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AFRICAN DEPARTMENT AND
INSTITUTE FOR CAPACITY DEVELOPMENT

Industrial Policy for Growth and Diversification

A Conceptual Framework

Prepared by an IMF team led by Reda Cherif, Fuad Hasanov, and Nikola Spatafora and comprising Rahul Giri, Dimitre Milkov, Saad Quayyum, Gonzalo Salinas, and Andrew Warner

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Executive Summary

As countries strive for a strong recovery and to recoup the losses incurred during the COVID-19 pandemic, they need to map out a new path for development and high and sustained growth. Promoting diversification, developing new industrial capabilities, and designing the policies needed to achieve this goal should be a priority. A successful diversification strategy should tackle both broad policy failures, such as an unfavorable business environment and investment climate and sector-specific market failures. This departmental paper presents a conceptual framework to analyze industrial policy, defined as targeted sectoral interventions. The authors first discuss the key principles that should guide policymakers, that is, a focus on the market failures that could justify targeted sectoral interventions, as well as the potential government failures that can undermine these interventions. The authors then discuss some commonly employed policy tools, their rationale, and the associated pitfalls. Finally, the authors outline a stylized decision-making framework.

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1. Introduction

Economic diversification is at the core of both structural transformation and development, and there is a need to shed new light on the policies required to achieve it. A rich literature shows that sustained growth, and the improvement in living standards it brings about, are associated with a process of economic diversification (IMF 2014). This is typically described as the transition from agriculture or mining toward a wider range of sectors, more sophisticated products, and higher-quality varieties of goods and services. Such diversification is driven by many factors, including infrastructure, education, fiscal and monetary policies, as well as technology and social development. These themes were central to the debate about development even before the COVID-19 pandemic. For example, diversification was long associated with lower output volatility, higher long-term growth prospects, and stronger job creation (IMF 2014). While the pandemic may have changed some of the parameters of the discussion, for instance as a result of bottlenecks in global value chains or the shrinking of fiscal space, diversification remains as important as ever (Cherif and Hasanov 2020). Indeed, the shortage of vaccines, tests, and medical goods has highlighted the vulnerabilities of countries lacking industrial capabilities (Box 1). Going forward, the challenges associated with climate change (IMF 2020) and rising automation require a renewed effort to promote diversification to achieve high and sustained growth.

A successful diversification strategy should tackle both broad policy failures and sector-specific market failures. The emergence of new, modern sectors hinges on the presence of effective government institutions, a favorable business environment and investment climate, and credible macroeconomic policies. Policy failures, which are not necessarily sector-specific, may include a burdensome regulatory framework, high tariffs on critical inputs, an overvalued exchange rate, inadequate infrastructure, or an insufficiently skilled workforce (Salinas 2021). Broad-based structural reforms to tackle these policy failures could support growth with potentially small costs (IMF 2019). However, market failures may also represent an important binding constraint to the development of specific sectors.

This departmental paper sets out a conceptual framework to analyze industrial policy, defined as targeted sectoral interventions. The authors start by discussing four key principles that should guide policymakers: first, focusing on the nature and magnitude of the market failures that could justify targeted sectoral interventions; second, subjecting such interventions to a cost-benefit test; third, analyzing potential government failures, stemming from weak governance or lack of administrative capacity, which can undermine these interventions; and fourth, considering how to mitigate the risks associated with weak governance. The authors then examine some commonly employed policy tools, their rationale, and the associated pitfalls. Finally, the authors outline a stylized decision-making framework for officials to determine how to best use these tools.

2. Guiding Principles: Market Failures versus Government Failures

Industrial policy is typically justified by the presence of sector-specific externalities, where the benefits of addressing them outweigh the costs and risks of the proposed intervention. For a targeted sectoral intervention to raise welfare, it must address an externality. In addition, the externality must not be amenable to resolution through neutral means, such as a better definition of property rights. The intervention must also pass a cost-benefit test, which considers alternative uses for public funds. Further, government failures must not undermine the case for the intervention.

A. Externalities and Sector Selection

Coordination failures and learning externalities imply that firms do not fully internalize the productivity gains from potential activities. New sectors need to achieve a critical scale and scope to be viable, and this may require coordinated action by different producers and suppliers (Murphy, Shleifer, and Vishny 1989). For instance, the development of a sector may require the presence of specialized intermediate goods, skills, or infrastructure, to lower the cost of final production. But if the sector is not already developed, the suppliers of such specialized inputs may lack the incentive to enter.¹ Similarly, knowledge spillovers may boost productivity in other firms in the sector, or in other sectors (Henderson 2007). As a corollary, policies that promote the formation of sectoral clusters may enable productivity gains, or “economies of agglomeration” (Rosenthal and Strange 2004).

Learning externalities may arise because firms do not know *ex ante* which products are most likely to succeed in a given environment. A firm entering a new sector will bear the risk of discovering its eventual cost structure and whether production is viable. If it succeeds, other firms will be able to follow in its footsteps and benefit. If it fails, it will bear the full cost of the experiment. Hence, uncoordinated actions may lead to sub-optimal entry and too little “self-discovery.”² Similarly, individual firms may find it costly or difficult to acquire information about potential buyers, especially in export markets (Atkin, Khandelwal, and Osman 2017). Again, a country’s firms may individually find it difficult to build reputation in new export markets, especially if potential buyers find it difficult to acquire information about product quality.

Such externalities create an argument for intervention, which may be strongest in the more modern, tradable sectors (Annex 1). Coordination failures and learning externalities are more likely in sectors that produce tradable goods and services, are characterized by high R&D intensity, and are relatively “sophisticated” (Cherif and Hasanov 2019b). In particular, manufacturing has long experienced high productivity growth; its productivity levels may exhibit convergence to the world frontier (Rodrik 2013); and it is often R&D intensive.³ In addition, “modern” services, such as transport and communications, financial intermediation, and business services, also exhibit increasing sophistication, tradability, scale, innovation, and learning-by-doing (Hallward-Driemeier and Nayyar 2017); the use of AI and blockchain technologies may further enhance productivity gains and spillovers in these activities. Some countries may be able to “leapfrog” from agriculture-led economies to such tech-driven services. That said, many of these services require relatively high skill levels, which are lacking in many developing economies. Modern agri-business activities, such as

¹ For instance, in the automotive and aerospace sectors (Cherif and Hasanov 2016).

² Hausmann and Rodrik (2003). For instance, this may be an issue in sectors such as electronics and machinery (Cherif and Hasanov 2019a).

³ Similar characteristics may apply to emerging industries such as clean tech (including renewable energy, electric vehicles, and batteries), robotics, and 3D printing.

salmon farming, may also be characterized by significant knowledge spillovers.⁴ At the same time, policy must recognize that the distribution of specific sectors across countries, or across regions within a country, will also reflect exogenous factors such as geography or the climate, for instance through their impact on transport costs, and access to inputs and markets.

In the short term, countries should not neglect “quick win” sectors, including traditional services, whose development may require less state intervention. Many developing countries’ initial comparative advantage lies far from the core of the product space, that is, where sophisticated manufacturing is located. It may be easier to diversify into products that are closer to their existing product space, for example agricultural processing and textiles, or relatively unsophisticated services such as tourism and call centers (see also Annex 1). These sectors could have the potential to employ a large number of workers and generate the resources needed to finance investment in advanced sectors. Given the nature of these sectors, the type of state intervention needed would be less extensive—mostly, resolving policy failures, bottlenecks, and regulatory hurdles. However, focusing solely on such sectors, and downplaying the role of technology and innovation, would not yield the type of structural transformation which generated rapid, inclusive growth, lifting millions out of poverty, in Asia and elsewhere (Aghion, Cherif, and Hasanov 2021).

B. Cost-Benefit Test

Any active policy should pass an appropriate cost-benefit test. Cost estimates should include not just the amount invested in a project, but also the administrative and efficiency costs associated with raising any required tax revenue, which will be especially high in developing countries (Besley and Persson 2014). On the benefit side, the social value of a project equals not its absolute value added, but the *difference* in value added between the project and the counterfactual projects which would have been carried out in the absence of any intervention. That is, one should consider how the labor and capital employed in the project would otherwise have been used—unless they would have remained unemployed. Benefit estimates should also include any potential spillovers, the scope for learning by doing, and the social value of any reduction in volatility achieved by shifting resources toward the project. Distributional and social implications should also be considered: will the project open opportunities for new firms and enhance labor-market participation, or will it mainly transfer funds from taxpayers to a few beneficiaries (Freund and Oliver 2016)? Cost-benefit analysis is often difficult in practice. Costs are generally easier to assess, while benefits are often uncertain and accrue in the future. Still, such analysis can provide a useful, first-approximation guide when ranking and undertaking various projects, as long as both risks and opportunities are appropriately weighted.⁵

The social rate of return to any active policy should exceed the best alternative return to the funds involved. One alternative use is to refrain from incurring the fiscal cost of implementing the proposed policy, instead returning the money to the taxpayers. Hence the present value of the project should be positive. In addition, it must be better than alternative uses of public funds, such as intervening in sectors characterized by greater spillovers.

Some externalities may be best resolved through the assignment of property rights, although this may require a high level of state capacity. Consider a classic coordination failure: a group of hotels in a potential tourism site would be profitable if restaurants and an access road were to be constructed, but in isolation none of the elements—the hotels, restaurants, or road—would be profitable. A theoretically costless solution is to auction the right to construct all three. The entity owning this right would internalize any coordination

⁴ See the discussion of Chile in Benavente (2016).

⁵ For instance, a risk-averse application of cost-benefit analysis would likely have argued against the Korean *Heavy and Chemical Industrialization* drive of the 1970s. Nevertheless, several recent empirical studies suggest that the industries receiving support, such as the automobile industry, did better than other sectors, continued to do well after the program ended, and generated positive spillovers to other industries (Choi and Levchenko 2021; Kim, Lee, and Shin 2021; and Lane 2021).

failures. However, this solution may create a monopoly, and may therefore presuppose the capacity for effective regulation and enforcement. Moreover, this solution may be less appropriate for sectors that require the coordination of a wide range of actors with specialized capabilities.

C. Government Failure: Incentives and Information

Government officials, including both political leaders and workers, are influenced by incentives, similar to private actors. Rent-seeking by sectors seeking assistance, corruption, and mercantilist pressures may lead to government capture by special interests and amplify distortions, especially in the weak institutional environment of low-income countries. *Legislators* have an incentive to direct government funds to their district, regardless of the social optimality of spending in that district. As a result, governments may alter programs to ensure that there are beneficiaries in the districts of key legislators. *Agencies* have an incentive to increase their influence within government, in competition with other agencies; *program administrators* are concerned with the stability of their jobs. Both may seek the continuation of government programs they run, regardless of their social contribution. *Citizens* must invest time and resources to understand whether government programs are effective. They will not always monitor legislators and agencies successfully or hold them accountable for ineffective programs.

As a result, governments may not implement optimal programs, or even the programs as originally conceived. For instance, the development of new Special Economic Zones (SEZs) may be used as an opportunity to appropriate land for real-estate development projects. More generally, the timing and structure of new programs may be driven by short-term electoral considerations; in some cases, governments may have an incentive to announce policies before elections to generate popular support, without necessarily following up with implementation. Likewise, governments may fail to implement an exit strategy, so that programs last beyond the originally intended duration—infant-industry protection is notoriously difficult to withdraw.

The informational requirements for evaluating interventions rigorously are high. Some of this information will never be obtained with any reasonable degree of accuracy. Indeed, incentive issues may cause governments not to evaluate or monitor programs transparently and effectively, since such information may put the programs in jeopardy. And, in turn, informational deficiencies will amplify the scope for distorted outcomes, including under-provision of public goods, and for unintended consequences.

D. Designing Policy to Mitigate Risks

Industrial policy should be designed not just to tackle the underlying market failures, but also to mitigate the risk of government failure, including through government capture. Several principles may help minimize this risk. First, demanding accountability for the support received, for instance by meeting specific performance targets such as export market shares, with a corresponding willingness to cut losses. Second, maintaining competition, including by supporting sectors rather than specific firms, and by focusing on export orientation. These were often key characteristics of the East Asian growth miracles, in sharp contrast with the import-substitution strategies pursued in other developing countries, where high tariffs led to monopolies and to an inability to innovate or compete internationally, even after decades of support. Third, using independent, appropriately qualified experts to select projects for public support (Tirole 2017). Fourth, complementing any interventions with reforms to control corruption. At the same time, too strict an accountability framework may paralyze the government into inaction—some risk cannot be avoided.

Some strategies may also help reduce informational uncertainty. First, since costs are easier to establish than benefits, governments should at a minimum analyze how much money is at risk if the uncertain benefits fail to materialize. Second, proposals can often be pre-screened with back-of-the-envelope calculations to establish whether they are likely to meet any cost-benefit standard. Third, existing and new interventions

should bear the burden of proving their merits; this gives those who stand to benefit from policies the incentive to generate data on their relative benefits. Relatedly, the private sector should be involved from the outset in the decision-making process. Fourth, governments should also invest in gathering information to assess the net benefit of programs, including by benchmarking costs against international standards, and assessing the benefits of past programs after their conclusion. Finally, policy proposals can often be piloted on a small scale to establish their feasibility, costs, and benefits, before being scaled up.

3. Policy Tools

The authors now provide a taxonomy of policy tools commonly employed to implement targeted sectoral interventions. The authors consider five categories of instruments: (1) product market, (2) capital market, (3) labor market, (4) land market, and (5) technology. The paper briefly discusses some of the risks they generate and the evidence on their effectiveness. The authors then consider each category separately; however, different policy instruments can complement or, conversely, offset each other. For instance, trade liberalization, combined with reforms to increase labor-market flexibility, can ease the reallocation of workers to more competitive sectors (McCaig and Pavcnik 2018, Goldberg and Pavcnik 2003). And these policy tools can be used for purposes beyond sectoral targeting, such as providing infrastructure, boosting participation in global value chains, or developing resilient production networks.

A. Product Market

Trade Policy

Import tariffs and nontariff barriers, including import quotas, local content requirements, and export subsidies are often justified on “infant-industry” arguments, to develop a sector that will eventually prove viable even without public support (Greenwald and Stiglitz 2006). The global trading regime currently restricts these instruments, and alternative tools should be carefully designed to ensure consistency with World Trade Organization (WTO) rules. Other measures currently being used to promote exports and/or encourage participation in global value chains include differential tax rates for profits from export sales, import-tariff rebates on imported intermediates, and credit lines for exports. Subsidies to foreign investors on the purchase of domestic inputs can achieve the same outcome as local content requirements.

Industry case studies find that, even when protection allowed domestic producers to grow and become competitive, it often led to net welfare losses (Harrison and Rodriguez-Clare 2010), even in the East Asian miracle economies (Ohashi 2005). What you protect seems to matter. Tariffs on capital and intermediate goods are especially likely to reduce growth (Estevadeordal and Taylor 2013), partly because such imports embody new technology. The protection of skill-intensive sectors is more likely to be associated with faster growth, at least in countries with good governance (Nunn and Trefler 2010).

Tax Incentives to Promote Investment

Tax holidays and exemptions, special corporate tax structures, targeted allowances, and subsidized infrastructure are sometimes justified as a second-best option when the economywide corporate income tax is relatively high. The emphasis is often on attracting foreign direct investment (FDI), which is viewed as generating particularly strong spillovers, including through improved technology and management techniques.

Tax incentives can significantly erode revenues without achieving offsetting benefits, unless they are properly designed and time-bound (IMF 2015, 2016; IMF and others 2015; Pack and Saggi 2006). Well-targeted incentives to reduce the cost of capital, including accelerated depreciation schemes, investment tax credits, and super deductions, have been used with some success in advanced economies. In contrast, open-ended and profit-based tax holidays are less effective and can erode the tax base indefinitely (Villela, Lemgruber, and Jorratt 2010, Cubeddu and others 2008). In East Asia, a significant export development was occurring while these incentives were in place; but Latin America and Africa applied similar incentives in most failed cases of export promotion. Tax incentives commonly used to attract FDI are often found to be largely ineffective, with their costs exceeding any spillovers. Other complementary inputs and policies need to be in place to both attract FDI and realize its full benefits: in particular, macroeconomic stability, a minimum level of human

capital, high-quality infrastructure, openness to trade, developed financial markets, non-stringent capital controls, and an attractive business environment, including strong property rights and efficient regulation (McIntyre 2017, James 2013). To ensure effective governance and transparency, tax incentives should always be governed by tax laws, with minimum scope for discretion by tax authorities or finance ministries. Also, beneficiaries of tax incentives should file returns even where no tax obligation exists; this approach will allow authorities to measure the cost of tax incentives and determine whether their objectives are being met.

The State as a Producer and Consumer

As producers, states often enter “strategic” sectors through state-owned enterprises (SOEs). Typically, these sectors have strong upstream or downstream linkages, but require large fixed-capital investments and a long time horizon; examples include water, electricity, and other types of infrastructure. As consumers, states can provide a stable source of adequate demand through public procurement agencies. For instance, recipients of government support may be required to source a portion of their production domestically. Public procurement can also be used to spur technological change by setting technical standards for the goods being procured.

The direct involvement of governments in production and consumption has often proven costly, with significant hidden subsidies, direct transfers, and overstaffing. This trend is largely owing to the often-conflicting objectives that SOEs try to achieve, political interference, and a lack of competition. SOEs also tend to crowd out private investment. However, SOEs can still generate positive human capital and R&D spillovers (for instance, the technological externalities from the development of Airbus). Getting the most out of SOEs requires clear mandates and strong governance rules to promote a high degree of transparency in their activities, appropriate incentives for their managers, and effective oversight and risk mitigation (IMF 2020b; World Bank 2014, 2015).

Measures to Reduce Informational Frictions

Informational gaps and asymmetries may be addressed more directly by promotion agencies that match buyers with suppliers. For instance, export promotion agencies may organize fairs, linkage programs, and other services such as quality certification schemes that facilitate domestic and foreign investments. Such measures are often referred to as “soft industrial policy.” Such schemes are particularly likely to boost exports where they provide a clear and effective one-stop shop, as opposed to multiple agencies that employ unclear mandates, involve significant coordination with the private sector, and promote increases in product quality or complexity (Lederman, Olarreaga, and Payton 2010, Cadot and others 2015).

B. Capital Market

Securing financing to enter new sectors is particularly difficult where the financial sector is underdeveloped or expected to comply with stringent prudential restrictions, so that financial intermediaries have short investment horizons or are very risk averse, and borrowers find it difficult to establish collateral. Various capital-market interventions have been justified on the grounds that governments may have longer investment horizons, or better information than private lenders on the riskiness of a particular investment. Also, given weak property rights, the public sector may have a better chance of having a loan repaid. Further, intervention may signal to private investors that the government has “skin in the game” and is committed to the reforms necessary for the industry to succeed. On the other hand, such interventions generate costs, whether direct or indirect, and they may crowd out other investment opportunities.

Directed and Direct Lending

Government can instruct commercial banks to allocate a proportion of their lending to a particular sector. The evidence on the impact of directed lending is mixed, but it can boost production when the targeted firms are severely credit constrained (Banerjee and Duflo 2014). However, it can also undermine financial sector profitability. Alternatively, the public sector may lend directly, often through specialized public sector development banks or export-import banks. This will increase the public sector borrowing requirement. If the credit is provided at interest rates below what a commercial bank would normally charge, then this support is akin to a subsidy which has a fiscal cost. The large-scale failures of development banks in the 1970s and 1980s meant that many were privatized or closed (Thorne and du Toit 2009). But a large number continue to operate in a wide range of economic sectors, including agriculture, infrastructure, international trade, housing, tourism, and energy, and new ones continue to be established in developing and advanced economies alike (Griffith-Jones and Ocampo 2019). They often face challenges including large nonperforming loans and the lack of a well-defined development mandate; sometimes, they compete with or crowd out private financial intermediaries (World Bank 2018).

Credit Guarantees

Governments may provide loan guarantees to support credit flows to firms from commercial banks or investors. The use of such schemes has expanded considerably in the wake of the COVID-19 pandemic (IMF 2020c). This intervention does not require the government to set up a specialized financial vehicle. However, such guarantees create a contingent liability for the public sector. The beneficiaries of the guarantee may also misuse the funds. Improper or imprudent use of loan guarantees can have significant adverse impact on public financial management and fiscal policy. Few rigorous evaluations of guarantee schemes have been undertaken (OECD 2017a). In general, it is difficult to identify schemes that resulted in appreciable increases in lending, and several have suffered significant losses (ADB 2016).

Venture Capital and Incubators

In advanced economies, venture capital and private equity firms play an important role in providing financing to start-ups. These financial firms are often missing in developing countries, especially in low-income countries. Public intervention can help develop this sector. Governments can also set up public bodies to play the role of venture capital firms. Related, governments are increasingly setting up or lending support to start-up incubators. These incubators can provide a range of services, such as capital, public land, and expertise, and often engage with public universities.⁶

C. Labor Market

Skills Development

Sectors may face a shortage of required skills. To close this skill gap, governments can grant tax credits or subsidies to firms, industry associations, and skill councils that provide training. Governments can also directly create vocational training institutions geared toward industry-specific skills, partially funded through payroll levies in the targeted sectors.⁷ The effectiveness of such measures depends on the degree of collaboration with the targeted sector in designing and delivering training, including apprenticeship in firms (see the discussion of Mexico's automotive cluster in Cherif and Hasanov 2016). Success may also require a more general strengthening of primary and secondary education.

⁶ India is setting up incubation centers across the country in partnership with Indian Institute of Technology. Bangladesh has launched a Connecting Start-up Initiative that provides various support to new ventures. The vast majority of advanced economies, through central or local government, help incubators in partnership with universities.

⁷ For instance, the Philippines are currently upgrading their workforce skills by expanding training programs, including through internships and apprenticeships, and investing in Information Technology and Business Management Process programs to develop skills in animation, data analytics, and cloud computing.

Labor Taxes

Governments can lower labor costs in favored sectors by selectively reducing payroll taxes. Alternatively, they may provide tax holidays or credits to investors based on employment creation. To meet OECD regulations these incentives need to be very limited in terms of the sectors targeted, but any specificity may violate WTO rules against export-targeted subsidies.

These selective tax reductions can be successful (Manelici and Pantea 2021) but may also simply provide windfalls to the favored sectors with limited impact on employment. To increase the chances of success, policy should impose minimal constraints on firms' operations and productivity, giving firms flexibility to adjust their business models. Avoiding overly stringent conditions on hiring (for instance, local labor-content requirements) has proved important in several successful cases. Also, subjecting tax reductions and credits to sunset clauses should help minimize the scope for abuse.

D. Land Market

Cheap Land

Governments can provide access to public land at below-market rates for a new activity. This may be a second-best response to land-tenure regulations that limit access to land for factories or impact the use of land as collateral. It may prove particularly attractive to foreign investors who find it challenging to negotiate the local land market. However, this response incurs an immediate fiscal cost. SOEs often receive preferential access to cheap land; a more neutral approach to land distribution could potentially enhance the effectiveness of industrial policy. In addition, well-defined land and property rights would provide necessary incentives to develop agribusiness.

Special Economic Zones

Special Economic Zones (SEZs) may provide firms with better infrastructure and public services, as well as corporate tax and import duty exemptions, more streamlined regulations, and other product market incentives (Farole and Akinci 2011). While some SEZs allow only foreign firms, others accommodate domestic firms. SEZs can be helpful where countrywide reforms face political economy constraints, and/or the government is unable to provide good-quality infrastructure and services throughout the economy (as is the case in many low-income countries). However, SEZs can reduce government incentives to implement more comprehensive reforms, such as trade liberalization or infrastructure upgrading (Leong 2013). SEZs can also have limited spillovers to the rest of the economy, depending on how they are designed and function in practice.

SEZs have a mixed track record (World Bank 2017). They appear to have promoted growth in countries such as China, Jordan, Korea, Malaysia, Mauritius, and Singapore (Wang 2013, Leong 2013). However, in many cases this reflected the trade liberalization associated with SEZs, rather than the proliferation of SEZs themselves. In other countries, particularly in sub-Saharan Africa, SEZs have not worked as well. Overall, the success of SEZs seems to require an integrated strategy comprising a conducive business environment within the zones, strategic locations, technology upgrading and skills training, and strong linkages with the local economy (Zeng 2015). Private-sector-led financing, development, and management will minimize fiscal risks and improve the likelihood of success.

E. Technology

R&D tax incentives and subsidies are typically justified based on the significant externalities from one firm's R&D on the productivity of other firms. They could prove particularly effective for export diversification, by reducing the risk involved in adopting foreign technologies and developing new export sectors (Hausmann

and others 2007). Governments also often engage in R&D themselves, provide direct funding for it,⁸ or set up public-private research consortia.⁹ Governments can support digitalization by providing important information and communications technology infrastructure, including strengthened cybersecurity; creating regulatory sandboxes to encourage experimentation; helping establish sector-specific digital platforms; and boosting the digital skills of the workforce.

Numerous studies indeed find a negative impact of taxes on firms' R&D.¹⁰ However, R&D subsidies can be expensive instruments (for instance, costing half of a percentage point of GDP in Korea in the 1980s; UNCTAD 2016). Further, returns to R&D are on average smaller in developing than in advanced economies (Goñi and Maloney 2017), since they depend on the level of human capital, which is critical to assimilate and apply technologies. All this suggests that R&D incentives in developing countries must be carefully designed to prove cost-effective. For instance, they should be complemented by investments in education and infrastructure to strengthen the capacity to absorb technologies from abroad (IMF 2016).

Technology-transfer instruments may improve the technology used by domestic firms. Removing restrictions on foreign productive investment in modern sectors is likely to prove helpful. But while FDI brings in foreign technology and managerial know-how, for developing countries it is also important that technology be eventually transferred to domestic firms. In this context, governments can help bridge information gaps between foreign firms and local subcontractors.¹¹ They can buy technology licenses for local producers or participate in patent pools to increase access to technology. In addition, they may help local firms master imported technology, for instance by setting up training institutes to help adapt technology to the targeted sector.

⁸ Many international firms made Singapore their regional R&D hub because of the high standard of research infrastructure facility developed with public funding (Weiss 2015).

⁹ For instance, to develop indigenous digital telephone technology in Korea and laptop computers in Taiwan Province of China (Weiss 2015).

¹⁰ Acheson and Malone (2016), Agrawal Rosell, and Simcoe (2014), Bournakis and Mallick (2018), Cappelen and others (2010), Czarnitzki, Hanel, and Rosa (2011), Dechezleprêtre and others (2016), and Gucerı and Liu (2019).

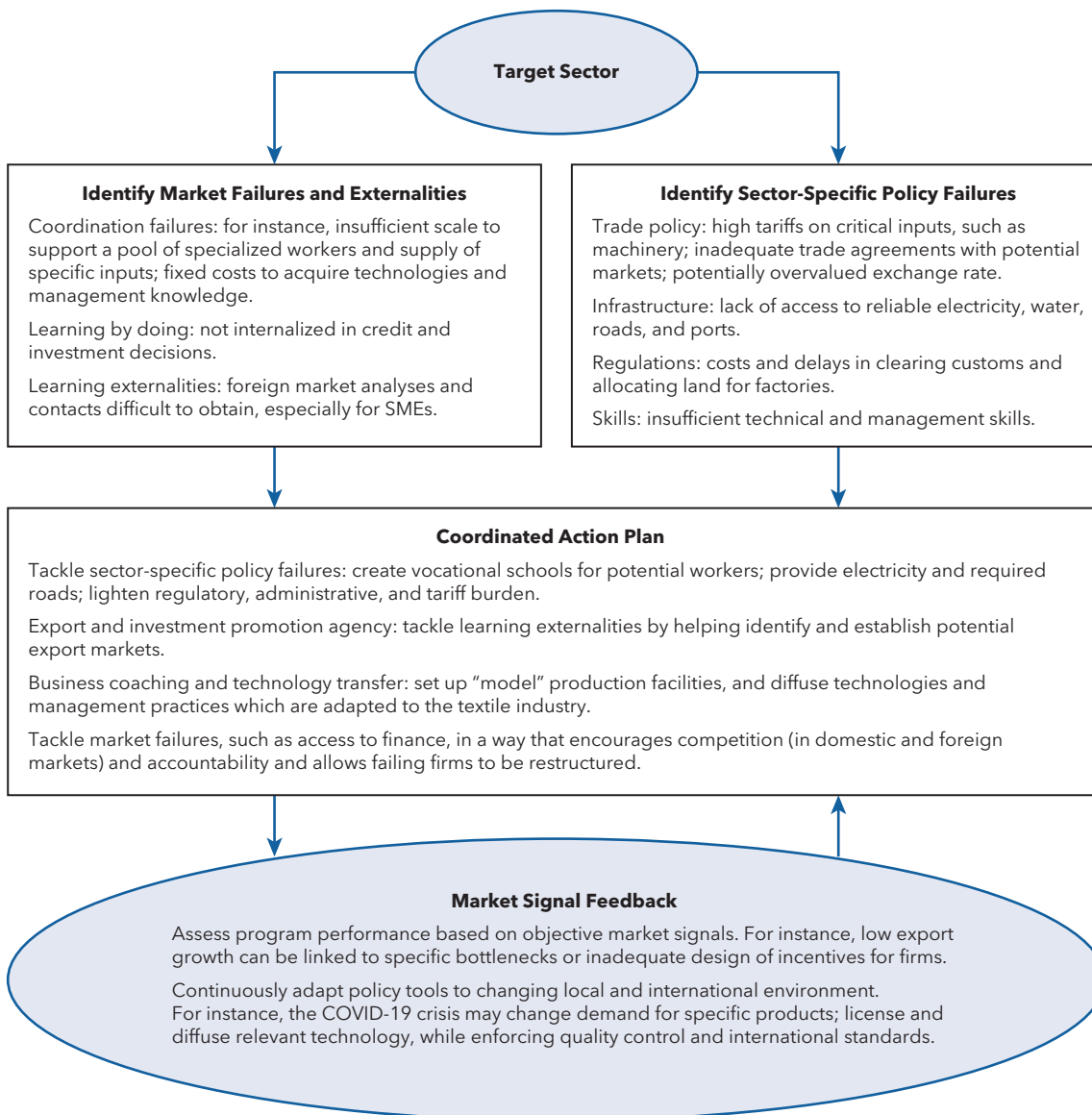
¹¹ In Malaysia, in the 1980s, the Penang Development Corporation brought together foreign investors and local subcontractors to help the electronics sector move to higher-skill activities and more complex products (Weiss 2015).

4. Decision-Making Framework

Governments differ in not only their available resources, but also their institutional capabilities, such as public development finance institutions. Further, political priorities and public sensitivities also differ across countries. A one-size-fits-all approach is therefore not possible. The authors suggest a decision-making framework to assist policymakers in choosing the policy tools that are the best fit for their circumstances and that are best suited to implementing a response. This framework involves addressing three key sets of questions:

- Targeting. *Which* sectors to assist, and why? That is, which sectors and activities are characterized by market failures with substantial social costs? What resources are available to address these market failures? What are the country's priorities?
- Implementation. *How* to assist sectors? That is, how much and what type of public support should be provided, in order to minimize government failures? How should the interventions be structured? How should they be monitored and evaluated? And how long should they last?
- Governance. *Who* decides which sectors to assist? In particular, how should the needs of individual sectors be determined, and by whom? How will the proposed governance structures mitigate the risk of government failure, and reduce informational uncertainty?

The authors illustrate schematically how implementation considerations could be used to help design and implement a sectoral action plan for a targeted sector which enjoys solid market prospects, but whose development is being constrained by market and policy failures (Figure 1). Once a sector is identified, all the relevant market and policy failures are assessed in detail. Next, the policy tools are articulated into an action plan, which coordinates the efforts of all stakeholders. Finally, program performance is assessed regularly based on objective market signals, and the policy tools are adapted to changes in the environment. As an example, the authors discuss how such a sectoral action plan could apply to the production of critical medical products in the context of the pandemic (Box 1).

Figure 1. Decision-Making Framework: Implementation Considerations

Source: Authors.

Box 1. A Sketch of Industrial Policy for Critical Medical Products

The severe shortages in critical medical products, including in several advanced economies, witnessed during the COVID-19 pandemic offer a vivid example of the challenges and constraints the market could face. The authors sketch state policies needed to ramp up the production of test kits as an example of critical medical goods (Cherif and Hasanov 2020). The strategy is based on the “True Industrial Policy” (TIP) principles of setting ambitious goals, building capabilities and adapting quickly, engaging the private sector, and providing necessary support while ensuring accountability (Cherif and Hasanov 2019b, 2019c). Many features of the strategy sketched below have been followed in advanced economies to some extent, albeit without the same focus and speed. And these features are barely applied in developing economies. The strategy can be summarized along the lines outlined above (see also Cherif and Hasanov 2020):

- **Targeting:** A clear and ambitious objective (for example, administering a scalable epidemiological test for 5–10 percent of the population every day, free and mandatory) is needed, with numerical targets (for instance, produce tests on the order of 5–10 percent of the population every day), deadlines (for example, by end-month) and an endgame (for instance, virus-free within weeks and relying on an early-warning system thereafter).
- **Implementation:** The state needs to set up a taskforce responsible for ramping up production, directly reporting to the high-level council in charge of applying the strategy and involving major actors across different government agencies and levels and the private sector, with regular meetings and communications to the public. Key agencies such as science, treasury, central bank, development bank, and others would be part of the council.
- **Governance:** The task force should have the authority to change incentives (through moral suasion, tax breaks, or financing) and enforce accountability (quality and quantity) for firms, once clear objectives have been agreed with them. The task force would run the operation and coordinate across firms, the value chain, and government agencies. Access to financing would be provided (for instance, via a development bank).

Dealing with all these challenges calls for collaboration among firms and policymakers to reduce coordination and informational frictions and gain speed. While the main mechanism of the market is competition, in crisis times there is a need to shift toward collaboration. Information-sharing among firms concerning production processes, technology, and resources would help combine efforts to solve common bottlenecks and learn from each other. It would particularly support new entrants in learning from incumbents. Setting up informal and fast information-sharing forums at different levels of the firm (for example, R&D personnel, engineers, and technicians), using industry associations and public-private industry alliances would contribute to knowledge flows, coordination, and collaboration.

Incentives could be put forward by the government to encourage collaboration. The SEMATECH alliance of US semiconductor companies in the 1980s is an example of the public-private industry alliance in support of the US semiconductor industry. Others have proposed a more direct intervention to create a “Pandemic Testing Board” that takes its name and function from the WWII war production board (Maier and Kumekawa 2020). Operation Warp Speed by the US government helped develop and manufacture vaccines in record time. Another approach could align with what the US Federal Reserve Board implemented during the 2008 financial crisis, using its crisis powers to coordinate banks and organizing bailouts and liquidity support. A high-level policymaking agency could take on a similar role in fighting the pandemic crisis.

Box 1. A Sketch of Industrial Policy for Critical Medical Products *(continued)*

To achieve success, incentives must be aligned, and accountability must be enforced. The objectives and accountability for all the relevant actors should be clearly set. The relevant agencies in charge of regulation and administrative issues (for instance, agencies regulating medical products) need to switch to an emergency mode operation. It should have the responsibility of not only doing quality control but also helping firms meet the needed requirements within the shortest time possible. It should also act as an information disseminator as to how to reach the quality standards. The same applies to the firms involved in the production chain of test kits. If the production target such as the number of tests kits, amounts of inputs needed, or specific infrastructure required, is clearly specified, incentives would be aligned, and accountability can be enforced. A mechanism to share the burden among firms, and potential incentive mechanisms to compete and collaborate (for example, prizes, tax breaks, or loan guarantees) could also be considered as the success of the firms involved would benefit the whole economy. A high-level government task force would coordinate the production orders and information flows.

In addition to production, the whole testing infrastructure needs to be planned out. Deploying tests en masse requires logistical support, potential quarantine facilities, and financial support for the quarantined and may face bottlenecks depending on the selected test technology. For example, if a test requires face-to-face interaction to collect samples, then enough protective gear should be made available for the testing centers. Enforcing the isolation of infected people in a quarantine would require similar planning. Similar to voting, testing a large part of the city or country's population daily can be achieved using the facilities and parking lots of schools and community centers, making the task manageable.

5. Conclusions

Arguments for industrial policy must establish both that some sector-specific externality exists and that the benefits of the proposed intervention will outweigh its costs and risks. Potential externalities include coordination failures, stemming from the presence of specialized inputs or skills, or from knowledge spillovers; and informational externalities, arising because firms do not know *ex ante* which products are most likely to succeed. The proposed intervention should represent the best feasible manner of tackling the externality. It must pass the appropriate cost-benefit test, which considers alternative uses for public funds, and any distributional and social implications. Further, the risk of government failure must not undermine the case for the intervention. This risk may be mitigated through an emphasis on maintaining competition, including by supporting sectors rather than specific firms, and by emphasizing trade openness.

Policy tools commonly employed to implement targeted sectoral interventions may focus on product markets, labor markets, capital markets, land markets, and/or technology. Many such schemes have not been rigorously evaluated. Some policies, such as targeted infrastructure, R&D subsidies, and support for start-up incubators, appear in many cases to have proved effective. Other interventions, such as trade-related measures, strategic investments by SOEs, and direct lending, carry high risks, including of promoting rent-seeking. In general, all schemes must be carefully designed to prove cost-effective. And they are more likely to succeed where governance and administrative capacity is strong, and when they are complemented by reforms to tackle underlying weaknesses.

In the race to address climate-change challenges, both advanced economies and developing countries must design, implement, and coordinate appropriate industrial policies. The negative externalities associated with carbon emissions represent a colossal market failure, affecting everyone across the globe. Carbon pricing, sectoral regulations, and financial-sector climate-risk assessments represent important tools to reduce emissions (IMF 2020). In parallel, large-scale state intervention is also required to both accelerate the transition from fossil fuels toward greener technologies and to help countries adapt to climate change: “tackling the problem in a coherent and effective way requires providing an analysis that identifies: the investments and innovations we need and the policies and finance that can draw through and support these investments and innovations” (Stern 2021). Electric vehicles and renewable energy can be competitive with equivalent “dirty” technologies and yet have not been widely adopted (Gates 2021, Mann 2021). These challenges demand an urgent call for policies to help spur, scale up, and adopt green technologies across a wide range of sectors, from energy generation to transportation and industry. Here, advanced economies have a double responsibility: they must go beyond merely adopting green technologies themselves; they must also assist developing countries in doing so.

Annex 1. Sector Selection¹

To create sustained growth to catch up and keep up with the frontier, the economy has to produce and export “sophisticated products,” that is, goods or services that are conducive to high productivity gains and spillovers to tradables. In addition to forward linkages, sophisticated industries have a high content of intermediate goods creating backward linkages in the production process. The spillovers and high linkages result in agglomeration effects and clusters feeding back into productivity gains. Linkages and spillovers, productivity gains, and agglomeration and clusters should support high sustained growth and employment.

One measure of sophistication is based on the industry’s R&D intensity (share of R&D spending in value added). Industries with high R&D intensity include computer/electronic/optical products, pharmaceuticals, transport equipment except for motor vehicles, information technology services, motor vehicles, electrical equipment, machinery and equipment, chemicals, and scientific, professional, and technical services (Annex Figure 1.1). Metals, furniture, and textiles (within manufacturing), as well as telecom, publishing, and finance/real estate (within services) have much lower R&D intensity. Interestingly, some industries that have high value-added per worker end up on a lower end of the R&D intensity spectrum (for instance, metal production, telecoms, and finance and real estate).

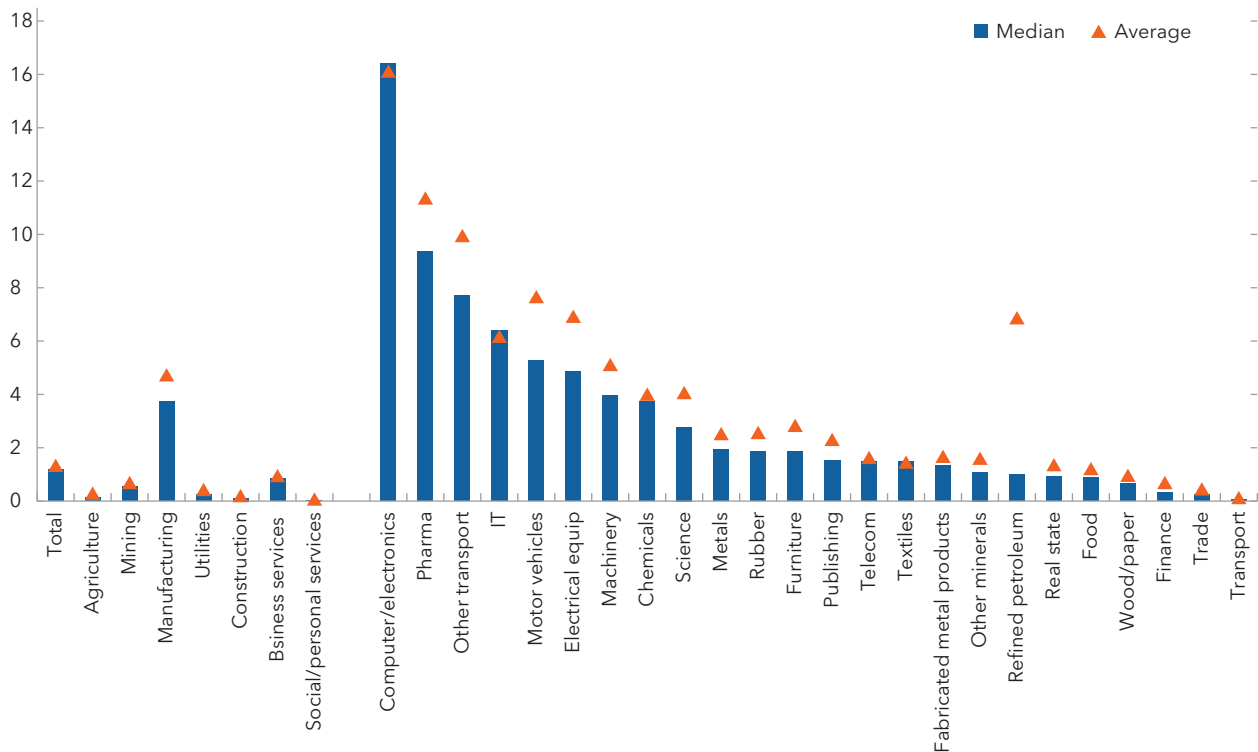
With the decline of manufacturing in developing countries and the acceleration of automation, a debate exists as to whether countries should still pursue manufacturing or leapfrog toward services. The discussion about the rise of services is mostly centered on “modern” services. Two types of services—transport and communications (land, water, and air transport; postal services and telecommunications) and financial intermediation (insurance and pensions and real estate) and business services (rentals of machinery and equipment, software and data processing, R&D, and professional services)—tend to exhibit labor productivity growth similar to or higher than that of manufacturing (IMF 2018).

However, it is not clear-cut that “modern” services would be sufficient for sustained growth and employment generation. Most of the services included in transport and communications, financial intermediation, and business services would not be considered “sophisticated” according to the measure of sophistication based on R&D intensity (Cherif and Hasanov 2019c). Only scientific, R&D, and professional services would fall into this category. Other service categories such as financial intermediation may require high skills, which are lacking in many developing economies, and pay high wages but may not support employment on a large scale. India and the Philippines are among the countries that managed to achieve scalability and tradability in telecommunications and information technology services, including call centers. In the Philippines, business process outsourcing employs more than a million people, accounts for about 8 percent of GDP and brings in huge export earnings. These types of industries could constitute “quick wins” although they are insufficient as a long-term growth strategy.

Other services such as tourism are also “quick wins” but do not qualify as key to long-term growth. These industries may generate some export earnings, growth, and employment. But specialization in tourism yields limited growth benefits (Arezki, Cherif, and Piotrowski 2009). An increase in the tourism sector share of exports by 8 percent (one standard deviation in a sample of more than 80 countries during 1980–90) increases growth by only ½ percentage point a year. Tourism comprises low productivity activities such as trade and hotels/restaurants. Even in small open economies with a focus on service exports, the generated export earnings typically remain limited.

¹ Annex 1 is based on Cherif and Hasanov (2019b, 2019c).

Annex Figure 1.1. R&D Intensity, OECD (2015)
(Percent of GDP)



Source: OECD (2017b).

Business services—which are sophisticated services—could support productivity growth and employment, and in fact, are mostly related to manufacturing industries. This phenomenon is described as the “servicification” of manufacturing. The value-added of services in manufacturing gross output increased by about 6 percentage points between 1995 and 2011, accounting for about one-third of gross manufacturing output in a median country in 2011 (IMF 2018). Although services account for a larger share of manufacturing output now than before, it is not a significant share yet (although for some countries it is larger than 50 percent). Alternatively, knowledge-intensive business services seem to have sprung up in disappearing manufacturing clusters (Cermeño 2018, 2019). And these knowledge hubs were originally related to the proximity to manufacturing clusters (Marshall 1880, Hall 1902).

Manufacturing could continue to be an important driver of sustained growth. Based on Cohen and DeLong (2016), who studied Alexander Hamilton (one of the early architects of industrial policy) and his approach to trigger the US catch-up with the technological frontier, DeLong has emphasized that manufacturing creates engineering communities of technological competence that help spread knowledge, generate spillovers, and sustain productivity growth. Rodrik (2016) argues that since high sustained growth in early industrializers has been driven by manufacturing—a technologically dynamic sector—developing countries today could miss out on this opportunity to industrialize and sustain growth. None of the growth episodes in developing countries in the past couple of decades has been driven by the type of rapid industrialization observed in East Asian countries, casting doubt on the sustainability of recent growth experiences in Latin America and Africa (Diao, McMillan, and Rodrik 2017).

Using comparative advantage indicators such as revealed comparative advantage (RCA) as a basis to predict future successful industries could be problematic. The evolution of the car industry in Korea provides a good illustration. In 1970, the nascent automotive industry was insignificant in terms of exports (or RCA).

According to this measure, it would have been deemed too complex for the capabilities of the time. By 1990, it represented 2.6 percent of exports but with an RCA of 0.6 or less than one, it would still not qualify as a comparative advantage industry. A decade later, cars represented more than 6 percent of exports and showed a revealed comparative advantage (RCA greater than one). It took more than three decades to build a “comparative advantage” that did not exist initially. One could observe a similar evolution in electronics in Korea and Taiwan Province of China starting in the 1960s.

Based on the experience of the Asian miracles, a comprehensive strategy should take simultaneously different approaches in different sectors, fully benefiting from current comparative advantage while at the same time building the expertise for tomorrow’s leading industries. Assume that a developing economy has some sectors in which its factor endowments or its experience provide a clear comparative advantage (say, fertile land for agriculture, cheap labor for low-skilled manufacturing such as textiles, beautiful beaches for tourism, or other natural resources). For a typical developing economy, these are sectors of low sophistication and limited spillovers. Given the country’s comparative advantage, these industries should not require any significant sectoral state intervention: they will flourish provided that major government failures are tackled and public goods are provided. In other words, the focus should be on “horizontal policies” (including transportation for agricultural products, electricity for textile factories, and safety and airports for tourists). Here, the state should act as a facilitator, and results should materialize relatively quickly in the form of export revenue and employment. In such sectors, the state should avoid an active risk-taking role through tools such as subsidies, state-owned enterprises, or directed/guaranteed credit. There are two rationales for this approach. If these sectors truly enjoy a comparative advantage, then an active role of the state will only discourage competition and create opportunities for cronyism and inefficiencies. Moreover, there may be a large opportunity cost of state intervention in low-skill, low-spillover, and low-productivity-gain sectors (such as tourism), as opposed to intervention in high-skill, high-spillover, and high-productivity-gain sectors.

In parallel, the authors assume there are sectors for which the standard analysis would not reveal a comparative advantage. Notable examples of such sectors in the 1960s and 1970s would be the automotive industry in Korea, the semiconductor industry in Taiwan Province of China, and the aircraft industry in Brazil (Embraer), all of which turned out to be major commercial successes and large employers and represent a significant share of these economies’ exports. These sectors could also include backward linkages with existing sectors. For instance, Norway used very aggressive policies to spur the growth of its oil service industry in the 1970s and until the mid-1990s, the result of which was the emergence of a high-tech and successful oil service cluster that had not existed before. These policies included the interference in tenders by oil companies to the benefit of local firms and laws requiring oil companies to perform one-half of their R&D in Norway. The common features among the policies pursued to develop these sectors in these countries included an appetite for risk-taking, an emphasis on technological development, and encouragement of competition in domestic and international markets. More important, these policies were pursued relentlessly over decades. Lastly, in addition to correcting market and government failures to encourage firms to enter these sectors, industry and market studies would be needed to assess the potential of the market, product value chains and market niches, and what the local economy can contribute to this market.

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