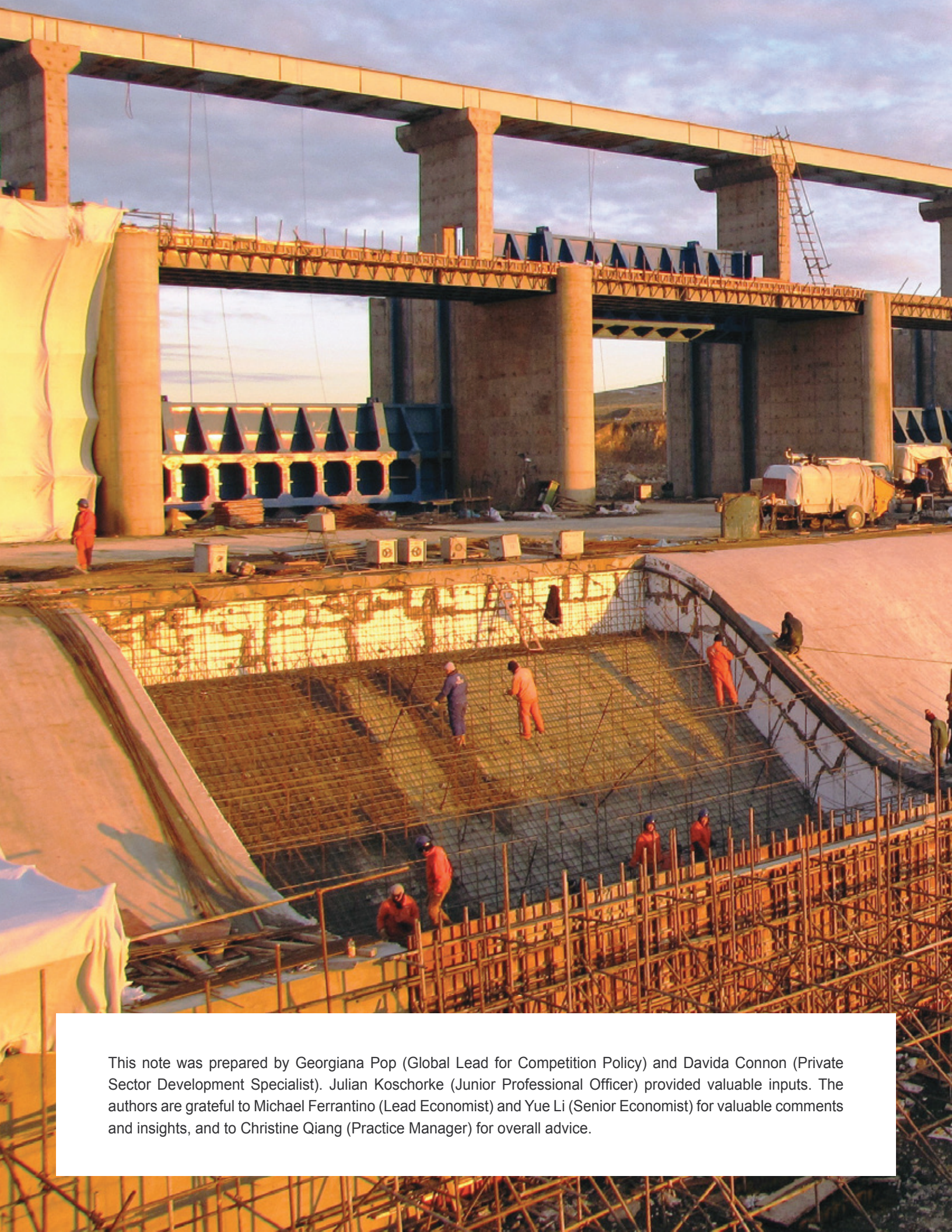TRADE, INVESTMENT AND COMPETITIVENESS

**EQUITABLE GROWTH, FINANCE & INSTITUTIONS INSIGHT**

# Industrial Policy Effects and the Case for Competition

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# ABSTRACT

## Competition policy and industrial policy—not mutually exclusive

_It is conventional wisdom that industrial policies can be at odds with competitive markets. This note examines the historical basis for industrial policy and empirical effects. Although the direct effects of industrial policy are mixed, the indirect effects often involve market distortions. By contrast, the literature is broadly united on the benefits of competition for productivity and innovation. This review finds that the most successful industrial policies reinforce competition, suggesting that competition policy and certain types of industrial policy can be crafted as complements._

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## >>>
# Introduction

Competition is a key driver of growth and innovation. At the same time, conventional wisdom—and the weight of the evidence—often suggests that competition policy and industrial policy are conflicting alternates (figure 1). Competition policies aim to foster competition between market players on a level playing field. There, all market players face the same set of rules and entry opportunities, thus reducing the risks of the anticompetitive effects associated with monopolies and dominance. By contrast, industrial policy actively alters those rules through targeted support measures, policy or regulatory protection of incumbents from competition, preferential treatment, and direct government intervention in favor of certain industries and firms. One of the most common forms of industrial policy, subsidies, can distort competition by affecting firms' entry and exit decisions, especially in highly concentrated markets. Subsidies also distort competition by affecting pricing and production decisions, and companies may make different decisions about the level of spending on research and development (see OFT 2004). Tariffs and other trade policy instruments are vulnerable to similar criticism, with the evidence broadly showing that trade-restrictive measures reduce market competition and subsequently have negative effects on productivity or result in higher price-cost margins for protected firms—see, for example, Dutz (1991) on Morocco; Harrison (1994) on Côte d'Ivoire; Krishna and Mitra (1998) and Khandelwal and Topalova (2011) on India; and Levinsohn (1993) on Turkey.

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**F I G U R E  1  - Industrial policy tools versus competition policy**



**Industrial Policy**
· Subsidies / tax breaks / loans
· Trade policy
· State-owned enterprises
· Preferential public procurement

PRODUCTIVITY, INNOVATION, AND ECONOMIC GROWTH

**Competition Policy**
· Opening markets and removing anticompetitive regulation
· Promoting a level playing field
· Ensuring effective competition law enforcement

*Source: World Bank.*

Meanwhile, the empirical record consistently shows that competition and open markets have a positive effect on sustainable economic growth by driving investment and improving private sector dynamism. Competition fosters cost reductions, innovation, and productivity growth (Acemoglu, Antràs, and Helpman 2007; Aghion and Griffith 2008). Two mechanisms contribute to this result: first, competition shifts market share toward more efficient producers, and, second, competition induces firms to become more efficient in order to survive (Kitzmuller and Licetti 2013).

In practice, competition policy focuses on three main areas: (1) the promotion of pro-competitive regulations and government interventions to enable contestability, firm entry, and rivalry; (2) competitive neutrality and nondistortive public aid support; and (3) the enforcement of antitrust laws (typically rules against abuse of dominance and anticompetitive agreements, as well as merger control) (World Bank 2017). The main objective of enhanced competition is to generate the right incentives for firms to improve their economic performance relative to their actual and potential rivals and in so doing deliver the best outcomes for consumers and the economy as a whole. It is not to increase the number of firms in a market or to eliminate market power to achieve a theoretical state of perfect competition.

In competitive environments, investment is higher (Alesina et al. 2005), and it leads to employment gains, faster economic growth, and improvements in overall welfare. The benefits of competition for firm productivity and innovation are widely accepted (see, for example, Aiginger 1997; Bouis and Duval 2011; Bourlès et al. 2010; Commander and Svejnar 2011; Conway et al. 2006; Nicoletti and Scarpetta 2005; Porter 1990). Accordingly, the positive effects of competition policy enforcement on productivity growth are well documented (Buccirossi et al. 2013; Voigt 2009). Strong enforcement has been shown to reduce the negative economic effects of anticompetitive behavior such as cartels (Alexander 1994; Symeonidis 2008), and competition laws may have an indirect effect on domestic competition by promoting entry (Kee and Hoekman 2006). Evidence also points to the positive impacts on overall productivity of competition and the efficient allocation of inputs and outputs across businesses (Eslava et al. 2004).

Greater competition in domestic markets can also enhance the ability of firms to compete in international markets (Goodwin and Pierola 2015). Firms typically acquire many of their inputs—transport, energy, telecommunications, and financial services—in local markets. If those upstream markets lack competition, prices may be higher, raising costs for downstream firms and making them less competitive in international markets. Meanwhile, competition increases the variety and quality of goods and services, and it can lead to lower consumer prices (Edmond, Midrigan, and Yi Xu 2011; Igami 2015; Treichel et al. 2012).

Notwithstanding the observed benefits of competition, it is not a panacea and will not always lead to optimal market outcomes. Competition policy, too, faces challenges, and market imperfections and failures may warrant government intervention (Aghion, Boulanger, and Cohen 2011). For example, if the market is left alone to deal with pollution and environmental damage, it produces less clean production and less clean innovation than would be needed to mitigate negative externalities from climate change and global warming. According to Aghion, Dechezleprêtre, et al. (2010), firms with a history of "dirty production" continue to create "dirty innovation," whereas the opposite is true for companies with a history of clean innovation. This finding suggests that there is a path dependency in innovation. Combined with a history of "dirty" technologies, this path dependency implies that markets produce socially suboptimal levels of clean innovation. Acemoglu et al. (2012) argue that the best way to direct research in this area is to combine economy-wide measures, such as carbon trading or carbon taxes aimed at reducing pollution, with more targeted or sector-specific measures, such as clean innovation subsidies. According to the analysis, adopting only economy-wide measures would produce inferior results and be excessively distortionary.

This note focuses on the intersection between competition and industrial policy. Both seek to improve productivity and innovation, thereby contributing to economic growth. However, both face shortcomings in certain contexts. Although the bulk of the evidence examined in the following sections suggests that industrial policy fails on many counts, in some circumstances it can effectively address market failures or imperfections in competitive markets.

From this perspective, this note explores the empirical evidence on the direct and indirect effects of industrial policy interventions, and it considers whether industrial policy can be designed in a manner compatible with market competition and supportive of its benefits. Section 2 examines the evolution of industrial policy and explains the most common criticisms. Section 3 reviews the empirical evidence on the direct and indirect effects of the most prominent industrial policy instruments, seeking to identify instances in which competition-friendly industrial policy produces positive market effects. With such a review, one is better equipped to understand when industrial policy tools create the fewest distortions and how they can be better designed to counteract market failures while minimizing distortions to markets. Section 4 reviews evidence on competition-friendly industrial policy, and section 5 offers some conclusions.

# >>> Industrial policy: Contours and critics

    Industrial policy is generally categorized one of two ways: that which is economy-wide, cross-cutting, or horizontal, and that which is targeted at the sector or firm level. Whereas the former generally benefits the wider economy or the business environment, the latter is aimed at improving the performance of specific industries or firms. Table 1 compares these two types of industrial policy in different market contexts (Crafts and Hughes 2014, 4).

**T A B L E  1 - Examples of horizontal versus selective industrial policy instruments by policy objective**

| | HORIZONTAL | SELECTIVE |
|---|---|---|
| **PRODUCT MARKET** | Competition policy | National champions |
| | Indirect tax | Nationalization/privatization |
| | Product market regulation | State aid |
| | Exchange rate policy | Trade policy |
| | | Public procurement |
| **LABOR AND SKILLS** | Education policies | Targeted skills policy |
| | Training subsidies | Apprenticeship policies |
| | Wage subsidies | |
| | Labor market regulation | |
| | Employment taxes | |
| **CAPITAL MARKET** | Corporate tax policy | State investment bank |
| | Financial market regulation | Strategic investment fund |
| | | Emergency loans |
| **LAND** | Land use planning rules | Place-based clusters policy |
| | Infrastructure policy | Enterprise zones |
| **TECHNOLOGY** | R&D tax credit | Public procurement |
| | Science budget | Patent box |
| | Intellectual property rights regime | Selective technology funding |

*Source: Crafts and Hughes 2014.*

Historically, the most popular industrial policy tools were targeted at the sector or firm level, used to create national champions and protect infant industries. In postwar Europe, for example, industrial policy was highly targeted and interventionist—that is, it was closely linked to the support of specific industries and industrial sectors and their isolation from international markets (Pack 2010). In the 1970s, an increasingly cross-cutting approach emerged, focusing more on measures to shape the business environment for all enterprises in a nondiscriminatory manner (Bianchi and Labory 2006; Uvalic 2014). Because such policies are theoretically designed in a competitively neutral way, they should have no (or very little) impact on market competition (Välilä 2006). In practice, a policy subsidizing research and development (R&D) might benefit research-intensive industries more than others (Crafts and Hughes 2014), but it is not intended to give an advantage to certain enterprises or sectors over others. Indeed, Crafts and Hughes (2014) argue that competition policy is a form of "horizontal" industrial policy, while Labory (2006) classifies competition policy as a distinct pillar of industrial policy, separate from both horizontal and more targeted measures.

Country experiences show that, in practice, industrial policy encompasses a range of active government interventions in the economy and the creation of open, competitive markets. For example, China, Japan, the Republic of Korea, and Taiwan, China, among others, have all employed policies that are often described as industrial policy, but that vary widely upon closer analysis. Japan, for example, was often perceived during the late twentieth century as employing economic institutions that favored collaboration over competition. Despite this, according to Porter and Sakakibara (2004, 28), "in the internationally successful industries, internal competition in Japan was invariably fierce." Korea's chaebols (large business conglomerates) have been fostered and supported since the 1960s, often selected based on international success and granted various subsidies and protections. However, the same companies have been expected to compete openly on export markets (Lall 1994).

China, arguably responsible for the reemergence of the industrial policy debate globally (Aghion, Boulanger, and Cohen 2011), has settled on a mix of classically interventionist

industrial policies and market competition, while relying heavily on state-owned enterprises, or SOEs (Xiaojuan 2002). Indeed, research by Noland and Pack (2003) suggests that industrial policy alone in China was not responsible for an increase in the overall productivity of firms. Similarly, Taiwan, China, actively supports sectors such as cotton textiles, plastics, and automobiles, but has employed a policy blend that does not fully conform with classical notions of industrial policy (Wade 1990). In the United States, although the government is a champion of antitrust laws and competitive markets, industrial policy is still apparent through exemptions for certain entities from antitrust laws, through trade protection measures, agricultural subsidies, and procurement policies, as well as actions at the state level (White 2008).

Because of the diverse range of industrial policy tools and attitudes toward industrial policy, ultimately "there is no universal definition of industrial policy and definitions range from restrictive to broad" (Bianchi and Labory 2006, 604). Nonetheless, definitions converge around the notion that the purpose of government interventions in the economy is to enhance economic growth and performance through the productivity, innovation, and overall competitiveness either of entire sectors or of specific companies and industries. For example:

- **Wade (1990, 13):** "Industrial policy aims to direct resources into selected industries so as to give producers in those industries a competitive advantage."
- **World Bank (1993, 304):** Industrial policy is "government efforts to alter industrial structure to promote productivity-based growth."
- **Foreman-Peck and Federico (1999, 3):** Industrial policy is "every form of state intervention that affects industry as a distinct part of the economy."
- **Chang (2003, 112):** Industrial policy is "aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole."
- **Soete (2007, 273):** Industrial policies are "structural policies designed to strengthen the efficiency, scale and international competitiveness of domestic industrial sectors," while conceding that this "typically contains an element of national champions, of self-reliance in bringing about growth and development."
- **Warwick (2013, 16):** "Industrial policy is any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity towards sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of any such intervention."

Despite the wide variety of measures that can be categorized as "industrial policy," it is often criticized based on a state's (lack of) capacity and political economy concerns. These concerns relate primarily to sector- or firm-specific measures. For example, it is argued that the state is poorly placed to assess the possible economic success of different enterprises or sectors over others. And even if the government does choose correctly, industrial policy risks inducing rent-seeking or capture. Ades and Di Tella (1997), employing a sample of 32 mainly member countries of the Organisation for Economic Co-operation and Development (OECD), find evidence suggesting that corruption is indeed higher in countries pursuing active industrial policies. For example, through the 1980s and 1990s the Korea Fair Trade Commission tried to curb anticompetitive practices by the country's chaebols, but it failed because of the connections that existed between those companies and the Korean government (Noland 2000).

Tariffs, under the guise of industrial policy, frequently serve to protect special interest groups with political ties strong enough to be sheltered by government-sponsored protective measures. Indeed, Goldberg and Maggi (1999) demonstrate that trade protection is in fact often for sale. Studying the pattern of trade protection in the United States in 1983, they find that the lobbying contributions of industry corresponded with levels of protection and relevant import barriers, although the government continued to be welfare-maximizing in its decisions to exchange protection for financial contributions. Gawande, Krishna, and Olarreaga (2012) also demonstrate the relevance of lobbying as a significant determinant of trade policy, although they argue that it reduces the welfare-maximizing decisions of government. Similarly, Mobarak and Purbasari (2005) show that politically connected firms are from 6 to 22 percentage points more likely to receive import licenses than their competitors, and the licenses often lead to the creation of monopolies.

Concerns about the legitimacy of industrial policy and government intervention are compounded when the empirical record of industrial policy is taken into account. And yet, although economists and other competition advocates dismiss industrial policy as ineffective (Aghion, Boulanger, and Cohen 2011), it continues to abound in practice. Private sector lobbying and genuine government efforts to promote various diverse public objectives, such as sector or regional development or increased productivity, spur governments to resort to industrial policy to protect specific industries or firms and give them an advantage over others. The next section explores the success of such measures, presenting a review of the empirical evidence on the ability of the most common industrial policy tools to achieve their intended goals and counteract market failure (direct effects) while minimizing distortive effects on markets (indirect effects).

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# Industrial policy effects

The most prominent industrial policy tools include (1) subsidies or state aid—that is, policies that provide benefits to firms such as tax breaks, below-market loans, and direct transfers; (2) strategic trade policy, including import tariff protection and local content requirements; (3) nationalization of business through state ownership; and (4) discretionary or discriminatory procurement procedures that reduce competition among firms and often favor domestic over foreign bids (see Crafts and Hughes 2014; Tilton 1996). The nationalization of business is exemplified by China, where direct government involvement in the economy through SOEs is a dominant form of industrial policy. More nuanced approaches include measures to remove coordination failures between investors and firms to encourage concurrent investment, such as information exchanges, and sequenced subsidies to firms in relevant industries (Harrison and Rodriguez-Clare 2010; Pack and Saggi 2006).

The sections that follow review the literature examining the *direct effects* of the most prominent industrial policy measures on their stated goals, such as increased productivity, employment, or investment in R&D, as well as their *indirect effects* on the market and competition, observed through effects on market share, markups, allocative efficiency, and overall welfare. Empirical assessments of indirect effects are less common, in part because of the difficulties involved in measurement and the availability of data. Where industrial policies are found to deliver on their intended goals, they tend to reinforce efficiency and competitive principles and support competition more broadly in the market.

## >> SUBSIDIES

Subsidies are the most widely used industrial policy instrument. The World Trade Organization's Agreement on Subsidies and Countervailing Measures defines a subsidy as a financial contribution by a government or any public body that confers a benefit (Article 1). Article 107 of the Treaty on the Functioning of the European Union defines a subsidy as "any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favoring certain undertakings or the production of certain goods." It stipulates that such measures are inconsistent with the common market except in certain limited cases. Bianchi and Labory (2006, 619) define state aid as "financial transfers to business that take many forms such as subsidies, grants, tax exemptions, etc." Per European Union (EU) guidance, subsidies that are open to all enterprises, such as general taxation measures or employment legislation, are not prohibited and do not constitute state aid.[1] Currently, the European Commission presumes that state aid distorts competition, yet it approves 98 percent of applications, often for social or distributional reasons.

Subsidies are often justified based on the need to alleviate market failures caused by externalities (such as public goods), by informational asymmetries, or a lack of competition (Spector 2009). Externalities may be inefficient, such as when the market is not able to provide the optimal level of a good or service, as may be the case with infrastructure such as roads and ports. Or externalities may be socially unacceptable, such as when the market generates negative externalities such as pollution or other types of environmental damage. The outcome of the market may also be efficient but deemed unfair, thereby justifying, for example, targeted education grants or regional development programs for redistributive purposes and to increase overall welfare. Subsidies can also correct market failures caused by informational asymmetries in certain markets—for example, for high-tech firms and R&D activities that may face credit constraints in the market in the absence of government R&D subsidies (Takalo and Tanayama 2008). Moreover, subsidies can help to increase competition in markets with high barriers to entry by, for example, subsidizing upfront set-up costs and supporting small and medium enterprise (SME) development.

But because subsidies can be highly targeted and tamper with market signals, they may cause two basic types of inefficiencies: productive inefficiency and allocative inefficiency. Productive inefficiency occurs when the total output produced in the economy does not draw from a cost-minimizing combination of inputs because production by inefficient firms is encouraged. In lowering costs for some firms, subsidies distort operational decisions and incentives, influencing cost management and production, reducing productivity, and distorting prices. Subsidies correspondingly distort firms' ability to stay in the market, despite lackluster productivity compared with that of their competitors. And different types of subsidies can have discrete effects. For example, if firms can count on receiving bailout aid, this creates relatively soft budget constraints on them and may encourage riskier behavior. Likewise, the possibility of R&D aid may reduce the incentives for firms to innovate in order to reduce costs, improve quality, and become more efficient using private funds (Spector 2009).

Allocative inefficiencies result when resources are directed away from the most efficient and productive firms in an economy. This creates capital misallocation and an inefficient dispersion of activity, which has knock-on impacts on total factor productivity, or TFP (Herrera, Lugauer, and Chen 2018; Restuccia and Rogerson 2017). These impacts can contribute to low-productivity firms gaining or maintaining higher market shares at the expense of others. Moreover, when aid is available firms have good reason to direct resources toward rent-seeking activities, such as lobbying, rather than more productive uses (Spector 2009).

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1. European Commission, Competition, State Aid Control, https://ec.europa.eu/competition/state_aid/overview/index_en.html.

As a result of these dynamics, it is critical to assess both the direct effects of subsidies, at the level of subsidy recipients, and the indirect effects, which include spillovers to nonbeneficiaries as well as impacts on competition outcomes measured at the market level. At the beneficiary level, direct effects are assessed by determining whether the subsidy induced the recipient to take a different course of action or induced additional activity compared with a scenario in which it did not receive the assistance (the incentive effect). At the market level, the spillover effects on nonbeneficiaries (such as crowding out of activity) and the indirect effects on competition outcomes, observed through markups and expansions in market share of recipients at the expense of nonrecipients, are most relevant (Rotemberg 2019).

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### → >>> DIRECT EFFECTS

As for industrial policy more generally, most of the literature and government evaluation programs focus on the direct effects of subsidies—that is, whether they achieve their primary objectives such as higher productivity, job creation, export promotion, or sector-level investment in R&D. The literature indicates that subsidies are limited in their ability to obtain their primary objectives and may even be counterproductive in certain contexts.

Subsidies intended to increase productivity, for example, are often found to have little to no significant effect in the long run and, if so, only under special circumstances. In some instances, subsidies even decrease productivity. Comparing Swedish companies that received state aid to companies that did not, Bergstrom (2000) finds that the productivity of subsidized firms increases in the first year after the support, but that in the long run productivity falls below that of firms that did not receive any support. Similarly, Van Cayseele, Konings, and Sergant (2014) find that state aid enhances productivity growth most for firms that are cash-poor, meaning that laggard firms (which are more likely to be financially constrained) experience more TFP growth than close-to-frontier firms when receiving state aid (this effect is driven mainly by the postcrisis years in the sample). Studies of Japan and Korea find that subsidies have no or only negligible impacts on productivity (Beason and Weinstein 1996; Lawrence and Weinstein 1999; Ohashi 2005). Harris and Robinson (2004) find no evidence of benefits from state aid when comparing similar receiving and nonreceiving companies in the United Kingdom. Investigating the impact of state aid to the Slovenian manufacturing industry, Schweiger (2011) finds that there is no significant impact on TFP. Another Slovenian study finds that firms receiving a higher portion of subsidies are less productive when compared with counterparts from the same sector receiving fewer or no subsidies (Domadenik, Koman, and Prasnikar 2018).

However, the same study finds that subsidies increase productivity growth by 0.03 percentage points when they are more widely dispersed across firms in a given sector (Domadenik, Koman, and Prasnikar 2018). Along the same lines, in studying 11 EU member states between 1992 and 2003, Gual and Jodar-Rosell (2006) find that state aid, awarded primarily for objectives such as R&D investment, SMEs, or worker training, despite it ultimately targeting the manufacturing sector, has a positive effect on TFP growth. Aghion, Boulanger, and Cohen (2011) use Chinese firm-level panel data to show that subsidies have stronger positive effects on TFP and innovation when directed to more competitive sectors and when they are less concentrated in those sectors. In a similar study, Aghion, Dewatripont, et al. (2010) show that the effects can even be negative for sectors with a low degree of competition, with the positive effects increasing as competition increases.

As for the effects of subsidies on employment, the evidence is somewhat mixed. Studies differentiate between static efficiency (defined in terms of keeping people employed) and dynamic efficiency (defined as creating new jobs). Using a matching technique, Murn, Burger, and Rojec (2009) find that although subsidies prove ineffective in creating new jobs, the firms receiving aid lay off fewer workers than firms that did not receive aid (static efficiency). Likewise, in the United Kingdom discretionary grants to firms for investment in economically disadvantaged areas significantly reduce unemployment in the areas targeted and increase investment and the net entry of firms (Criscuolo et al. 2012). However, the same study also identifies a negative impact on aggregate productivity growth, pointing to possible interference by state aid in the allocative efficiency mechanism of the market. Meanwhile, Martin, Burger, and Mayneris (2011) use a difference-in-difference approach to investigate the effect of policies aimed at promoting industrial clusters in France, finding that the policies failed to stimulate employment (dynamic efficiency).

Although the direct effects of subsidies on exports are widely supported in theory (see Cohen 2006; Harrison and Rodriguez-Clare 2010; Warwick 2013), empirical support is weak. Looking at short-run relationships in the European Union, Stöllinger and Holzner (2017) find limited evidence that state aid promotes manufacturing value-added exports. Although €1 million in additional aid to the manufacturing sector leads to an increase in manufacturing value-added exports of €1.37 million for the average EU member state, the results vary significantly across EU members in the sample. Indeed, the effects were weakest for countries with less competitive manufacturing sectors. Likewise, in their study of policies promoting industrial clusters in France, Martin, Mayer, and Mayneris (2011) find that the policies were unable to reverse the declining productivity trend of targeted firms and had no robust effect on exports.

By contrast, in their analysis of the relationship between sector-specific state aid provided by 12 EU member states between 1995 and 2008 and their corresponding share of total EU exports, Aghion, Boulanger, and Cohen (2011) find that sectoral aid can have a positive effect on export performance and innovation, but principally where aid is more decentralized across economies. Badinger and Url (2012) assess the impact of export credit guarantees issued by the Austrian export credit agency on the export performance of a cross-section of Austrian firms, identifying a large and statistically significant effect on the export performance of recipient firms. Again, the more competition-friendly the subsidy and the less targeted it is in terms of selecting firms, the more positive are the outcomes.

Subsidies are also often employed to promote the rescue and restructuring of firms in difficulty. Studies reveal that these subsidies have fewer positive impacts. London Economics (2004) analyzed 71 cases in which restructuring and rescue aid was granted between 1995 and 2002, finding that only one-third of the recipient firms continued with the same legal status when granted the aid. The others ceased operations, changed their name, or were bought by other companies. In their analysis of firms that received rescue or restructuring state aid in 15 EU member states between 1995 and 2003, Chindooroy, Muller, and Notaro (2007) find that firms receiving rescue aid were less likely to survive than firms that receiving restructuring aid. However, the study is not conclusive in terms of the survival of firms that have received aid compared with the survival of firms that have not received aid. In studying the effects of subsidies for SMEs following the Great East Japan Earthquake of 2011, Kashiwagi (2019) finds that although subsidies were effective in the retail sector, they made no significant difference in manufacturing and service sectors. It is assumed that this finding stems from the variations in the degree of private support across sectors rather than from variations in supply chain disruption.

As for the ability of subsidies to increase R&D, the results are broadly positive (Almus and Czarnitzki 2003; Falk 2004; Guellec and Van Pottelsberghe de la Potterie 2003). Almus and Czarnitzki (2003), using matching strategies to study R&D subsidies in eastern Germany, find a positive and significant effect. Hussinger (2008) employs a two-step selection model and concludes that subsidies in Germany are effective in promoting R&D investment. Bloom, Griffith, and Van Reenen (2002) also find positive effects, with firms increasing R&D spending by approximately 1 percent for every 1 percent reduction in the cost of R&D granted through tax incentives. The effects are even greater in a censored panel data regression model with random effects by Parisi and Sembenelli (2003), which finds that a 5 percent reduction in the cost of R&D by means of a subsidy can increase R&D activities 7.5–8.8 percent.

Some variance is observed based on the size of the receiving firm and aid intensity. In a study of Israeli manufacturing firms, Lach (2002) finds that although subsidies have a significant positive effect on the R&D expenditure of small firms, the effect is negative for large firms. Bronzini and Iachini (2014) come to a similar conclusion regarding an R&D subsidy for Italian firms. González, Jamandreu, and Pazó (2005) examine the effects of R&D policies in Spain and find a positive (small) effect on private investment, but again mainly for small firms. In a study of state aid in Lithuania, the effects vary by sector and aid intensity, with state aid having the greatest effect on the development of educational projects, followed by research, experimental projects, and production projects (Ginevičius, Podvezko, and Bruzge 2008). In a study of SMEs across the Finnish economy, Hyytinen and Toivanen (2005) find that firms in industries that are more dependent on external financing invest relatively more in R&D and are relatively more growth-oriented when they have more government funding (potentially) available. An ex post impact evaluation of state aid schemes in Romania finds that a state aid scheme designed to support regional development and job creation has positive direct effects on employment and, to some extent, on investment, and it generates positive spillovers—in terms of employment and productivity—to nonbeneficiary firms in beneficiary sectors, with no evidence of market distortions (World Bank forthcoming).

## >>> INDIRECT EFFECTS

Empirical assessments of the indirect effects of subsidies and other government policies are less common, in part because of the difficulties involved in measurement and the availability of data. Nevertheless, this area of the literature is growing, and it overwhelmingly indicates that subsidies often create significant market distortions and compromise competition by, for example, distorting markups and allocative efficiency and reducing overall welfare. Because of the mixed potential for subsidies to achieve their primary objectives through direct effects on subsidy recipients, explored earlier, the balance of the evidence weighs against the use of subsidies in most cases as a tool of industrial policy.

In an ex post analysis of the impact of certain state aid measures on competition commissioned by the European Commission, three key characteristics were identified as having the greatest impact: (1) the relative size of the aid; (2) the breadth of the aid; and (3) the frequency of the aid (Oxera 2017). In the study, each case was investigated comparing two states of the world: a factual state (the situation that prevails when a shock has occurred) and a counterfactual state (the situation that prevails in the absence of the shock). This approach allows the research to test whether a given state aid has led to a distortion of competition. The study finds that the impact of the aid on

competition depends on how these characteristics express themselves in each case. In cases in which the aid is small relative to market size (less than 1 percent of total revenue), the study concludes that the effects on competition are likely to be negligible. For example, in the case of a one-off payment of €80 million to the French substrates manufacturer, Soitec, for its NanoSmart nanotechnology R&D program in 2007, the study finds that the effects on competition were unlikely to be significant because the aid did not have any material impact on market shares, profits, competitors' R&D spending, market entry, or exit. Correspondingly, where the aid granted is large relative to the size of the market, the effects on competition are significant, such as where the aid amounted to 51 percent of the total revenue of regional airports in southwest England. In addition, when aid is delivered more frequently (such as on an annual basis) in markets characterized by a high degree of entry and exit, it is more likely to distort competition in favor of incumbents.

Allocative inefficiencies are common in markets where subsidies are provided, especially if they are not well designed. Investigating the effect of state aid provided to rescue and restructure struggling firms in Slovenia's manufacturing sector, Schweiger (2011) observes that the aid was effective to the extent that the receiving firms did not exit the market and the aid had a positive impact on market share growth. But because there was no significant impact on TFP growth, Schweiger concluded that the aid was market distorting. Similarly, Bravo-Biosca, Criscuolo, and Menon (2013) find that R&D tax exemptions slow down the reallocation of resources toward more innovative market entrants and are likely to favor incumbent firms. In a study of shipbuilding subsidies in China between 2006 and 2013, Barwick, Kalouptsidi, and Bin Zahur (2019) discover that although the subsidies boosted China's domestic investment and entry by 270 percent and 200 percent respectively—and China's world market share by 40 percent—they also attracted inefficient producers, exacerbated the problem of excess capacity, and did not increase industry profits in the long run. Restuccia and Rogerson (2008) find that subsidies, because they distort the allocation of resources across establishments that differ in productivity, can reduce aggregate output and TFP in the range of 30–50 percent. Coppens, Hilken, and Buts (2015) reveal that aid is more likely to distort competition if the aid is granted to incumbent companies in highly concentrated and highly segmented markets.

Meanwhile, economic theory suggests that low markups as proxies for competitive pressure can be associated with allocative efficiency and perfect competition. However, subsidies can result in a distorted sense of firm efficiency. When subsidies are present, they logically reduce the cost structure of a subsidized firm—especially when the subsidy scheme under

analysis is designed to cover investment or operational costs—and so lower markups do not necessarily reflect real productivity performance. Certainly, subsidy beneficiaries having lower markups may suggest that such firms have more leeway to reduce prices as they need to recover lower real costs. But many other factors can influence markups as well, such as size, age, ownership status, R&D status, and location (Iooty, Pop, and Pena, forthcoming). Because of the competing interpretations and the difficulties involved in measuring causality between subsidies and markups, the relationship between subsidies and distortions and competition (as measured through markups) should be interpreted with caution.

In preparation for the 2019 World Bank report Innovative China: New Drivers of Growth, a background paper by Iooty and Dauda (2017) assessed the evolution of firm markups in the Chinese economy to shed light on the contribution that more competition could make to productivity growth in the country. The analysis measures how firm markups are related to productivity and specific firm characteristics, including receipt of subsidies. Based on a micro-level analysis of enterprises between 1998 and 2013, the study finds that firms receiving income subsidies tend to earn a lower markup when compared with firms in the same product market that do not receive subsidies. As noted earlier, this finding is subject to divergent interpretations. Lower markups could be interpreted as a sign of increased efficiency and profitability, but this is not necessarily the case. Subsidies also reduce the investment costs for firms and distort cost structures. As a result, cost structures and prices do not reflect real productivity performance.[2]

In a similar study of markups in Romania between 2008 and 2017, Iooty, Pop, and Pena (forthcoming) show that the recipients of a state aid scheme to promote regional development and job creation had 80 percent lower markups than comparable firms not granted aid under the program. The firms with the highest markups were more common in sectors such as wholesale and retail, which are classified as "less knowledge intensive services," according to Eurostat, and which tend to be less innovation-driven. The authors advise caution in interpreting these results because they do not represent the totality of state aid schemes offered by the Romanian government and because estimated differences cannot be taken as evidence that provision of state aid always reduces markups. Other firm characteristics may also be relevant. The study finds that ownership structure may explain markup differences across firms—that is, firms in which the state has majority or minority ownership demonstrate higher markups when compared with domestic privately owned companies in the overall economy and especially in the manufacturing sector. The average difference in markup is higher for minority state-owned companies (28.9 percent) than for fully state-owned firms (20 percent). In manufacturing, markups of fully state-controlled firms are the highest on average, at 52.7 percent, when compared with the reference category (domestic privately owned firms). Nevertheless, although it is difficult to show causality, the fact that the recipients of state aid studied in Romania have lower markups may still speak to the fact that subsidized firms—regardless of their level of state ownership—have more leeway to reduce prices because they need to recover lower costs. As such, subsidies can contribute to unleveling the playing field between recipients and nonrecipients.

In terms of the impacts of subsidies on overall welfare, the evidence for state aid in EU countries is mixed. Broadly, studies indicate that the ability of state aid to increase aggregate social welfare without distorting competition varies, depending on the characteristics of the market and of the recipients of the aid, but there is no one-size-fits-all in terms of the amount of the subsidies in a given market and their effects (Besley et al. 1999; Collie 2000 and 2002; Harbord and Yarrow 1999). One study finds that state aid to R&D will increase aggregate welfare if the spillovers from R&D are large, but it will always decrease aggregate welfare if the spillovers are small (Collie 2005). An ex post impact evaluation in Romania showed that a de minimis state aid scheme designed to incentivize access to finance for micro and small and medium enterprises generated negative spillover effects on nonbeneficiary firms in terms of job creation. This finding suggests that potential job displacement, even if it did not distort competition, led to increased employment and turnover of beneficiary firms, and it reduced the probability of aided firms closing their activities (World Bank, forthcoming). Furthermore, the effects on the profits of domestic and foreign firms depend on the particular characteristics of the market (Garcia and Neven 2005). Accordingly, Strohm (2006) argues that because the overall welfare effects of industrial policies in a dynamic environment are difficult to estimate, this justifies the use of industrial policies only if they do not distort rivalry in otherwise competitive markets. Finally, using a panel data set that covers 27 EU member states over the period 1992–2011, Tunali and Fidrmuc (2015) find that state aid is not an effective instrument to foster higher economic growth or overall investment rates.

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2. According to the study, subsidized firms may have more leeway to reduce prices as they need to recover (lower) costs. However, because the methodology applied does not assess the causal impact of state aid on the markup performance of beneficiaries, this result should not be taken as evidence that provision of state aid is beneficial for markup reduction.

## >> TRADE POLICY

Implementation of industrial policy using the tools of trade policy, such as tariffs, import/export quotas, local content requirements, or some form of trade-related subsidy often aims to protect "infant industries" or certain domestic industries that governments deem unable to survive international competition. However, there is little to no empirical evidence in favor of using such policy as a tool to protect or grow infant industries, and most studies dismiss the approach.

### >>> DIRECT EFFECTS

Single industry empirical studies unambiguously conclude that tariffs may induce short-term growth at the sector level, but that in the long run welfare losses generally exceed short-term benefits and protected domestic industries are unable to catch up to international peers. Studying protectionist tariffs for the semiconductor industry in Japan, Baldwin and Krugman (1986) find that the costs to Japanese consumers outweighed the limited maturation benefits experienced by the sector. Luzio and Greenstein (1995) study the effect of protection on the microcomputer industry in the 1980s in Brazil. They find that although there was a rapid short-term growth, in the long term the sector never caught up with the technological frontier; the policy was abandoned in the early 1990s. Rask (1994) examines the case of tariff protection for the Brazilian ethanol industry and finds no empirical evidence of improved economies of scale and very little technical change. In a study of tariff and nontariff protection in 38 industries in Korea, Lee (1995) concludes that less government intervention in trade is linked to higher productivity growth. Supporting this finding, Edwards (1998) uses nine alternative indexes of trade policy across a sample of 93 advanced and developing countries to show that TFP growth is faster in more open economies. Similarly, Dovis and Milgram-Baleix (2009) find that a 10 percent reduction in tariffs results in a 1.4 percent gain in TFP in Spain's manufacturing

sector. In some studies, import quotas have an even stronger negative effect on firm performance than tariffs (Edwards 1998; Kim 2000). A notable exception is a study by Nunn and Trefler (2010) that shows that tariff protection favoring sectors with higher-skilled workers can lead to higher levels of long-term growth in the per capita gross domestic product (GDP).

Local content requirements, which are typically intended to boost local supply chain linkages, are also negatively associated with productivity and competitiveness. Hufbauer et al. (2013) estimate that local content requirements globally affect 2 percent of trade across all sectors and reduce it by US\$93 million annually. One cross-country study across multiple sectors finds that local content measures lead to a concentration of domestic economic activity, undermining the growth and innovation opportunities that arise from a diverse economy (Stone, Flaig, and Messent 2015). Moreover, the measures did not boost productivity, nor did they improve export competitiveness. Dutz et al. (2017) find that Brazil's local content requirements combined with tax exemptions were narrowly effective in limiting imports, but failed to make the Brazilian car industry competitive, resulting in smaller-scale production and higher consumer prices. Similar results were recorded for Australia's local content policy in its automotive sector in the 1960s and 1970s, including reduced employment, technological change, and innovation in the sector (Pursell 2001).

Most studies argue that the removal of protectionist trade policy generates both intra-firm and intra-industry productivity gains—for Africa, see Ng and Yeats (1997); Brazil, Muendle (2004); Chile, Pavcnik (2002); Côte d'Ivoire, Harrison (1994); Korea, Kim (2000); Mexico, Tybout and Westbrook (1995); the former Yugoslavia, Nishimizu and Page (1982). Because firms are forced to reduce costs by exposure to, not protection from, foreign competition, foreign competition promotes increased

efficiency (Tybout 2000). In a study of Spain's manufacturing sector, Dovis and Milgram-Baleix (2009) show that a 10 percent increase in international penetration rates results in a 2.2 percent increase in productivity at the firm level. In a study of import liberalization in Morocco, Dutz (1991, 33) finds that it is more likely to drive smaller firms to exit, which, based on the positive relationship between firm size and firm efficiency, "supports the view that trade liberalization may well result in welfare-improving output re-adjustments." Khandelwal and Topalova (2011) highlight that the positive effects of trade liberalization on firm-level productivity can be enhanced through complementary reforms to reduce restrictions on FDI and reduce or remove licensing requirements.

## ✕ >>> INDIRECT EFFECTS

Considering the broader effects of trade policy on the economy and competition in the market, the empirical results of studies again skew against protectionist policies. For example, Australia's local content schemes in the automotive sector in the 1960s and 1970s are thought to have been strongly counter-competitive, resulting in ex-factory prices 85 percent higher than the duty-free prices of imported cars (Pursell 2001). In another in-depth analysis of local content requirements in the automotive sector, this time in Brazil, Sturgeon, Chagas, and Barnes (2017) find that although competition among domestic producers increased (the policy attracted new market entrants and increased investments from existing producers), prices ultimately went up because domestic automakers were protected from import competition.

Several studies demonstrate the positive relationship between trade liberalization and reducing markups, which can stem both from increased competition between firms and improved resource allocation in the economy. For example, industries subjected to the most trade protection in Côte d'Ivoire had the highest markups and productivity was up to four times lower than less protected sectors (Harrison 1994).

The broad trade liberalization in India in 1991 had strong pro-competition effects across a variety of industries, as reflected in reductions in price–marginal cost margins, and produced some evidence of an increase in the growth rate of overall productivity (see Krishna and Mitra 1998). Similarly, considering trade liberalization in Turkey, Levinsohn (1993) observes a reduction in markups charged by manufacturing firms because the sector was exposed to greater international competition.

As for allocative efficiencies, studying the effects of trade reform in Ghana, Biggs and Shah (1997) find that as the level of protection declines, overall allocative efficiency improves in the market. A study of the effects of trade liberalization on productivity in Chile indicates that although within-plant productivity improvements could be attributed to liberalized trade for the plants in import-competing sectors, aggregate productivity improvements stem from the reshuffling of resources and output from less to more efficient producers in each sector (Pavcnik 2002). Trade liberalization in Brazil, by increasing competition from abroad, has been shown to increase the likelihood of inefficient firms exiting the market, thereby contributing positively to a more efficient allocation of resources in the economy and greater aggregate productivity (Muendler 2004).

In terms of the indirect effects of trade reform on overall welfare, in his analysis of the U.S. tin industry in the 1890s, Irwin (2000) finds that even though tariff protection increased the industry's maturity by about 10 years, the net effect on welfare was negative because the cost to consumers was too high. In much the same way, Baldwin and Krugman (1986) find that Japan's home market protections for the semiconductor industry produced more costs than benefits for consumers. Head (1994) reveals that for the U.S. steel rail industry, tariff protections hurt consumers in both the short and long run, and the effects on overall welfare were extremely small, although positive.

## >> STATE-OWNED ENTERPRISES

The nationalization of business through state-owned enterprises and other forms of state holdings in businesses are popular tools in national industrial policy. Recent estimates suggest that SOE assets are worth US$45 trillion, almost half of global GDP, up from around US$13 trillion in 2000 (IMF 2020). Like subsidies, the most common justifications for SOEs are the need to compensate for market failures, the advancement of strategic objectives, and the promotion of development objectives (World Bank 2019). When they are managed and regulated correctly, SOEs in the appropriate context have the potential to act as important drivers of economic growth given their size, mission, and strategic vision. For example, if SOEs are major players in a given market, they can drive the adoption of higher standards and production of higher-quality goods and services along entire supply chains. SOEs are often a natural choice for industries with significant economies of scale, where a single monopolist producer or supplier is needed to achieve optimum efficiency (Kowalski et al. 2013). Examples are frequently found in network sectors, such as energy provision, communications, or transport. Particularly where network SOEs operate efficiently, they can lead to significant positive spillovers to the rest of the economy through the provision of high-quality, efficient, and optimally priced outputs.

Correspondingly, inefficient and poorly exercised state ownership can have significant negative effects on economies by creating additional risks for public finances, risks to the financial sector through state-owned banks, and risks to productivity and economic growth through spillovers from inefficient SOEs to private firms (Böwer 2017; Shapiro and Globerman 2012). The presence of SOEs in the market can unintentionally lead to adverse effects and market distortions, which can be broadly categorized into three groups: (1) effects of SOEs on market functioning and private sector participation; (2) effects of SOE performance on development outcomes; and (3) effects of domestic SOEs on global markets (World Bank 2019). These effects are often a result of direct or indirect benefits provided to SOEs by the government that are not offered to private firms, which creates an unlevel playing field, distorts competition, and skews firm incentives (OECD 2011). Benefits include subsidization, preferential tax treatment or exemptions, in-kind benefits, and concessionary financing and guarantees. As a result, SOEs often operate within soft budget constraints, secure in the knowledge that they will continue to receive government support regardless of their level of return on investment or losses suffered (Kornai, Maskin, and Roland 2003). This security reduces incentives to increase efficiency, productivity, and quality in the goods or services delivered (Kowalski et al. 2013).

### >>> DIRECT EFFECTS

In empirical studies, state ownership is rarely associated with productive efficiency. Zhang, Zhang, and Zhao (2001), in studying the effects of ownership and market competition on Shanghai-based firms between 1996 and 1998, observe that SOEs were the least efficient in the sample. The study also finds evidence (albeit weak) of learning and improvement of management techniques among SOE managers who operate in environments with stronger competition. Goldeng, Grünfeld, and Benito (2008) use returns on assets as well as costs relative to sales revenue to study firm performance in markets where SOEs and privately owned companies compete. They find that SOEs perform significantly worse than privately owned firms. More recently, the International Monetary Fund (IMF), drawing from a sample of about 1 million firms in 109 countries, finds that SOEs are less productive than private firms by one-third on average, in part because of poor governance. In countries with perceived lower corruption, SOE productivity is more than three times higher than that in countries where corruption is seen as severe (IMF 2020).

Cornett et al. (2005) examine government ownership and involvement in a country's banking system in East Asian countries between 1989 through 2004. They find that prior to 2001 state-owned banks were less profitable and had greater credit risk than privately owned banks. These trends were most pronounced in countries with the greatest government involvement and political corruption in the banking system. In addition, state-owned banks were worse off during the Asian financial crisis (1997–2000), experiencing greater deterioration in cash flow returns, core capital, and credit quality than privately owned banks. However, during the postcrisis period of 2001–04, state-owned banks quickly caught up with privately owned banks on cash flow returns, core capital, and nonperforming loans.

By contrast, Chen, Firth, and Xu (2009) find that between 1999 and 2004 Chinese SOEs controlled by the central government through the State-owned Assets Supervision and Administration Commission (SASAC) exhibited much better overall financial performance than privately owned companies as well as those partly state-owned and managed through state asset management bureaus (SAMBs). SASAC-controlled SOEs are usually nationwide companies involved in various industries, and although owned, controlled, and closely monitored by the central government, they have substantial autonomy over their activities. In addition, they are able to invest in listed firms and often hold substantial shares that give them outright or de facto control. By contrast, SAMBs are established at the local level of provincial cities and are shareholding institutions that belong to the state, tasked with managing state assets. According to the study by Chen, Firth, and Xu (2009, 180), SOEs partly owned or managed by SAMBs are subject to weaker supervision and management, in part because of the lack of skills of SAMBs (and their officials) and the lack of incentives associated with firm performance—that is, SOEs are "bereft of leadership and oversight." As for the comparatively poor performance of privately-owned companies, Chen, Firth, and Xu (2009, 180) observe that "market-oriented state shareholders may be the most suitable controlling owners of firms in countries with weak institutional environments."

Another cross-sectoral study of SOEs in central, eastern, and southern Europe finds that SOEs (1) generate less revenue per employee; (2) pay higher wages than private companies; and (3) not surprisingly are significantly less profitable, with the driving factor being the inefficient use of resources, especially labor (IMF 2019). This finding reinforces earlier research—a global study of very large SOEs highlighted that they are significantly less profitable, more highly leveraged, and more labor-intensive than private sector comparators (Dewenter and Malatesta 2001). Interestingly, the solution is not necessarily privatization.

The same study finds little evidence that privatization itself enhances profitability. Instead, government restructuring efforts prior to privatization sales can improve profitability, with no further efficiency gains observed thereafter. Indeed, it appears that the effects of state ownership on efficiency can persist even following privatization. A study of SOE privatization efforts in China shows that although the profitability improved following privatization, privatized SOEs still significantly underperform compared with their private counterparts (Harrison et al. 2019).

The fact that SOEs often have access to subsidies and public funds also appears to have little impact on financial performance. A study of current Chinese SOEs, former SOEs, and privately-owned firms observes that state-owned firms receive more subsidies and lower interest rates than former SOEs that have been privatized, and former SOEs are favored relative to firms that have always been held privately (Harrison et al. 2019). Nevertheless, another study of Chinese SOEs over the last decade demonstrates that those receiving government-mandated financial assistance continue to sustain losses, and the public debt attributable to SOEs has continued increasing, often to unsustainable levels (Molnar and Lu 2019). Zhang, Zhang, and Zhao (2001) find that even adjusting for capital structure, taxes, and the welfare burdens of Chinese enterprises, SOEs still exhibit poor financial performance attributable to "soft loans," and their profit growth is markedly slower than that for firms with different ownership structures.

Most recently, across a sample of about 1 million firms in 109 countries, SOEs were found to be less productive than private firms by one-third on average (IMF 2020). The primary factors were weak SOE accountability and poor countrywide governance. By contrast, in countries with strong countrywide governance, the productivity gap was only 7 percent. This finding is reinforced by Baum et al. (2019), who also find that SOEs perform markedly worse than their private sector counterparts in countries with high levels of corruption or poor fiscal transparency (even after controlling for a country's level of development). The same study also demonstrates that SOE governance reforms can generate significant gains in performance.

As for whether SOEs make a meaningful contribution to higher employment in an economy, the results are also disappointing, showing no positive effects on employment in the aggregate. Although SOEs account for a large share of employment worldwide (OECD 2017), a study of labor market data from 194 countries and the effects of public sector employment on private sector employment reveals that the public sector employment completely crowds out private sector employment and does not help to reduce unemployment overall. According to Behar

and Mok (2013, 24), "a public job typically comes at the cost of a private-sector job and therefore does not reduce overall unemployment." In several cases, privatization of SOEs has been shown to lead to overall increases in employment, even if there are layoffs in the former SOEs themselves (Davis et al. 2000; Earle and Shpak 2019; Estache and Trujillo 2008). For example, a study of the Zambian air transport sector reveals that the emergence of two new private airlines following the collapse of the state-owned provider led to higher overall employment in the sector (Kikeri 1998).

## >>> INDIRECT EFFECTS

When SOEs receive special advantages, not only does this unlevel the playing field vis-à-vis private firms, but SOEs may achieve market positions not warranted by the efficiency of their production. Such a situation shifts production away from the most efficient producers and distorts resource allocation more broadly in an economy, and it can lead to overcapacities and increased production, regardless of the market needs. In their study of SOEs in Shanghai between 1996 and 1998, Zhang, Zhang, and Zhao (2001) observe that although SOE exposure to foreign competition is positively associated with efficiency, no relationship is observed between the degree of domestic competition and productive efficiency. Massive government stimulus programs to Chinese SOEs during the 2007–08 financial crisis were associated with inefficient outcomes. Indeed, despite the assistance, Chinese SOEs continued to operate with losses (Wildau 2016). Moreover, lending directed to SOEs resulted in overcapacities and the creation of national champions, which increased production and infrastructure regardless of market needs (OECD 2019). Buehler and Wey (2013) argue that state ownership plays only a subtle role in crowding out private investment. Public investment strategically crowds out private investment in markets where the private firm regards investments as strategic substitutes and private investment is undesirable from the state-owned firm's perspective. Otherwise, "crowding out will either also be practiced by a private firm, or public investment will boost private investment" (Buehler and Wey 2013, 329).

A study of over 6,000 SOEs in 11 EU member states finds that the efficiency of resource allocation by SOEs lags those of private firms in most sectors, with substantial cross-country variation (Böwer 2017). These effects are considered more pronounced in developing economies because of their smaller markets, comparatively weak private sectors, weaker government regulation and competition enforcement, and weaker SOE governance and institutional frameworks (World Bank 2019). Considering SOEs in the steel sector across countries, Mattera and Silva (2018) find that not only are SOEs

associated with poorer economic performance and higher levels of indebtedness than private enterprises, but they also have contributed to increasing overcapacity in the sector.

SOE inefficiencies, particularly where SOEs are sheltered from competition, are also associated with lower levels of development. One study finds that a 5 percent increase in SOE efficiency in the Arab Republic of Egypt could result in a 5 percent increase in GDP (Smith and Trebilcock 2001). Estache and Fay (2009) find that poor service delivery in the utilities sector and a lack of effective infrastructure provided by SOEs constrains investment and economic growth, with a disproportionate effect on poor people. A study of China finds that productivity growth attributable to China's SOE reform is mainly due to improvements in resource allocation (Huang 2019). Brandt, Tombe, and Zhu (2013) also point out that resource misallocation reduced China's nonagricultural productivity by an average of 20 percent during 1985–2007, with over half of the loss attributable to the misallocation of capital between state and nonstate sectors within provinces.

Preferential treatment and the resulting market position of SOEs can facilitate anticompetitive conduct by SOEs such as predatory pricing and other behavior aimed at excluding current competitors or preventing the entry into markets in which they operate (World Bank 2019). In their analysis of markups in Romania between 2008 and 2017, Iootty, Pop, and Pena (forthcoming) show that, controlling for other firm characteristics, ownership is the most relevant in explaining differences in markups (as proxies for competitive pressure). In Romania, state-controlled companies tend to exhibit the highest markup premiums when compared with domestic privately-owned companies across the economy and especially in the manufacturing sector: 29 percent higher for minority state-owned companies and 20 percent higher for fully state-owned companies.

SOEs are also vulnerable to political capture by ruling parties, which can lead to distorted decisions in the market. For example, the low interest rates granted by state-owned banks in Italy were not driven by enhanced efficiencies on the part of the bank or by a particular social purpose. Instead, the party affiliation of senior management most closely correlated with the interest rate discount given in different provinces. And interest rates were lowest when the political affiliation between management and the area from which the firm was borrowing was the strongest (Sapienza 2004). Meanwhile, Ferrari, Mare, and Skamnelos (2017) observe that on-lending by state development–oriented institutions through other financial intermediaries limits the scope for political interference and competition distortion, while also enabling more resources to be transferred at lower cost by leveraging the infrastructure of other institutions.

## >>   PUBLIC PROCUREMENT

In an effort to protect local companies, support and stimulate infant industries, create employment, and support undeveloped regions, governments may also pursue discriminatory procurement practices that favor local firms over foreign firms (Ssennoga 2006). Like trade policy, however, more open procurement practices that foster competition between local and foreign firms have been shown to reduce purchasing costs, encourage innovation, and lead to skill and technology transfer from international best practices and experiences. Cecchini (1988) highlights three major areas of cost savings stemming from open and transparent public procurement: (1) public authorities are able to buy from the cheapest (foreign) suppliers (static effect); (2) the inclusion of foreign companies leads to downward pressure on prices charged by domestic firms in previously closed sectors (competition effect); and (3) increasing economies of scale emerge as the industry reorganizes under the pressure of new competitive conditions (restructuring effect).

With this in mind, a number of international agreements are aimed at removing barriers to procurement for foreign firms. For example, the Agreement on Government Procurement (GPA), originally signed in 1981 under the auspices of the World Trade Organization (WTO), involves 20 parties and 46 WTO members (counting the European Union and its 27 member states, as well as the United Kingdom). It aims to "mutually open government procurement markets among its parties" and to favor and promote and ensure "open, fair and transparent conditions of competition" in government procurement. But despite the GPA and similar provisions in regional and bilateral free trade agreements, discrimination persists, and transparency in procurement remains a highly sensitive political issue for many governments.

Barriers to procurement for foreign firms can be overt—set out explicitly in the law—or they may be covert—that is, government measures that impede access to procurement or render it impossible for foreign participants to compete on the same terms as domestic participants (Carboni, Iossa, and Mattera 2017). Overt barriers include the imposition of tariffs on the imports of goods and services by foreign firms (which increases their costs relative to local players), set-aside schemes that induce procurement agencies or contracting authorities to place a share of their purchases with smaller (usually local) businesses, buy-national programs that require certain goods and services to be sourced locally, price preferences that favor local suppliers, and direct contracting with local suppliers outside of the procurement tender process or limitations or prohibitions on foreign firms in certain types of procurement. Covert barriers include barriers embedded in tender documentation that can limit the participation of foreign firms by, for example, including obligations to use only local inputs, local bureaucratic requirements that may be difficult for foreign firms to fulfill, and restrictions on the participation of foreign firms to those that have local subsidiaries in a country. Language barriers have also been cited as another major obstacle to the participation of foreign firms in procurement tenders (European Commission 2012).

According to the EU's Global Trade Alert database, public procurement barriers are one of the top five most frequently used discriminatory trade instruments, with 533 harmful interventions introduced between 2009 and 2017. Of these, localization requirements accounted for 81 percent of all recorded government interventions in procurement (although approximately 79 percent of those were in the United States). Otherwise, price preference margins are the most frequently used instrument for direct discrimination, followed by market access restrictions. In 2017 Germany and China were the countries most frequently affected by discriminatory measures—402 and 397 cases, respectively (Kutlina-Dimitrova 2018).

The empirical evidence on the effects of overt and covert measures of discriminatory procurement is more mixed than in other areas of industrial policy.

## >>> DIRECT EFFECTS

In general, economic arguments in favor of using discriminatory procurement as a tool to boost local industry have been shown to hold in small numbers or in imperfectly competitive settings where profits and rents are to be shifted (Mattoo 1997). One can argue that discrimination is rational simply because foreign profits do not enter domestic welfare, and so there are indisputable direct benefits for domestic firms (Branco 1994). The "Buy American" policy on public procurement, for example, was found to have a significant impact in curtailing foreign supplies (Lowinger 1976).

More recently, in Japan it has been shown that 40 percent of SMEs would have exited the procurement market but for the government's set-aside program, which devotes half of the procurement budget to SMEs (Nakabayashi 2013). Moreover, the higher procurement costs were outweighed by the higher levels of competition that were preserved in the market. In a study of bid preferences for smaller firms in California auctions for road construction contracts (small businesses received a 5-percent bid preference in auctions for projects using only state funds and no preferential treatment on projects using federal aid), Marion (2007) shows that they lead to an increase in procurement costs, likely because participation by larger, low cost firms is smaller in such auctions. In addition, where procurement involves important monitoring or contract compliance issues, the likelihood of performance by local firms may be higher due to opportunity costs—namely, the threat of losing future repeat business. This may be a meaningful benefit for procuring entities and justify local firm discrimination (Rotemberg 1993). In circumstances in which local firms have a cost disadvantage in the relevant product or service markets and only a limited number of firms (foreign and domestic) bid for the contract and in which local firms are subject to preferential price treatment, foreign participants could be forced to lower their bids, leading to lower costs for the procuring entity (McAfee and McMillan 1989).

## >>> INDIRECT EFFECTS

As for the indirect effects of public procurement based on local content rules, the evidence indicates that it can in limited circumstances be welfare-enhancing for society. In such contexts, shifting demand to domestic firms may reduce price-cost margins as domestic output expands (Chen 1995). Considering a ban on government purchases of foreign suppliers, Baldwin and Richardson (1972) find that when domestic supply exceeds government demand at free trade prices, a ban on foreign suppliers has no effect on domestic prices, net imports, and national welfare. By contrast, when domestic supply is less than the government demand at free trade prices, a procurement ban raises the price paid by the government and domestic output, reducing total imports and national welfare. In addition, in many contexts government demand will be too small to meaningfully affect outcomes (Evenett and Hoekman 1999).

Although there may be situations in which discriminatory procurement has the potential to lower procurement costs and it may make sense from a practical or public preference perspective, many other studies suggest that the benefits are likely to be modest at best.

Several studies argue that discriminatory procurement policies generate excessive costs for procuring entities and inefficiencies on the supply side of the procurement process that outweigh any welfare gains to society (Cox and Furlong 1997; Deltas and Evenett 1997; Uttley and Hartley 1994). Governments will likely pay higher prices for procured goods and services because without foreign competition local firms have little to no incentive to invest in technology or efficiency-enhancing improvements in production. As a result, product and service choice and quality may be more limited in protected markets. One study finds that firms in protected markets are characterized by low product specialization, resulting in uneconomical product ranges, short product runs, and higher costs (Uttley and Hartley 1994). Arguably, local content requirements embedded in procurement tenders force manufacturers to alter the composition of the products they make. Domestic content restrictions can then work to raise prices or reduce quality because manufacturers would otherwise have made different choices. Discriminatory procurement has also been found to be a driving force behind domestic and international industrial specialization by countries (Brülhart and Trionfetti 2001, 2004).

In addition, when competition is suppressed in procurement markets, it can result in cartel behavior in the form of bid rigging. This behavior reduces the purchasing power of public funds because of higher costs, thereby lowering the ability of governments to deliver public goods and services (World Bank 2017). Clarke and Evenett (2003) find that even a small reduction in bid rigging could lead to price reductions of 15 percent on 1 percent of government contracts, which in certain countries was significantly more than the average annual operating budget of national competition agencies (including in India, Kenya, South Africa, Tanzania, and Zambia). Bid rigging by four pharmaceutical distributors in South Africa from 1998 to 2007 was found to have increased prices by 10–15 percent, as compared with a brief noncollusive period in 2001. Also in South Africa, Khumalo, Mashiane, and Roberts (2014) find that a South African cartel in precast concrete products (pipes, manholes, channels and drains, railway sleepers, poles, toilets, bus shelters, and palisade fencing) has resulted in overcharges in the range of 16.5–28 percent in Gauteng and 51–57 percent in KwaZulu-Natal.

Reforms of the Russian procurement system, including laws making bid rigging punishable by imprisonment for up to three years, resulted in budgetary savings estimated at more than €26.5 billion between 2006 and 2010 (UNCTAD 2012). The average number of bidders also increased following the reform, from 9 to 26. An OECD (2003) report documents a number of instances in which countries experienced significant public savings following the adoption of transparent and competitive procurement procedures and measures to combat bid rigging. For example, Guatemala achieved savings of 43 percent in the cost of purchasing medicines; the Karachi Water and Sewerage Board in Pakistan saved Rs 187 million (US$3.1 million); Japan saw a 20 percent decline in prices across 18 tenders; and the U.S. Department of Defense saved 23 percent.
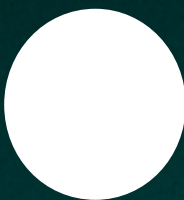
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# Combining industrial and competition policy

The weight of the evidence reviewed in the preceding section indicates that industrial policy generally fails to achieve significant positive direct effects, and it frequently risks distorting competition in the market:

- Subsidies may or may not increase productivity and innovation, depending on how they are designed. For example, subsidies appear to have more positive effects on productivity when they are more dispersed—that is, subsidies for R&D often produce more R&D, although the effects appear to vary based on the size of the firm and aid intensity. On the other hand, subsidies are also associated with distortions of competition, including allocative inefficiencies and higher markups.
- Protectionist trade policies tend to reduce rather than increase productivity and efficiency over the medium to long term. For example, although higher tariffs may induce short-term growth at the sector level, studies indicate that there are welfare losses in the long run because protected industries are unable to catch up to international peers. As trade protection declines, allocative efficiencies generally improve in associated markets and markups are reduced.
- Preferential treatment of SOEs and weak oversight are linked to SOE inefficiency and lower profitability. Although SOEs can play a key role in delivering goods and services, especially in situations of market failures, SOEs do not appear to have positive effects on aggregate employment, and they increase the financial burdens of the state. In many cases, SOEs are associated with allocative inefficiency, higher markups, overcapacity, and lower levels of development.
- Discrimination in government procurement has mixed effects. Although favoring domestic firms may have positive effects for those firms, the evidence tends to suggest that those effects are outweighed by the higher costs generated for the procuring entities, which have negative implications for overall welfare and can foster anticompetitive behavior such as bid rigging.

The ability of industrial policy to achieve its direct objectives appears to be relatively weak (direct effects), and there is growing evidence that it can lead to market distortions (indirect effects). And particularly because the overall welfare effects of industrial policies in a dynamic environment are difficult to estimate, there is a strong argument that industrial policies should aim to avoid distorting rivalry in otherwise competitive markets (Strohm 2006).

Evidence increasingly points to a new "mode" of industrial policy that supports or increases competitive pressure between firms. Recent papers (some of which were highlighted in section 3) point out that when industrial policies are designed in a competition-enhancing manner, they can mitigate the negative consequences in the economy, such as those caused by financial or production frictions, and have significant positive effects (Itskhoki and Moll 2019; Liu 2019). For example, Aghion, Boulanger, and Cohen (2011, 6) argue that "sectoral aid that enhances within-sector competition by not focusing on one (or a small number) of firms, is more likely to be growth-enhancing than more concentrated aid." Using data on medium and large companies in China between 1998 and 2007, Aghion et al. (2015) show that when industrial policies such as subsidies or tax holidays are directed to competitive sectors or are designed to preserve or increase competition (such as by inducing entry or encouraging younger enterprises), the effects on productivity or productivity growth are greater. The study finds that although higher subsidies or tax holidays are associated with higher productivity in initially competitive sectors, the results are mixed or negative for loans and tariffs. The authors thus conclude that instead of "picking winners" and distorting rivalry, there is virtue in picking sectors that are already competitive in order to enhance productivity and productivity growth. This finding is supported by Domadenik, Koman, and Prasnikar (2018), who find that when subsidies were more widely dispersed within particular sectors, they increase productivity growth by 0.03 percentage points. These findings directly undermine the notion of industrial policy that targets specific firms and seeks to create national champions as a means of driving growth.

Thus industrial policy can be reconceived as a tool to support competition. Geroski (2005) supports this view, arguing that the "competitiveness" industrial policy proponents aspire to can only be achieved, realistically, through the kind of "competitiveness" that competition policy actually strives to create. Likewise, Aghion et al. (2015, 1) argue that "there can be *complementarity* [emphasis in original] between competition and suitably designed industrial policies in inducing innovation and productivity growth." They also find when a large number of firms in a sector with a low degree of concentration receive state aid, innovation and productivity growth are enhanced. Furthermore, Aghion, Dewatripont, and Rey (1997) show that industrial and competition policies have the opposite effects on firms, depending on whether they are "profit-maximizing" firms (with efficient managers) or "conservative" firms (with managers seeking to maintain personal benefits and minimize efforts). Competition policy has a negative effect on profit-maximizing firms and a positive effect on conservative firms, while industrial policy has the exact opposite effect in each case. As such, striking the right balance between the two policy approaches is perhaps precisely what can make each effective in different market contexts.

In several instances, industrial policies that target specific sectors or firms have been designed to promote efficiency and innovation and to encourage competition among domestic firms. For example, in China in the 1970s and 1980s SOEs in the textile sector that reached their production quotas could sell their "above norm" products at 15 percent above or below the regulated prices. Xiaojuan (2002) finds that this effectively relaxed price controls to allow for more competition, and firms became more competitive as a result, increasing their output, reducing prices, and speeding up development of new products and technology. Along the same lines, Cherif and Hasanov (2019) argue that the Asian Miracle was the result of an ambitious technology and innovation policy combined with competition, specifically (1) supporting domestic producers in sophisticated industries, beyond their initial comparative advantage; (2) preferring recipients that were export-oriented; and (3) pursuing fierce competition with strict accountability. These principles favored more competition and autonomy of the private sector, indicating how well-designed industrial policies can complement competition.

To achieve complementarity between industrial policy and competition, interventions need to be carefully designed and scrutinized in order to align them with competition principles (figure 2).

In the subsidy context, to create the largest productivity gains and spur innovation, the evidence suggests that subsidies be designed in a manner that is efficiency-enhancing and promotes competition between firms. A comprehensive subsidy control framework administered by an independent agency can help governments achieve this balance to ensure measures are appropriate to achieve their purported goals, while also minimizing distortions to competition and free trade, and to ensure that no less distortive measure(s) would be more effective, appropriate, or cost-efficient. Competition-enhancing subsidies target less concentrated sectors and can include support for SME capacity building and creating supplier linkage programs to connect domestic SMEs with larger firms and FDI (World Bank 2020). For example, between 2000 and 2002 the Czech Republic's National Supplier Development Program for the electronics and automotive sectors used targeted training to improve the competitiveness of Czech SMEs and raise local content in these sectors. Within 18 months of completion of the program, one-third of participants had gained new business, and the share of components sourced from SMEs in these sectors increased from a rate of 0–5 percent at the start to 2.5–30 percent by 2004 (Malinska and Martin 2000–2002).

Protective trade policy should be approached in much the same way and designed in a manner that promotes competition between firms domestically and enables domestic firms to compete with international firms in the medium to long term. Higher import tariffs should therefore be time-limited and their effects on domestic industries closely monitored to ensure the measures generate higher cumulative benefits than costs. Governments may also consider the need for domestic firms to be exposed to imports and foreign firms in order to promote innovation, as well as knowledge and technology transfer. To achieve this, protectionist tariffs or export taxes could be removed or lowered gradually over time to allow domestic firms time to adjust, although the political economy of such steps may be challenging. In some cases, quantitative restrictions, such as import quotas, may be more appropriate and easier to design so that their protective effects decline automatically over time (Melitz 2005).
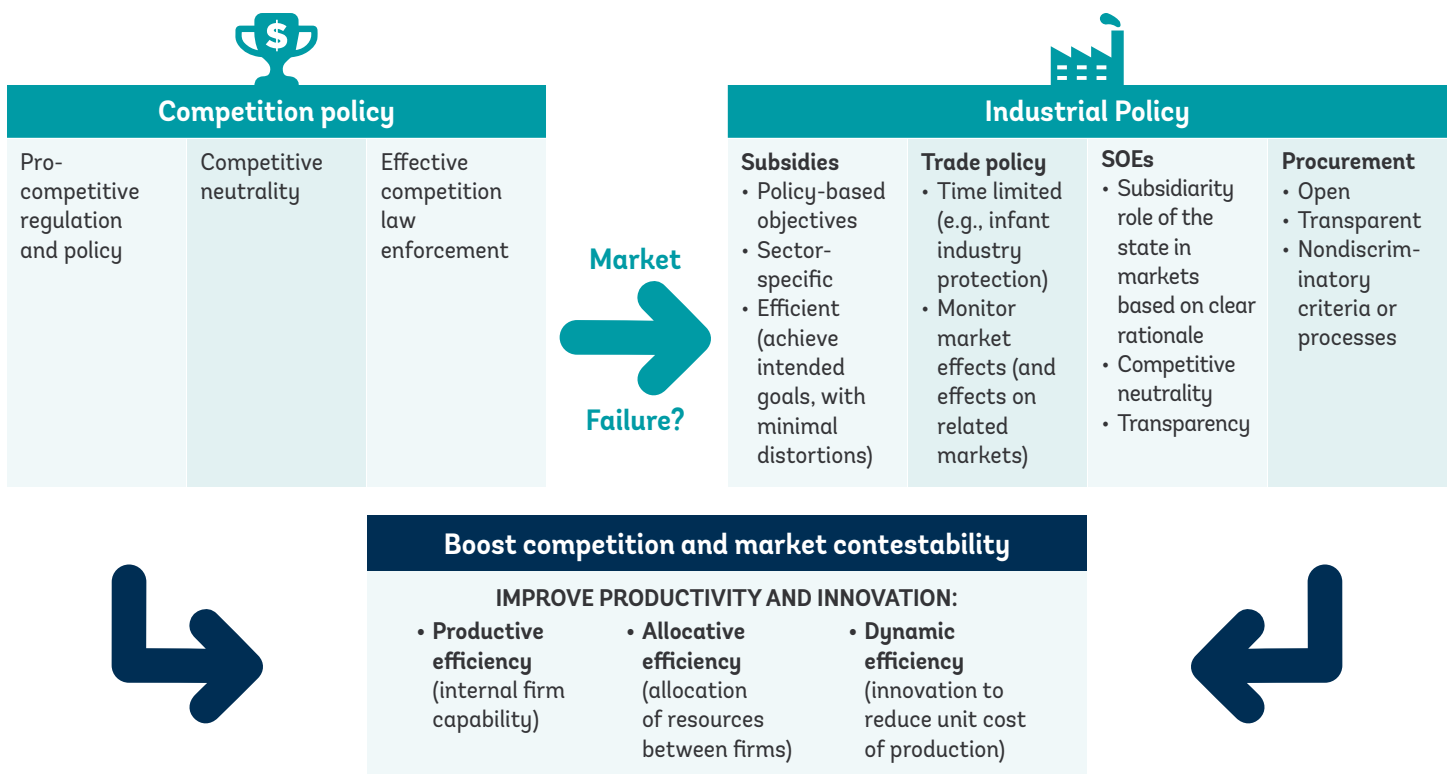
Where governments choose to participate directly in markets through SOEs, it is important to adhere to the principle of competitive neutrality and ensure that all enterprises, public or private, domestic or foreign, face the same set of rules.[3] The effective implementation of competitive neutrality reduces the risk of anticompetitive behavior by SOEs as well as market distortions created by preferential treatment to SOEs and their participation in the market. Exclusive benefits for SOEs, such as preferential financing, credit guarantees, subsidies, or exclusive rights, should be scrutinized, and wherever possible they should be removed or extended to other actors in order to level the playing field between SOEs and private companies. Furthermore, subjecting SOEs to strong corporate governance frameworks and accountability mechanisms is crucial to aligning operational incentives for SOEs and ensuring public funds are not used to cross-subsidize commercial activities.

Finally, although discriminatory procurement policies may be politically appealing and produce limited benefits in certain circumstances, their risks should be carefully evaluated in each context. Discriminatory procurement has been shown to raise prices for procuring entities, encourage collusive practices, reduce technology and knowledge transfer from international markets, and result in poorer good and service delivery. Particularly in the developing country context, there may be greater potential to deliver on social and economic objectives through public procurement that is open to foreign participants in a competitive, transparent, and nondiscriminatory bidding process.

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## FIGURE 2 - Industrial and competition policies: Links and effects



| Competition policy | | | | Industrial Policy | | | |
|---|---|---|---|---|---|---|---|
| Pro-competitive regulation and policy | Competitive neutrality | Effective competition law enforcement | | **Subsidies** <br> • Policy-based objectives <br> • Sector-specific <br> • Efficient (achieve intended goals, with minimal distortions) | **Trade policy** <br> • Time limited (e.g., infant industry protection) <br> • Monitor market effects (and effects on related markets) | **SOEs** <br> • Subsidiarity role of the state in markets based on clear rationale <br> • Competitive neutrality <br> • Transparency | **Procurement** <br> • Open <br> • Transparent <br> • Nondiscriminatory criteria or processes |

**Market → Failure?**

### Boost competition and market contestability

IMPROVE PRODUCTIVITY AND INNOVATION:
- **Productive efficiency** (internal firm capability)
- **Allocative efficiency** (allocation of resources between firms)
- **Dynamic efficiency** (innovation to reduce unit cost of production)

*Source: World Bank.*
*Note: SOEs = state-owned enterprises*

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3. For a detailed discussion, see generally OECD (2011).

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# Conclusion

The empirical record generally weighs against the efficacy of industrial policy at achieving its primary objectives (direct effects). Industrial policy fails when it targets individual firms at the expense of others with a view toward reinforcing or strengthening market position to create national champions and unlevel the playing field. A growing body of literature also demonstrates the anticompetitive effects of industrial policy and its propensity to create market distortions (indirect effects). In other words, when not done right, industrial policy can do more harm than good to markets and overall welfare. One way of reducing or even avoiding the deleterious effects of industrial policy is to ensure that it is designed and implemented in a manner that addresses market failure, supports competition between firms, and promotes efficiency.
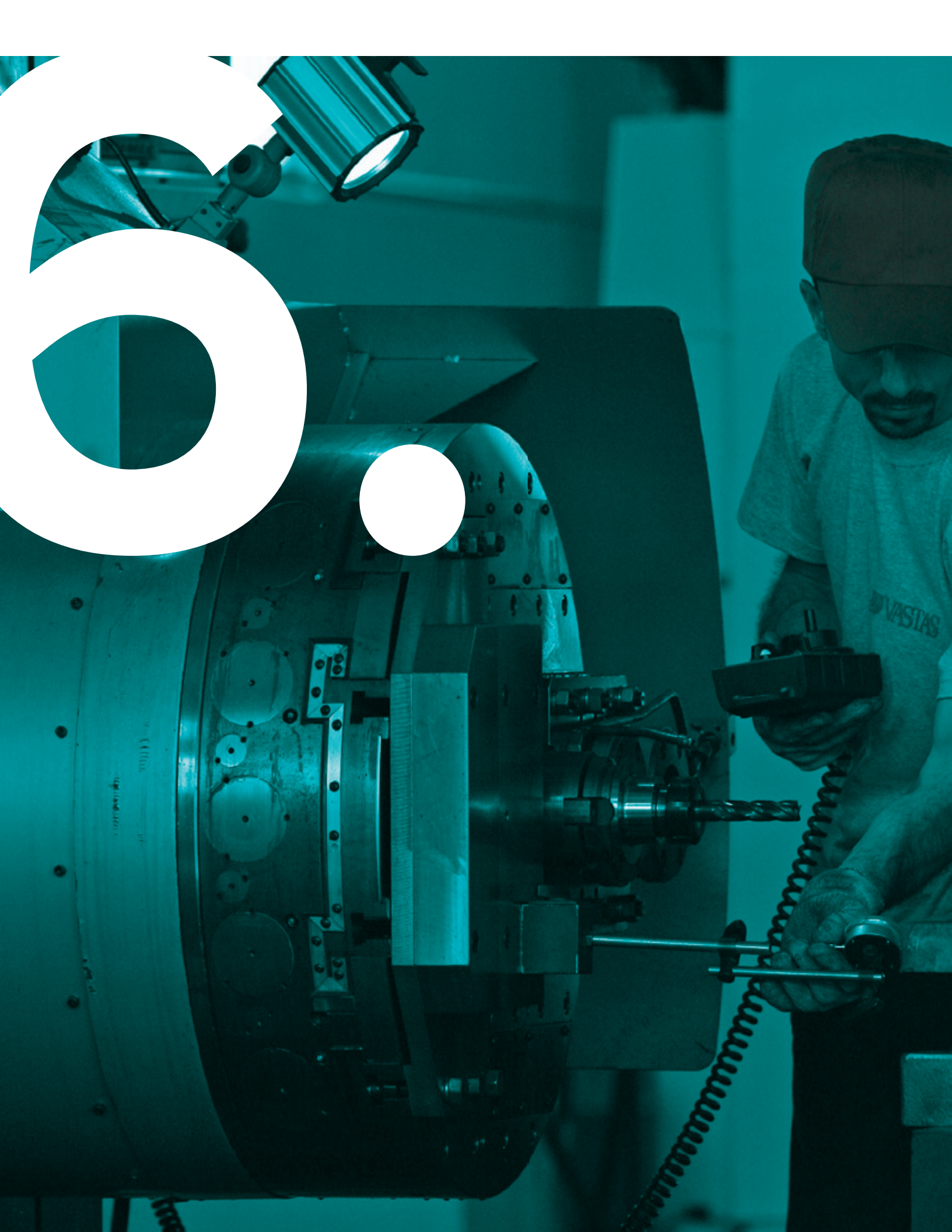
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