkages* that involve the production and provision of goods and services required for the production of the export resource; and (b) *forward linkages*, where the production of resources provides a stimulus or an input for subsequent economic activities in the country. The latter include, for example, the processing of raw materials into other manufactured goods, such as iron ore into steel-based goods, or from energy resources to energy-intensively manufactured goods.

Second, *fiscal linkages* arise from resource revenues funding public investments, for example in railways and other transport infrastructure and investments in developing human capital. Third, *demand or consumption linkages* arise from the economic activities generated by the local spending of income earned by those directly employed or contracted by the export-oriented resources sectors (e.g. salaries, wages, profits). These linkages include so-called *multiplier effects*, where the demand created by those spending their income earned in the resources sectors on locally produced goods and services create further positive demand effects by those who benefited from this first round of spending. Roe and Round (2017) examine this subject in greater detail.

Hirschman's observations led him to doubt the potential of the export-oriented resources sectors to serve broader economic development and diversification. He concluded that, first, *fiscal linkages* would be limited, because raising taxes on the basis of the resources sectors would not automatically direct public spending towards the establishment of policies and conditions that would support other productive activities. Second, *consumption linkages* would also be limited, because the needs of those directly employed by the resources sector could potentially be met with imports from abroad, not least because their sector was generating the foreign exchange to engage in cross-border trade. Finally, there was perhaps some potential for *backward linkages*, because supply industries were likely to apply technologies that were more closely related to those applied

²⁶ See Prebisch (1950) for the Prebisch-Singer hypothesis.

²⁷ See also Auty (2001).

by resources projects.²⁸ Contemporary debates and criticisms of the extractives sectors have picked up on these concerns, as further discussed in sub-section 3.3.

3.2 The 1980s and 1990s: sector liberalization in the ascendant

By the 1980s many low- and middle-income countries entered fiscal and debt crises, compounded by the commodity price slumps of the time, and some needed to accept International Monetary Fund and World Bank stabilization and structural adjustment programmes. While state-led industrialization on the back of the resources sectors was not always a failure, it did have a high failure rate when industrial policy was abused by political and economic elites for their own advantage. State failure via state-led industrialization rather than market failure was emphasized under the ‘Washington Consensus’, in particular ‘rent-seeking’ (discussed in sub-section 2.2) provided the microeconomic explanation for the resource misallocation that this industrial policy approach had seemingly prompted (Khan 2015).

Another argument was that, by rushing to create capital- and skills-intensive industries, countries had moved too far beyond their comparative advantages at too early a stage in their development (compounded by focusing too much on often small domestic markets through import-substituting industrialization). Instead, they should have concentrated on their comparative advantages in using their abundance of unskilled labour and land to produce for export markets.

The proponents of the Washington Consensus argued that the extractive industries could help countries return to growth, in particular by generating much needed foreign exchange. The implicit industrial policy advice at the time was that countries should attract more foreign investment into the resources sectors, including privatizing and/or selling off their state-owned companies. During this time, almost all national mining and some oil and gas companies in low- and middle-income countries were privatized and sold off, thus removing their troubled finances from the public accounts. The expectation was that once the sector was opened up to foreign private investment and new projects were developed or resumed production, these would generate public revenue and additional positive trickle-down effects that would benefit the wider economy. Given the perceived risks of state failures, it was implicitly expected that this would happen mostly through private sector initiatives, with governments confining themselves to maintaining macroeconomic stability, undertaking further liberalization to remove state controls that distorted individual incentives, and generally refraining from intervening in markets. In several low- and middle-income countries, significant new private investment and some increased public revenues did indeed follow as a result of this approach. Examples include Ghana after 1986 and Tanzania after 1996.

3.3 Since the 2000s: the promise of the extractive-led development agenda

Since the late 1990s, low- and lower-middle-income countries generally have received substantial foreign investment, funding large-scale projects especially in the oil, gas, and minerals sector on an unprecedented scale. The construction and operation of such projects has boosted growth rates and per capita income. But they have often not delivered on the expectation that positive trickle-down effects would harbour broader benefits, including more diversified economies and more economic opportunities at national, sub-national, and community levels.

This disappointment has prompted serious questions as to why this expectation has not been met.

²⁸ In the language of one of the two approaches on revealing comparative advantages set out in Annex B, supply industries were thought to share the same ‘product space’.

The questioning has taken place at two levels. First, at the community level, the environmental movement has highlighted the discontent of local communities, where negative impacts are felt most immediately and intensively. Having gathered strength and international bargaining power from the 1980s onwards, environmental activists influenced the development of new international standards on corporate environmental and social performance and demanded that companies deliver social investments in affected areas and communities. Tomlinson (2017) and McDonald (2017) have covered this development in more detail.

Second, at the macro-level, many resource-rich countries have done worse than those less well-endowed with natural resources (the ‘resource curse’) and this has triggered a second wave of activism. As set out in Lahn and Stevens (2017), researchers initially focused on the macroeconomic and fiscal challenges facing resource-rich countries, seeking appropriate policy responses. However, since policy responses were often weak (or non-existent), attention soon shifted towards the political economy of resource rents as an explanation of why neoliberal policy-prescriptions had not resulted in broad-based socio-economic development.

Attention turned to ‘good governance’ and how countries can better succeed with their extractive industries, if they put in place ‘appropriate’ sector policies and institutions. These, so it has been argued, can address the macroeconomic, fiscal *and* political-economic risks associated with resource wealth. Several policy papers compiled as part of the UNU-WIDER project on ‘Extractives for Development’ have elaborated on the macro-fiscal and monetary management and the political-economic and governance issues.²⁹

Indisputably, much has happened since the 2000s. At one level, extractive companies have been pushed to improve their local impact management and their relationships with local communities. At the same time, international initiatives, such as the Extractive Industry Transparency Initiative, have invested in gathering and disseminating information, and have encouraged greater transparency and better governance in the sector, especially in relation to resource revenues and the legal, regulatory, and contractual arrangements underpinning these. Yet, it has remained unclear whether, and/or to what extent, these efforts have supported countries in diversifying away from the extractives sectors. As underlined in the introduction, the very suggestion that it is possible to transform and diversify an economy on the back of extractive projects draws attention to what happens *around* the sector. For the extractives-led development agenda to succeed, productive knowledge and technological capabilities relevant to other sectors have to improve. In principle, public authorities have a key role to play in a real world of positive transaction costs, to reduce those costs and address structural market failures. Industrial policy defined in its widest sense lies at the heart of that role.

4 What next on new industrial policy and extractives-led development?

Unfortunately, because the debate on new industrial policy is so multifaceted, it is also rather inconclusive and does not (yet) provide governments of countries with extractive resources with any sort of road-map that could guide them on the strategies most likely to produce long-term sustainable benefits. Worse even, some proponents taking part in the various debates on ‘new industrial policy’ as outlined above probably regard the extractive industries as an almost irrelevant side-show to these debates: they would see the focus areas for actions as being the manufacturing

²⁹ See UNU-WIDER (n.d.) for further WIDER Working Papers, as well as Addison and Roe (forthcoming).

sector and its associated technologies.³⁰ The detailed review presented in this paper has sought to demonstrate that this would be far too narrow a view: several strands in the newer literature suggest important potential roles for the extractive industries in contributing to economic diversification. The remainder of this section sets out four observations on new industrial policy and extractives-led development.

Observation 1: a positive role for extractive industries

A starting point for spelling out a more positive role for the extractive industries in these debates is Hirschman's (1977) pessimistic view on the limits of *fiscal linkages*. He feared that raising taxes and collecting more revenue from the resources sectors would not *automatically* direct public spending decisions towards the pursuit of policies and public goods and services that would support productive activities in other sectors. But, with the broader global acceptance of the case for industrial policy now established and a more nuanced understanding of what such policy might comprise, there are no obvious reasons why considered and foresightful governments would not choose to devote some part of their resource revenues to support other non-extractive sectors with appropriate policy measures.

Furthermore, there is now an increased international understanding of the importance of, first, observing and, second, supporting what happens *around* the sector, as opposed to focusing more narrowly on what happens *within* the sector. This understanding has been re-enforced by several years of insights distilled from observing the successes and failures of the extractives-led development agenda to which the UNU-WIDER project on 'Extractives for Development' also seeks to contribute. This development makes it more likely that any host government that seeks to apply a new industrial policy approach in the interests of long-term sustainable economic development based on diversification will be able to draw on extensive international ideas and increasing support for these, including from development agencies that back respective initiatives such as, for example, the economic growth corridors of the World Bank.

Not least, this suggestion corresponds with the arguments of those proponents who associate new industrial policy with structural transformation, characterized by increased product and service sophistication and the transfer of resources towards more productive economic activities (Felipe 2015). There is little doubt that most of today's countries that are dependent on extractive industries need to embrace diversification and economic transformation as the route to longer-term and sustainable development (Lahn and Stevens 2017). Moreover, it is quite clear that in the period of high investment during the last super-cycle some lower- and middle-income countries have seen the transfer of some resources to higher-productivity activities associated with their increasing dependence on minerals and/or oil and gas. But, the challenge, to which there has not yet been a generally good response, is how to sustain such initial gains by spreading productivity gains to other sectors and, hence, to truly leverage the extractive industries for sustainable development.

Contrary to the position that some host governments like to take, such spreading does not happen automatically. In fact, new industrial policy suggests it requires smart policies that pro-actively support, for example, enterprise development, local skills training, and the promotion of new investments in non-extractive sectors that could stand a chance to become viable on their own.

³⁰ This observation does not mean that all proponents of industrial policy are set on reviving and encouraging manufacturing independently of the extractive industries. For example, Stiglitz (2015) recognizes that an economy based on natural resources can use those resources as a basis for diversification. He points to South Africa's experience of moving from producing earth-moving equipment for the mining sector to producing automobiles.

The more nuanced thinking that is now underpinning the debate provides several ideas on taking forward such policy interventions and developing supportive institutions.

One example is Rodrik's (2007) recommendation to adopt a corporatist approach, where the public sector takes responsibility for bringing together and aligning multiple interests across different areas and levels of policy making, with the aim to improve the environment for private sector activities. As noted above, there is significant congruence between this view on new industrial policy and the proposals put forth by international mining companies to partner with governments, local enterprises, and third parties to enhance mining's positive contributions to development, and minimize any negative impacts on host countries and communities (ICMM 2011).

Another line of thought is suggested by Greenwald and Stiglitz (2014), who have cautioned that the East Asian model of export-led manufacturing growth is unlikely to be relevant for the later developing economies of, for example, Sub-Saharan Africa. In a recent conference presentation, Stiglitz further noted that a narrow focus on manufacturing is no longer very helpful, because with increasing automation this sector is not expected to deliver significant growth in jobs globally (Greenwald and Stiglitz 2017).³¹ However, he notes that there are several other features of the East Asian model that remain very relevant to the design of future industrial policy. First, as an export-led model, this model does not face significant demand constraints from small domestic markets. Second, it addresses the foreign exchange problem of countries that might otherwise have been limited by the FOREX constraint. Third, it provides a convenient basis for learning-by-doing and the absorption of new technologies from abroad, which are critical elements of theme 2 above on discovering and learning. Fourth, it provides relatively easily taxable revenues and so helps to boost public spending capacity. Finally, being centred on a discrete number of enterprise units, it provides for a relatively natural system of accountability for those revenues, as compared to the problem of taxing a huge and dispersed set of agriculture-based businesses. A quick glance at this list of key factors suggests their relevance for the extractives-led development model.

On the other hand, there remains the question: if not manufacturing what can serve as the base-board for the industrial policy endeavours of the later developers? Stiglitz's answer is that new industrial policy needs to adopt a multi-sector approach. While manufacturing can still play a role, policies to support this sector will probably need to be directed at a much narrower subset of areas than in the past, focusing on those subsets of manufacturing that enjoy some degree of current advantage: most likely to include areas that are associated with the extractive resources sectors. At the same time, a multi-sectoral approach would require the agricultural sector to play a bigger role in most countries. More policy attention needs to be paid to formalizing respective property rights, to promoting more advanced technologies, to encouraging non-labour saving innovations, and to supporting respective skills development and learning across the relevant constituencies. The service sector can also be a key growth sector, but will typically also need much support for skills development and the opening up and development of selective tradeable services. Both the agricultural and the service sectors, if better supported by industrial policy, can provide important complementary activities to those of extractive industries. In summary, a multi-sectoral approach needs to be mutually re-enforcing and to encourage economic activities *around* a buoyant extractives sector into which private operators are willing to make often huge investments. Contrary to the view commonly held in development circles until recently, there is no reason for the extractives sector to be side-lined and treated as an embarrassing irrelevance alongside calls to

³¹ IEA, Santa Fe, Mexico City, Mexico June 2017. See also Greenwald and Stiglitz (2017).

industrialize and diversify economies. On the contrary, host governments should think of the extractives sector as an integral part of a broad-based multi-sector approach to industrial policy.

Observation 2: much theory, less practice

Much of the debate on new industrial policy appears to happen in the intellectual space of economists hypothesizing what countries *ought* to be doing. This comes at the expense of paying less attention to what countries have actually been trying to do and what in the process they have, or have not, achieved. An example of this is the intellectual debate centred around the arguments whether countries should be *complying with* or *defying their* comparative advantages (see Box 1).

This debate merits the question of what these two opposing arguments hold for the extractives-led development agenda. First, the argument of *complying with comparative advantages* would broadly point to the following recommendation: low-income countries endowed with extractive resources should continue to focus on this advantage and encourage investment in this typically export-focused sector. In addition, they should seek to attract industries and firms that can counterbalance the economic dominance of the extractives sector. For example, in the case of Sub-Saharan African countries, this would entail pursuing policies that attract those export-oriented, low-skill, labour-intensive industries that China and other emerging market economies are moving on from. The assumption would be that over time both types of foreign investments will somehow contribute to countries advancing their productive knowledge and technological capabilities.

Second, the argument for *defying existing comparative advantages* would suggest that countries should strive to acquire concrete new production experiences via learning-by-doing and cross-sector collaboration. In the context of the extractive sector, this argument would point towards acquiring productive knowledge and technological capabilities that are *transferable* across sectors, so that ancillary sectors with growth potential could gain a basis from which to launch from. This is the argument for using selective work packages associated with the development phase of extractive projects to support enterprise and skills development that can be capitalized beyond the sector (such as in relation to civil construction, infrastructure development, or general business services work).

Notably, both arguments are preoccupied with advising on the ‘right’ policy interventions, which comes at the cost of paying little attention to how positive institutional change would be brought about, which underpins the development of future comparative advantages. In addition, both positions assume the continuation of open trade and cross-border investment.

Observation 3: local content as industrial policy

A topic that the extractives-led development agenda has embraced is ‘local content’, seen as a means to build linkages between foreign investment in extractives projects and the local economy.³² Put quite plainly, however, local content strategies and policies are industrial strategies and policies by a different name.

As there is no universally agreed definition, local content practices can vary widely across countries; for example, some governments focus narrowly on the procurement of goods and services from companies that are owned by nationals, while others consider not only local procurement but also local hiring, skills development, community-based enterprise development activities, or shared

³² Alternative terminology may refer to local procurement and local employment, or to local participation.

infrastructure development (IPIECA 2016).

In recent years, countries have put more effort into developing local content strategies, policies, laws, and regulations to try and retain more value in the country and in local communities. The focus is usually on building *backward linkages*. This emphasis raises the obvious question of if, or to what extent, local content as an industrial policy has been a) successful in improving productive knowledge and technological capabilities that have served the objective of diversification, and b) improving the business environment by reducing transactions cost more generally and not sector specifically.

There is still relatively little research looking at the empirical evidence of what local content policies have delivered. Good practice guidance on local content is often based on short-term observations and case studies on the actions that individual countries have pursued, but without tracking whether these have actually resulted in positive institutional change that can sustain gains in productive knowledge and technologies over time. While the focus lies often on tracking the volume of goods and services that a specific extractive project has procured from local companies, there is no tracking whether those very same companies have acquired work orders beyond the specific project and whether they have generated additional value beyond the extractives sector, including contributions to government revenue.

Observation 4: secondary impacts of international environmental and social policies

Concerns over climate change and associated international, national, and local environmental policies are driving the green industrial policy agenda, which has culminated in the universal climate agreement reached at the Paris COP21 in November 2015. This development has prompted observers to consider the impacts of this agenda on the extractives-led development agenda, with terms including ‘unburnable carbon’ and ‘stranded assets’ describing these. As the green agenda is focused on the structural transformation of, first and foremost, the largest and most industrialized countries and emerging market economies and on what and how these are producing and consuming, low-income producers of extractive resources are the takers of the consequences of green industrial policies at the global level. At the same time, the extractives-led development agenda assumes that the energy and material intensity of economic growth will broadly continue.

The impacts of green industrial policy vary across the energy and the minerals sector: the former is likely to see a greater shift towards renewables, while at the same time some transformational green economy technologies are reliant on metals and minerals (World Bank 2017). Furthermore, some of the critical green technology minerals are produced as by-products of other, more conventional minerals as well as through various forms of mining: these include not only industrial mining but also artisanal and small scale mining, which generates a lot of employment but comes with a range of additional environmental and social challenges. In particular, stricter regulations on sourcing minerals from conflict-prone and high-risk areas that are complementing green industrial policies may mean that the mining sector will see the expansion of new forms of so-called *urban* and/or *flexible* mining, i.e. the recovery and recycling of secondary materials. Finally, as and when the structural transformation associated with green industrial policy progresses and a more circular economy evolves, there is the influence of the financial sector choosing more carefully what types of primary and secondary extractive resources activities it will invest in, including funding the implementation of a more circular economy.

5 Conclusion

There are at least three reasons why industrial policy is back on the agenda: i) the revision of the pro-poor development agenda of the 2000s, ii) international climate policy pushing for a more sustainable and greener economic system, and iii) disappointment with the social outcomes associated with economic liberalization and globalization. Yet, opinions on new industrial policy remain divided, ranging from re-evoking fears over the risk of unproductive rent-seeking to populist calls for industrial policy as the panacea for all that might have gone wrong with neoliberal capitalism. Meanwhile, those in the middle of this wide spectrum maintain that investing in productive knowledge and technological capabilities is critical for economic and social development.

This paper has sought to disentangle what the debate on new industrial policy entails and how it relates to the extractives resources-led development agenda, given that the latter builds on the premise that the extractive industries can have a positive developmental impact provided that host governments pursue 'appropriate policies'. The very suggestion that it is possible to transform and diversify an economy, partly at least on the back of these industries, draws attention to what is happening around the sector, as opposed to, or at least complementary to, what is happening in the sector.

First, the paper laid out the case for industrial policy based on the problem of transaction costs and how these should be dealt with. It distinguished between the ideal-case situation, where transaction costs are assumed to be zero, and the situation of the real world, where transaction costs are always positive. It argued that the latter case draws attention to the role that public authorities play in providing and maintaining the institutions that reduce transaction costs and condition how well economies perform. The challenge is that proponents of new industrial policy hold different views on how this role should be played. This is fundamentally not a technical but a profoundly political question.

Several themes were picked up that run across the ongoing debate, but the sobering conclusion has been that there simply is no consensus on new industrial policy. It is merely at the philosophical level where the case can be made for the role of public authorities to provide institutions that reduce transaction costs. This left a rather incomplete picture of what new industrial policy could bring to the extractives-led development agenda: a picture that the latter sections of the paper have sought to remedy, at least in part.

Looking back, since the middle of the 20th century, there have been three decades of hope resulting in the unfulfilled promise of state-led industrialization, followed by two decades of trust in sector liberalization, which also did not deliver on all the expectations associated with this approach. Finally, the promises of the extractives-led development agenda nurtured over the past decade has not been very clear on how it helps to steer countries towards improving productive knowledge and technological capabilities to diversify their economies beyond the extractives sector.

Looking forward, the paper first re-emphasized some important points of connection between the new mainstream literature on industrial policy and the basic attributes of the extractive industries. This suggested that there is no reason for the newer industrial policy debates to side-line the role of the extractive industries. The paper finished by highlighting four observations that the extractives-led development agenda should take note of. The first of these was that the evolving debate encourages new thinking on a positive role for extractive industries as part of a multi-sector approach to industrial policy.

Second, a large part of the new industrial policy debate is focused on what countries ought to be doing and what the right policy interventions are that they should be pursuing. This has come at the expense of paying more attention to the subject of positive institutional change underpinning the development of comparative advantages for the future.

Third, increasingly popular local content strategies and policies are industrial strategies and policies by another name, but often with a particularly narrow focus and without tracking whether these strategies and policies have actually resulted in positive institutional change that can sustain gains in productive knowledge and technologies over time.

Finally, the green industrial policy agenda has prompted observers to consider the impact of this agenda on the extractives-led development agenda. With the green industrial policy agenda focusing on the structural transformation of the largest and most industrialized countries and emerging market economies, low-income producers of extractive resources are cast in the role of passive takers of the consequences of these policies. Notably, the impacts vary across the energy and the minerals sector: the former is likely to see a greater shift towards renewables, while the latter, in addition to traditional mining, may see the strengthening of new forms of urban and flexible mining and the adoption of the concept of a more circular economy.

References

- Addison T., and A. Roe (forthcoming). *Extractives and Development*. Oxford: Oxford University Press.
- Aiginger, K. (2015). 'Industrial Policy for a Sustainable Growth Path'. In D. Bailey, K. Cowling, and P. Tomlinson (eds), *New Perspectives on Industrial Policy for a Modern Britain*. Oxford: Oxford University Press.
- Altenburg, T. (2011). 'Industrial Policy in Developing Countries'. Discussion Paper. Bonn: Deutsches Institute für Entwicklungspolitik.
- Amsden, A. (1989). *Asia's Next Giant: South Korea and Late Industrialization*. Oxford: Oxford University Press.
- Auty, R.M. (ed.) (2001). *Resource Abundance and Economic Development: UNU-WIDER Studies in Development Economics*. Oxford: Oxford University Press.
- Auty, R.M., and A.H. Gelb (2001). 'The Political Economy of Resource-Abundant States'. In R.M. Auty (ed.), *Resource Abundance and Economic Development: UNU-WIDER Studies in Development Economics*. Oxford: Oxford University Press.
- Bailey, D., K. Cowling, and P. Tomlinson (eds) (2015). *New Perspectives on Industrial Policy for a Modern Britain*. Oxford: Oxford University Press.
- Bridge, G. (2008). 'Global Production Networks and the Extractives Sector: Governing Resource-based Development'. *Journal of Economic Geography*, 8: 389–419.
- Chang, H.-J. (2007). *Institutional Change and Economic Development*. London: Anthem Press and UNU Press.
- Coase, R. (1960). 'The Problem of Social Costs'. *Journal of Law and Economics*, 3: 1–44.
- Congleton, R.D., A.L. Hillman, and K. Konrad (2008). 'Forty Years of Research on Rent Seeking: An Overview'. In R.D. Congleton, A.L. Hillman, and K. Konrad. *Forty Years of Research on Rent Seeking 1*. Berlin: Springer.

- Cristelli M., A. Tacchella, and L. Pietronero (2015). ‘The Heterogeneous Dynamics of Economic Complexity’. *PLoS ONE*, 10(2). Available at: <https://doi.org/10.1371/journal.pone.0117174> (accessed on 20 August 2017).
- Daintith, T. (2010). *Finders Keepers? How the Law of Capture Shaped the World Oil Industry*. London: RFF Press.
- Dietsche, E. (2013). ‘Sector Legal Frameworks and Resource Property Rights’. In R. Dannreuther and W. Ostrowski (eds), *Global Resources. Conflict and Cooperation*. Basingstoke: Palgrave MacMillan.
- Dietsche, E. (2017). ‘Political Economy and Governance’. UNU-WIDER Working Paper 2017/24. Helsinki: UNU-WIDER.
- Ding, H., P.G. Veit, A. Blackman, E. Gray, K. Reytar, J.C. Altamirano, and B. Hodgson (2016). *Climate Benefits, Tenure Costs. The Economic Case for Securing Indigenous Land Rights in the Amazon*. Washington, DC: World Resources Institute.
- Eichengreen, B. (2007). *The European Economy since 1945: Coordinated Capitalism and Beyond*. Princeton: Princeton University Press.
- Esteban, J., and J. Stiglitz (eds) (2013). *Industrial Policy Revolution I. The Role of Government beyond Ideology*. Basingstoke: Palgrave Macmillan.
- Felipe, J. (ed.) (2015). *Development and Modern Industrial Policy in Practice. Issues and Country Experiences*. Cheltenham: Edgar Elgar and Manila: Asian Development Bank.
- Felipe, J., and C.A. Hidalgo (2015). ‘Economic Diversification: Implications for Kazakhstan’. In J. Felipe (ed.), *Development and Modern Industrial Policy in Practice. Issues and Country Experiences*. Cheltenham: Edgar Elgar and Manila: Asian Development Bank.
- Fine, B., and E. Van Waeyenberge (2013). ‘A Paradigm Shift that Never Was: Justin Lin’s New Structural Economics’. *Competition and Change*, 17(4): 355–71.
- Fukuyama, F. (1992). *The End of History and the Last Man*. New York, NY: The Free Press.
- Greenwald, B., and J. Stiglitz (2014). *Creating a Learning Society: A New Approach to Growth, Development, and Social Progress*. New York, NY: Columbia University Press.
- Greenwald, B., and J.E. Stiglitz (2017). ‘The End of the Manufacturing Export-Led Growth Model and its Implications for Development Strategies’. Presentation at the IEA World Congress. 20 June, Mexico City. Available at: <https://www8.gsb.columbia.edu/faculty/jstiglitz/sites/jstiglitz/files/The%20End%20of%20the%20Manufacturing%20Export-Led%20Growth%20Model%20and%20its%20Implication.pdf> (accessed on 9 August 2017).
- Greif, A. (2006). *Institutions and the Path to the Modern Economy. Lessons from Medieval Trade*. Cambridge: Cambridge University Press.
- Guigale, M. (2013). ‘Can Governments Create Industries?’. Huffington Post (01.03.2013).
- Haggard, S. (2004). ‘Institutions and Growth in East Asia’. *Studies in Comparative International Development*, 38(4): 53–81.
- Hall, P., and D. Soskice (2001). *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- Hallegatte, S., M. Fay, and A. Vogt-Schilb (2013). ‘Green Industrial Policy. When and How?’. World Bank Policy Research Working Paper. No. 6677. Washington, DC: World Bank.
- Hardin, R. (1968). ‘The Tragedy of the Commons’. *Science*, 162: 1243–48.

- Hausmann, R., C.A. Hidalgo, S. Bustos, M. Coscia, and A. Simoes (2014). *The Atlas of Economic Complexity. Mapping Paths to Prosperity*. Cambridge, MA: MIT Press.
- Hidalgo, C.A., and R. Hausmann (2009). ‘The Building Blocks of Economic Complexity’. *Proceedings of the National Academy of Sciences of the United States of America*, 106(26): 10570–75.
- Hirschman, A. (1977). ‘A Generalized Linkage Approach to Development, with Special Reference to Staples’. In M. Nash (ed.), *Essays in Economic Development in Honor of Bert F. Hoselitz*. Chicago, IL: Chicago University Press.
- ICMM (International Council on Mining and Metals) (2011). *Mining: Partnerships for Development Toolkit*. London: International Council on Mining and Metals.
- IDB (Inter-American Development Bank) (2014). *Rethinking Productive Development: Sound Policies and Institutions for Economic Transformation. Series: Development in the Americas*. Basingstoke: Palgrave Macmillan.
- ILO/CEPEFOD (International Labour Office and European Centre for the Development of Vocational Training) (2011). *Skills for Green Jobs. A Global View*. Geneva: International Labour Office and European Centre for the Development of Vocational Training.
- Imbs, J., and R. Wacziarg (2003). ‘Stages of Economic Diversification’. *American Economic Review*, 93: 63–86.
- IPIECA (The Global Oil and Gas Industry Association for Environmental and Social Issues) (2016). *Local Content. A Guidance Document for the Oil and Gas Industry*. London: IPIECA. Available at: http://www.ipieca.org/media/1384/local_content_2016.pdf (accessed on 20 August 2017).
- Keller, M.R., and F. Block (2015). ‘Do As I Say, or As I Do? US Innovation and Industrial Policy Since the 1980s’. In J. Felipe (ed.), *Development and Modern Industrial Policy in Practice. Issues and Country Experiences*. Cheltenham: Edgar Elgar and Manila: Asian Development Bank.
- Khan, M. (2000). ‘Rent-seeking As a Process’. In M. Khan and K.S. Jomo (eds), *Rents, Rent-seeking and Economic Development. Theory and Evidence in Asia*. Cambridge: Cambridge University Press.
- Khan, M. (2015). ‘Industrial Policy Design and Implementation Challenges’. In J. Felipe (ed.), *Development and Modern Industrial Policy in Practice. Issues and Country Experiences*. Cheltenham: Edgar Elgar and Manila: Asian Development Bank.
- Khan M., and K. Jomo (eds) (2000). *Rents, Rent-Seeking and Economic Development: Theory and Evidence*. London: Cambridge University Press.
- Lahn, G., and S. Bradley (2016). ‘Left-Stranded? Extractives-Led Growth in a Carbon Constrained World’. Chatham House Research Paper. London: Chatham House/The Royal Institute of International Affairs.
- Lahn, G., and P. Stevens (2017). ‘The Curse of the One-size-fits-all Fix. Re-evaluating what we Know about Extractives and Economic Development’. WIDER Working Paper 2017/21. Helsinki: UNU-WIDER.
- Lange, M. (2005). ‘British Colonial State Legacies and Development Trajectories: A Statistical Analysis of Direct and Indirect Rule’. In M. Lange and D. Rueschmeyer (eds), *States and Development. Historical Antecedents of Stagnation and Advance*. Palgrave Macmillan.
- Lin, J. (2012). ‘From Flying Geese to Leading Dragons: New Opportunities and Strategies for Structural Transformation in Developing Countries’. *Global Policy*, 3(4): 397–409.

- Lin, J., and H.-J. Chang (2009). ‘DPR Debate—Should Industrial Policy in Developing Countries Conform to Comparative Advantage or Defy it? A Debate Between Justin Lin and Ha-Joon Chang’. *Development Policy Review*, 27(5): 483–502.
- Lütkenhorst, W., T. Altenburg, A. Pegels, and G. Vidican (2014). ‘Green Industrial Policy. Managing Transformation under Uncertainty’. DIE Discussion Paper. Bonn: Deutsches Institute für Entwicklungspolitik.
- McDonald, C. (2017). ‘The Role of Participation in Sustainable Community Development Programmes in the Extractives Industries’. WIDER Working Paper 2017/28. Helsinki: UNU-WIDER.
- McPhail, K. (2017). ‘Enhancing Sustainable Development from Oil, Gas, and Mining. From an “All of Government” Approach to Partnerships for Development’. WIDER Working Paper 2017/120. Helsinki: UNU-WIDER.
- Melia, E. (2015). ‘The Political Economy of Extractive Resources’. GIZ Working Paper. Eschborn: Gesellschaft für Internationale Zusammenarbeit.
- Mkandawire, T. (2012). ‘Institutional Monocropping and Monotasking in Africa’. In A. Noman, K. Botchwey, H. Stein, and J.E. Stiglitz (eds), *Good Growth and Governance in Africa. Rethinking Development Strategies*. Oxford: Oxford University Press.
- Mitchell, J., V. Marcel, and B. Mitchell (2015). ‘Oil and Gas Mismatches: Finance, Investment and Climate Policy’. Chatham House Report. London: Chatham House/The Royal Institute of International Affairs.
- Moran, T. (2015). ‘The Role of Industrial Policy as a Development Tool: New Evidence from the Globalization of Trade and Investment’. CGD Policy Paper 071. Washington, DC: Centre for Global Development.
- Newman, C., J. Page, J. Rand, A. Shimeles, M. Söderbom, and F. Tarp (2016). *Made in Africa. Learning to Compete in Industry*. Washington, DC: Brookings Institute Press.
- North, D. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- ODI (Overseas Development Institute) (2016). *Developing Export-based Manufacturing in Sub-Saharan Africa*. London: Overseas Development Institute.
- OECD (Organisation for Economic Cooperation and Development) (2015). *Policy Guidance on Resource Efficiency*. Paris: Organisation for Economic Cooperation and Development.
- OECD (Organisation for Economic Cooperation and Development) (2016). *Collaborative Strategies for In-country Shared Value Creation. Framework for Extractive Projects*. Paris: Organisation for Economic Cooperation and Development.
- Olson, M. (1965). *The Logic of Collective Action*. Cambridge, MA: Harvard University Press.
- Oqubay, A. (2015). *Made in Africa. Industrial Policy in Ethiopia*. Oxford: Oxford University Press.
- Östensson, O. (2017). ‘Local Content, Supply Chains, and Shared Infrastructure’. WIDER Working Paper 2017/96. Helsinki: UNU-WIDER.
- Ostrom, E. (2005). *Understanding Institutional Diversity*. Princeton and Oxford: Princeton University Press.
- Prebisch, R. (1950). *The Economic Development of Latin America and its Principal Problems*. Lake Success, NY: United Nations.

- Rodrik, D. (2007). 'Industrial Policy for the Twenty-first Century'. In D. Rodrik (ed.), *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*. Princeton, NJ: Princeton University Press.
- Rodrik, D. (2014). 'Green Industrial Policy'. *Oxford Review of Economic Policy*, 30(3): 469–91.
- Rodrik, D. (2016a). 'The Politics of Anger'. Project Syndicate. The World's Opinion Page. 9 March. Available at: <https://www.project-syndicate.org/commentary/the-politics-of-anger-by-dani-rodrik-2016-03> (accessed on 16 August 2017).
- Rodrik, D. (2016b). 'No Time for Trade Fundamentalism'. Project Syndicate. The World's Opinion Page. 14 October. Available at: <https://www.project-syndicate.org/commentary/protectionism-for-global-openness-by-dani-rodrik-2016-10?barrier=accessreg> (accessed on 16 August 2017).
- Rodrik, D. (2017). 'Too Late to Compensate Free Trade's Losers'. Project Syndicate. The World's Opinion Page. 11 April. Available at: <https://www.project-syndicate.org/commentary/free-trade-losers-compensation-too-late-by-dani-rodrik-2017-04?barrier=accessreg> (accessed on 16 August 2017).
- Roe, A., and J. Round (2017). 'Framework: The Channels for Indirect Impacts'. WIDER Working Paper 2017/79. Helsinki: UNU-WIDER.
- Salazar-Xirinachs, J.M., I. Nübler, and R. Kozul-Wright (2014). 'Transforming Economies. Making Industrial Policy Work for Growth, Jobs and Development'. Geneva: ILO and UNCTAD.
- Scott, A. (2008). *The Evolution of Resource Property Rights*. Oxford: Oxford University Press.
- Singh, A. (2011). 'Comparative Advantage, Industrial Policy and the World Bank: Back to First Principles'. Working Paper No. 418. Centre for Business Research. Cambridge: University of Cambridge.
- Smart, C. (2017). 'Industry by Design?'. Project Syndicate. The World's Opinion Page. 17 March. Available at: <https://www.project-syndicate.org/onpoint/industry-by-design-by-christopher-smart-2017-03> (accessed on 20 July 2017).
- Solimano, A., and D.C. Guajardo (2017). 'The Copper Sector, Fiscal Rules, and Stabilization Funds in Chile. Scope and Limits'. WIDER Working Paper 2017/53. Helsinki: UNU-WIDER.
- Stern, N. (2006). *Stern Review on the Economics of Climate Change*. London: HM Treasury.
- Stiglitz, J. (2015). 'Industrial Policy, Learning, and Development'. WIDER Working Paper 2015/149. Helsinki: UNU-WIDER.
- Stiglitz, J. (2017). 'How to Survive the Trump Era'. Project Syndicate. The World's Opinion Page. 20 February. Available at: <https://www.project-syndicate.org/commentary/surviving-the-trump-era-by-joseph-e--stiglitz-2017-02?barrier=accessreg> (accessed on 16 August 2017).
- Streeck, W., and K. Thelen (ed.) (2005). *Beyond Continuity. Institutional Change in Advanced Political Economies*. Oxford: University Press.
- Strom, S. (2017). 'The Political Economy of Industrialisation'. *Development and Change*. doi:10.1111/dech.12281 (accessed on 16 August 2017).
- Tacchella, A., M. Cristelli, M. Caldarelli, G. Gabrielli, and L. Pietronero (2012). 'A New Metrics for Countries' Fitness and Products' Complexity'. *Scientific Reports*, 2(723). doi:10.1038/srep00723 (accessed on 16 August 2017).
- Thelen, K. (2004). *How Institutions Evolve. The Political Economy of Skills in Germany, Britain, the United States, and Japan*. Cambridge: Cambridge University Press.

- Tomlinson, K. (2017). 'Oil and Gas Companies and the Management of Social and Environmental Impacts and Issues: the Evolution of the Industry's Approach'. WIDER Working Paper 2017/22. Helsinki: UNU-WIDER.
- UN (United Nations) (2015a). 'Transforming Our World: The 2030 Agenda for Sustainable Development. a/Res/70/1'. Resolution Adopted by the General Assembly on 25 September 2015. New York, NY: United Nations.
- UN (United Nations) (2015b). *Paris Agreement*. Paris: United Nations Framework Convention on Climate Change.
- UNU-WIDER (United Nations University World Institute for Development Economics Research) (n.d.). 'Extractives for Development (E4D)'. [online] Available at: <https://www.wider.unu.edu/project/extractives-development-e4d> (accessed on 9 August 2017).
- Wade, R. (1990). *Governing the Market: Economic Theory and the Role of Government in the East Asian Industrialization*. Princeton, NJ: Princeton University Press.
- Wade, R. (2010). 'After the Crisis: Industrial Policy and the Developmental State in Low-income Countries'. *Global Policy*, 1(2): 150–61.
- Wade, R. (2014). *Development Strategies in a Globalized World: Policymaking in an Evolved Framework of Global Governance*. Geneva: UNCTAD.
- Warwick, K., and A. Nolan (2015). *Evaluation of Industrial Policy: Methodological Issues and Policy Lessons*. Paris: OECD, Directorate for Science, Technology, Innovation, Committee on Industry, Innovation and Entrepreneurship. Available at: <http://dx.doi.org/10.1787/5jz181jh0j5k-en> (assessed on 17 August 2017).
- Whitfield, L. (2012). 'How Countries Become Rich and Reduce Poverty: A Review of Heterodox Explanations of Economic Development'. *Development Policy Review*, 30(3): 239–60.
- Whitfield, L., L. Buur, O. Therkildsen, and A. Mette Kjær (2015). *The Politics of African Industrial Policy. A Comparative Perspective*. Cambridge: Cambridge University Press.
- Williamson, O. (1985). *The Economic Institutions of Capitalism*. New York, NY: The Free Press.
- Williamson, O. (2000). 'The New Institutional Economics: Taking Stock, Looking Ahead'. *Journal of Economics Literature*, 38(3): 595–613.
- Williamson, O. (2008). 'Foreword'. In E. Brousseau, and J.-M. Glachant (eds), *New Institutional Economics. A Guidebook*. Cambridge: Cambridge University Press.
- World Bank (2017). *The Growing Role of Minerals and Metals for the Low Carbon Future*. Washington, DC: International Bank for Reconstruction and Development/The World Bank.
- Yalcintas, A. (2013). 'The Problem of Epistemic Cost: Why do Economists Not Change their Minds (About the "Coase Theorem")?'. *American Journal of Economics and Sociology*, 27(5): November.

Annex A

The assumption of zero transaction costs and the case for policy interventions

This annex provides a succinct summary of the case for industrial policy interventions in a world where transaction costs are assumed to be zero and ‘special cases’ are identified to warrant such interventions.

First to recall that for most of the second half of the 20th century, economic models and analyses of markets were built on the assumption of zero transaction costs. This assumption has been underpinned by the Coase (1960) theorem stating that, as long as there are no transaction costs, self-interest will guide people to establish political structures and property rights that maximize national wealth.

The adoption of this theorem allowed mainstream economists to neglect the role that institutions play in reducing transaction costs—lamentably contrary to the intentions of the theorem’s postulator, Ronald Coase. Economists simply assumed that people would automatically negotiate to achieve the economically most efficient institutions. In essence, the Coase theorem underpins the view that policy interventions in markets are only justified when clear cases of market failures can be identified.

The three ‘special cases’ justifying interventions hinge on particular goods and services plagued by either one, or both, of two unfortunate characteristics: *non-rivalry* and *non-excludability*. These two characteristics do not apply in a strictly binary fashion, but are better interpreted as lying on a spectrum ranging from ‘low’ to ‘high’. Table 1 (reproduced) shows the three cases. The fourth case in the bottom right-hand corner shows the ‘normal case’ of **private goods** to which the characteristics of *non-rivalry* and *non-excludability* do not apply and therefore markets are expected to automatically deliver these types of goods and services.

Table 1: Special cases of market failure

		Rivalry	
		Low	High
Excludability	Low	Public goods	Common pool resources
	High	Club goods	Private goods

Source: Author’s graph, based on standard economic theory.

Public goods are both *non-rival* and *non-excludable*. This means that one party’s consumption of such goods does not prevent another party’s consumption. At the same time, one party cannot exclude another party from consuming such goods. An example would be the ‘rule of law’ where one person’s protection of his/her rights is not negatively impacted by another person’s protection of the same rights. Another example is the air we breathe, where we cannot prevent others from using it, nor can we engage in physical rivalry over its consumption. Instead, we rely on a symbiotic relationship with the plant world to produce air for us.

Common pool resources are *rival*, but face the challenge of *how to enforce excludability*. Such resources include, for example, forests with their trees and wildlife; land with its biodiversity; and oceans, lakes, and rivers with their fish and other animal stocks and resources underground. Although humans can engage in physical rivalry over the use of these resources, it is more difficult

and costly to exclude others from using (or catching) these resources.

Club goods are *non-rivalry*, but are characterized by *high excludability*. This means that access can be limited, but those who have access are not negatively affected by fellow members of the club of users, as long as the number of club members is contained. An example would be a toll road, where users pay an entrance fees to use it, but once they are on the road, all users get to their destinations faster than if they were to use alternative routes. Club goods include *natural monopolies*, which are characterized by high barriers to entry, thus giving the largest (or first) supplier an overwhelming advantage over potential competitors. Natural monopolies typically include the infrastructure required to provide utilities, such as water, electricity, and transportation.

The case for policy interventions associated with each of these three types of goods is based on the following challenges:

A.1 Public goods—low rivalry and low excludability

Consumers are unlikely to pay for the production (or protection) of public goods, even if the availability of such goods is vital, if not critical, for society as a whole. Thus, some form of collective action is necessary to produce (or protect) such goods. The standard solution is to compel users to pay for the provision of public goods. For example, ‘rule of law’ is provided by a well-functioning political-administrative system funded with public revenue raised mainly from taxation. All beneficiaries (both persons and corporations) that reside within the borders of a sovereign territory are compelled to pay taxes in order to maintain such a system delivering and upholding this public good.

In the case of air, the challenge is to protect this public good from harmful pollution. Provided freely by the plant world, air should not be polluted with GHG emissions at a rate where the natural world is unable to recover from the human impact and the global ecosystem becomes negatively impacted. However, as this has in fact happened as a result of the fossil fuel-based industrial revolution, GHG-induced climate change has been referred to as the biggest market failure in the history of humanity (Stern 2006).

A possible solution is to compel polluters to pay for the negative externality they are causing. This would ensure the prices of the goods and services produced would reflect the cost of the pollution caused in the production process and the revenue generated could be used to reverse, or at least mitigate, the damage caused. But introducing such payments (e.g. in the form of carbon taxes) has proven to be a politically highly divisive suggestion. Climate change and GHGs are a huge collective action challenge that transcends the ability of individual countries to tackle it. Environmental economists have therefore sought another solution: by defining the imposition of emission controls limiting air pollution as a ‘public good’, they have worked hard to get countries to adopt a universal agreement to commit to containing GHG emissions.

A.2 Common pool resources—high rivalry, but low excludability

The problem with common pool resources is the risk of overuse beyond the natural rate of recovery. Because of low excludability each user looks after his/her own interest, irrespective of the aggregated social cost of overuse. At the same time, each user likes to believe that he/she is the only *free-rider* engaging in exploitation (or pollution).

One approach to solving the free-riding challenge has been credited to Russel Hardin, who in the 1960s suggested that common pool resources will always be overused unless ownership is reassigned, hence he coined the analogy of the ‘tragedy’ of the commons (Hardin 1968). He

proposed that the best solution against overuse and to maximize welfare would be to reassign such resources as private property. Containing the problem of low excludability, private owners would ensure that their long-term interests are served by limiting use in the short-term. As a second best solution, in case private ownership was not feasible, he proposed that such resources should be placed under state ownership, making it the state's responsibility to ensure that overuse could be contained.

Despite its influence in policy circles, Hardin's hierarchy of first, second, and least best solutions to managing common pool resources has been challenged. On the basis of her extensive empirical work on how common pool resources are actually managed, Elinor Ostrom (2005) has replaced the analogy of 'tragedy' with that of a 'drama'. Rebutting Hardin's conclusions, she highlighted that neither of the three forms of ownership is per se superior, because each can and has led to both good and bad outcomes.³³ Instead, she observed that in the real world outcomes are dependent on more complex sets of social norms and rules that condition whether common pool resources are managed sustainably. Common pool resources cannot per se be equated with the problem of 'open access', where excludability is extremely difficult. There are varying degrees of excludability and many examples where societies have developed institutions that have successfully addressed the free-riding problem and so ensured the sustainable use of communally owned resources.

The work of Ostrom and her collaborators has gained relevancy in the context of international climate policy, where measures to limit GHG emissions and mitigate their impacts focus not only on the concept of containing emissions as a 'public good', but also on common pool resources that turn CO₂ into oxygen and that store a large part of the CO₂ caused by human activities (i.e. forests and other plant habitat and oceans, lakes and rivers). Research by the World Resources Institute, for example, has suggested that more than half of the world's land resources continue to be held and managed by communities. This organization claims that, assured by formalizing communal property, ecosystem services provided by these communities could provide a much cheaper solution to reducing CO₂ emissions compared to other technical solutions, such as, for example, carbon capture and storage (Ding et al. 2016).

A.3 Club goods—high excludability, but low rivalry

Club goods pose the challenge that their supply falls short of potential demand and prices are higher than they would be if demand from all potential consumers were satisfied. In the case of natural monopolies, such as energy systems, the typical policy intervention is to make the provision of such goods the responsibility of public sector authorities, or at least for these to manage the provision of such goods to ensure demand is met and users are contributing to the costs of their maintenance and operation.

A.4 Summary

In the assumed world of zero transaction costs, the principle case for policy interventions derived for these three types of goods is based on identifying market failures associated with the characteristics of *non-rivalry* and *non-excludability*. Policy interventions are aimed at designing policies and establishing institutions that address these characteristics by different means, including, for example, internalizing the costs associated with negative externalities, making it compulsory to contribute to the provision of such goods, or by assigning property rights to re-shape these goods

³³ For this work, Elinor Ostrom was co-awarded the 2009 Nobel Prize in Economics.

to resemble the characteristics of private goods.

Although the theoretical case is well established for policy interventions in those particular industries where these characteristics prevail, in practice there is ample room for institutional variations. These are, not least, shaped by the geographical scale of respective goods and services. Quite obviously, most difficult is the provision of public goods at the global scale, such as emission controls, where no public authority can act on its own and where the development of appropriate institutions to deal with these characteristics is dependent on collaboration and cooperation across multiple levels. Meanwhile, at the national, regional, or local level an extensive range of different types of context-specific solutions can be feasible and appropriate for the same type of problem.

The choice of examples discussed above alerts to the fact that the production and use of extractive resources is heavily entangled in displaying the characteristics of non-rivalry and non-excludability. Thus, the markets associated with prospecting, producing, and trading extractive resources are contingent on how institutions have shaped these markets, not only over the past couple of decades but over the past centuries.³⁴

³⁴ Respective historical perspectives are presented in Scott (2008) and Daintith (2010).

Annex B

Revealing comparative advantages

The debate about whether a country should comply with or defy its comparative advantages prompts an empirical question: what actually are a country's *current* comparative advantages and, thus, the point of departure from which it can embark upon an industrial policy-driven journey of technical upgrading and diversification?

Simple arguments have focused on the three basic production factors that economic theory has relied upon since the times of Adam Smith and Karl Marx: whether a country is richly endowed with land, labour, and/or capital. But the world and the technologies that can be applied have moved on. New concepts and approaches have been developed alongside the ability to conduct data-intensive analytical assessments. In the context of the extractives-led development agenda, data-driven approaches provide some empirical insights into the extent to which producer countries are diversified (or not), and whether diversification has decreased or increased over time.

One of these approaches has been developed by César A. Hidalgo and Ricardo Hausmann and their colleagues at MIT. They have analysed an extensive amount of UN COMTRADE data to visualize the 'productive knowledge' of nearly 130 countries (Hidalgo and Hausmann 2009; Hausmann et al. 2014).³⁵ A country's productive knowledge is captured by the range of goods and services its economy can produce, both in terms of diversity and complexity. This is described as its 'product space', where respective groupings of goods and services are visualized in terms of their contribution to the national economy. The theory goes that the composition of a country's exports expresses its economic complexity and reflects the structures that have emerged to hold and combine productive knowledge. This knowledge can only be accumulated, transferred, and preserved if it is embedded in networks of individuals and organizations putting it into productive use. A powerful output of this approach is the visualization of economic diversity, not only across countries but also for individual countries over time.

Beyond visualizing current productive knowledge, this approach also strives to provide guidance on growth potentials. For example, Felipe and Hidalgo (2015) set out to guide hydrocarbon-rich Kazakhstan on its diversification ambitions, suggesting that the country should focus productivity-enhancing industrial policy interventions on products that require similar capabilities to those that the country already has, namely the 127 products that the country has successfully achieved to export.

A second approach, trading under the name of New Economic Metrics (NEM), has been developed in response and as a critique to the Hidalgo and Hausmann approach just described (Cristelli et al. 2015; Tacchella et al. 2012). This approach applies a different mathematical approach drawn in from complexity science, where the same is used to forecast the evolution of *dynamic* systems.³⁶ In contrast to the 'product space' approach, this approach aims to establish a country's comparative 'fitness', where fitness is conceptualized as a non-monetary metric that measures the

³⁵ As caveated in Hausmann et al. (2014: 25, Technical Box 2.2), reliance on international trade data is compromised in that this data does not capture what a country may be able to produce but is not exporting.

³⁶ For example, the same mathematical approach is typically applied to managing traffic systems and conducting weather forecasts. The authors contrast this approach against the static approach of Hidalgo and Hausmann.

intangible assets underpinning a country's competitiveness.

Looking at existing production networks and the complexity of productive capacity, this approach seeks to identify the associated intangible properties that underpin existing export structures. It compares countries' actual level of income with the expected level of income based on its level of fitness, in order to detect evolutionary trends across groups of countries clustering around specific regimes reflecting productive capacity. Using the same international trade data, the NEM approach also aims to provide evidence-based guidance on comparative advantages to help policy makers decide which sectors or activities to focus on to further diversify and expand a country's productive capacity.

In terms of applications, assessments have focused on a few OECD countries, but also a client-confidential assessment of the South African economy funded by Royal Dutch Shell. This study was conducted to help understand which sectors and activities might hold the greatest opportunities for sustainable economic diversification in the context of South Africa's relative reliance on extractive resources.

Irrespective of their differences, both approaches are set on laying open the productive knowledge and productive capacity that is embedded in the diversity and complexity of an economy but is not easily made visible. A phrase that is used to describe this challenge is 'tacit knowledge' and how much of it societies hold. In contrast to more easily measurable 'explicit knowledge', tacit knowledge takes a long and costly process to embed in people and organizations. It is for this very reason that people and organizations specialize in different occupations and specific functions. A major drawback remains, however, that both approaches cannot by themselves answer the question of why some countries have managed better than others to get their citizens and the organizations that employ them to specialize in producing a broader range of goods and services. It lies near to suggest that, at least in part, this has to do with their (idiosyncratic) institutional arrangements, including for example the width, depth, and quality of their respective skills development and training systems.

A further, complementary approach that gives insights into the challenges and opportunities of diversification is applied by economic geographers. They conduct *global network analyses* to research the interconnections between the producers of extractive resources and their upstream supply chains, as well as the consumers of these resources along the downstream supply chain up to so-called original equipment manufacturers. For example, Bridge (2008) has researched the relational production networks in the oil sector, documenting the organizational restructuring that has happened since the 1990s, and the increasing complexity and diversity of global sector interactions due to unbundling, outsourcing, and organizational rationalization.