Industrial Policy as Zombie Economics

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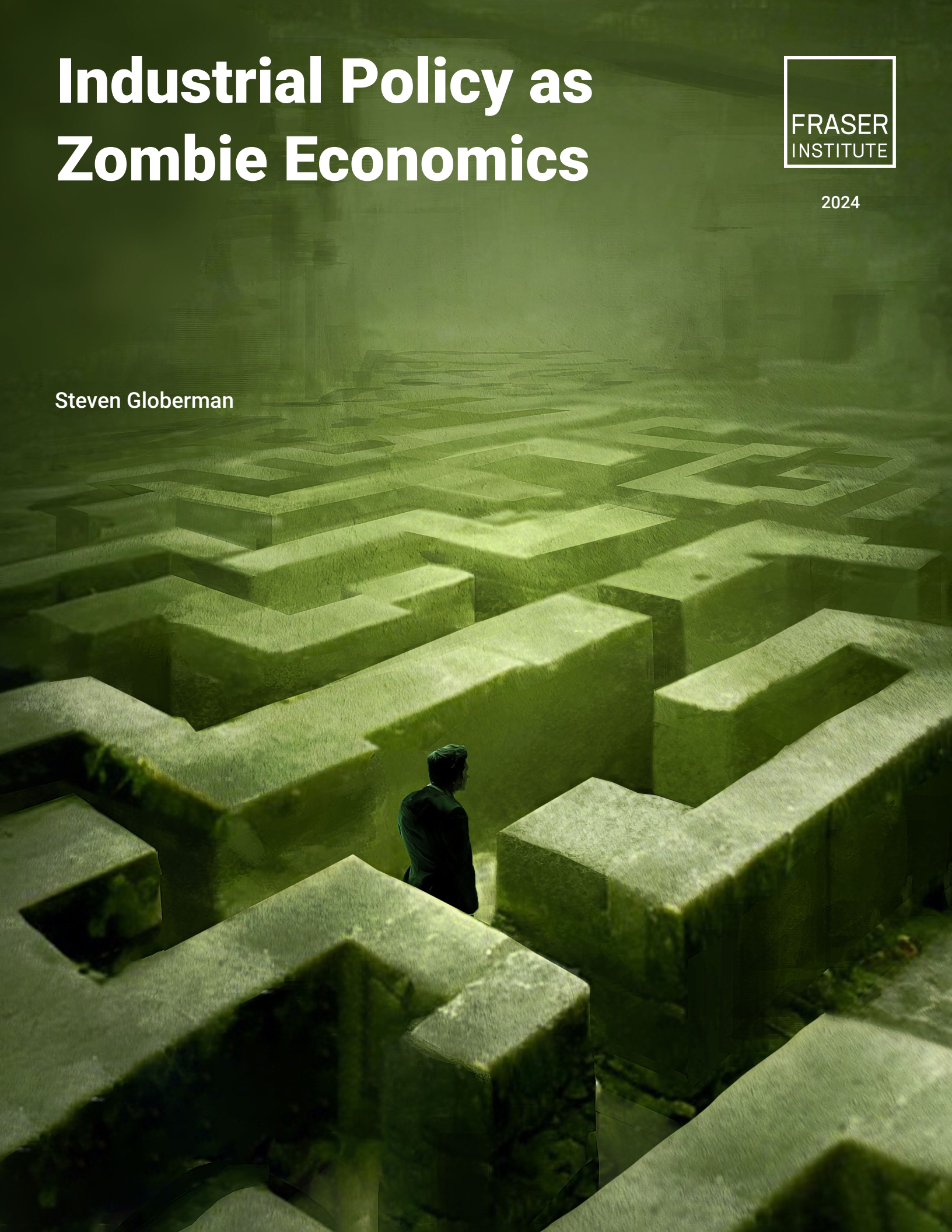

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FRASER INSTITUTE 50 YEARS

Contents

Executive Summary

- Recently, many developed economies, including Canada and the US, have implemented major government programs to promote the growth of specific industries and sectors including electronic vehicles (EVs) and the critical inputs to manufacturing EVS such as batteries, semiconductors, and Artificial Intelligence (AI).

- While not new, the resurgence of industrial policy reflects, in part, concerns about China's competitive position in the so-called industries of the future. It also reflects a renewed focus on the importance of growing the manufacturing sector to ensure self-sufficiency in the production of products such as pharmaceuticals, medical supplies, and semiconductor chips.

- The key premise behind industrial policy is that the government can and should promote the expansion of specific industries and activities that have the greatest potential to increase society's standard of living. The corollary is that the private sector, if left to itself, will underinvest in industries promising large net social benefits.

- Most economists have criticized the underlying premise of industrial policy. In particular, critics of industrial policy argue that bureaucrats ordinarily do not have the knowledge or the incentive to reallocate productive resources so as to accelerate real economic growth. Case studies of industrial policy initiatives tend to support this criticism.

- While supporters of industrial policy acknowledge the failure of many past initiatives, they argue that the underlying problems can be addressed by modifying the industrial policy process. In particular, they argue for embedding government in the private sector in what amounts to a public-private partnership to engage in transformative innovation.

- Public-private partnerships (PPPs) have been used for decades primarily in the construction and operation of infrastructure assets such as roads, ports, and hospitals. The track record of PPPs is, at best, mixed. Specifically, many PPPs have failed to deliver their anticipated net benefits because of high transactions costs associated with assigning responsibilities, monitoring the performance of the involved parties, and enforcing terms of the underlying

contractual agreement. Too often, the outcome is the termination of the PPP before its intended maturity.

- PPPs are usually structured around achieving specific explicit objectives. They also usually draw upon well understood technological and managerial principles. However, these conditions typically do not ~~obtain~~ apply in the case of transformative industrial policies which, by their nature, involve many more "partners" than do PPPs, as well as much greater economic and technological uncertainty.

- Given the problems that many PPPs have experienced, it seems unlikely that the complex cooperation and coordination between the public and private sectors as called for in new models of industrial policy will lead to more successful initiatives in the future than have been achieved in the past.

Introduction

> The critical policy consideration is not whether states should organize their economies, but how they should be organized.
> —US Senator Marco Rubio, quoted in Tucker (2019: 43)

In the aftermath of the COVID-19 pandemic, the long-standing debate surrounding the role and nature of industrial policy has strengthened.[1] The debate has been reinvigorated in part by a concern that Western economies are losing their innovative edge, particularly relative to China. It has also come to the fore in part due to worry from the Western economies about relying on political and military adversaries, again particularly China, not just for critical products in the green energy supply chain, but for semiconductors, pharmaceuticals, and precursors for medicines, among other high profile products. A growing consensus that climate change requires an accelerated substitution of green energy sources for carbon-based fuels has also motivated renewed support for industrial policy in Canada, the US, and Western Europe.

Both supporters and critics of the initiatives have identified major public policy initiatives introduced recently by governments of wealthy countries, including the US and Canada, as contemporary examples of industrial policy. The most significant recent initiatives are focused on helping to accelerate a transition away from the use of carbon fuels to sources of green energy. Prominent examples include major subsidies by federal and provincial governments in Canada to companies participating in different stages of the EV supply chain, as well as the Biden Administration's *Inflation Reduction Act*, which is largely focused on restructuring the US economy away from fossil fuels and toward green energy.[2] Tariffs and related trade policy initiatives levied by the US and European governments against Chinese EVs and other products have also reemerged as prominent instruments of industrial policy.

Ilyina, Pazarbasioglu, and Ruta (2024) used machine learning software to identify the dramatic growth in what the International Monetary Fund identifies as industrial policy interventions. Specifically, they found that a count of industrial policy initiatives increased consistently over the period 2010-2021, and that there were more than 2,500 industrial

1 See Agarwal (2023) for an overview of the recent renewal of interest in industrial policy by academics and policymakers.

2 Both governments are also subsidizing domestic initiatives in the semiconductor chip and Artificial Intelligence sectors (see Bivens, 2023).

policy interventions worldwide in 2023 alone, which underscores a growing commitment by governments to industrial policies in the past few years. The authors conclude that competitiveness was the objective for one-third of all industrial policy measures in 2023. The remaining two-thirds of these measures were motivated by climate mitigation, supply chain resilience, and national security considerations. Different forms of subsidies and export-related initiatives together account for most of the industrial policy measures they identified.

While industrial policy-related interventions and the debate surrounding industrial policy have a long history, a growing number of scholars and policymakers are calling for much more ambitious and systemic government intervention into the economy than did earlier proponents of industrial policy. The recent programs identified above, involving massive subsidies to specific participants in the EV supply chain, as well as subsidies to producers of semiconductor chips and AI software, underscore a seemingly renewed commitment to transformative industrial policy on the part of Western governments. The purpose of this paper is to identify how the nature of industrial policy and the debate surrounding its merits have evolved in recent years, and to consider whether the changing nature of industrial policy is likely to make it more economically effective or, instead, whether industrial policy deserves to be characterized as a form of "zombie economics."[3]

The paper proceeds as follows. The next section identifies definitions and objectives of what might be called traditional industrial policy. Section 3 provides a discussion of the rationale for and objections to traditional industrial policy. Section 4 briefly reviews some of the available empirical evidence bearing upon the economic consequences of industrial policy. Section 5 presents and addresses claims that some recent proponents of industrial policy have made, specifically, that new models and planning that they put forward represent a substantial improvement upon the traditional industrial policy model. Section 5 also includes an argument that the empirical literature on public-private partnerships provides relevant insights into the likely consequences of implementing what has been put forward as a new model of industrial policy. The section reviews some of the relevant evidence on the performance of public-private partnerships. The paper's final section provides concluding comments.

3 Zombie economics is a derogatory descriptor of economic ideas that have been discredited but still survive in public policy debates. It was originally used to demean supply-side economics. For a discussion of applications of this term to economic theories, see Quiggin (2012).

2. Overview of Industrial Policy

For centuries governments have practiced industrial policy. For example, in the late 1790s, then Secretary of the Treasury, Alexander Hamilton, argued successfully that the US should encourage the growth of manufacturing in the newly formed United States of America in order to diversify employment and to help the country become independent of foreign nations for military and other essential supplies. The Canadian National Policy of 1879-1895 was an instance of deliberate protection of infant industries; it used trade protection to spur the development of a domestic manufacturing sector.[4]

While government industrial policies may be centuries old, analysis of industrial policy drawing on economic principles only started proliferating in the late 1970s and early 1980s.[5] Numerous definitions of traditional industrial policy can be identified in the literature, although there is a substantial degree of similarity in the definitions. Table 1 provides a summary overview of a set of definitions.[6] The various definitions highlight the redistributive nature of traditional industrial policy, i.e., it generally encouraged some activities and discouraged others. The activities can be industry-specific, firm-specific, and/or location-specific. The definitions also suggest that industrial policy is meant to improve upon the performance of the market system, either by encouraging specific activities that would otherwise not be undertaken or by promoting increased or decreased levels of specific activities so as to achieve levels that are judged to be socially, if not privately, efficient.[7]

Table 2 identifies specific objectives of industrial policy from various sources. While the number of sources cited is necessarily limited, the information in the table leads to at least two observations. One is that earlier studies tend to emphasize the importance of

4 Kedrosky (2022), among others, argues that the promotion of import substitution came at relatively low cost to Canadian consumers. Harris, Keay, and Lewis (2015) provide some evidence that industries receiving greater protection under Canada's 1879 National Policy experienced faster growth in output and productivity than other industries. However, Alexander and Keay (2018) suggest that a multilateral move to free trade would have resulted in the best welfare outcome for Canadians, a position that is supported by successive Canadian federal governments seeking to address long-standing productivity problems through global and regional trade agreements.

5 Wraight (2024) asserts that arguments for industrial policy drawing on the concept of market failure emerged as the American left's answer to supply-side economics.

6 The summaries represent this author's interpretation and consolidation of the discussion in each of the studies cited. This is also how we prepared the summaries in table 2.

7 Put differently, traditional industrial policy was primarily focused on correcting for market failures whereby the private sector would produce too much or too little of a specific good or service in the absence of government intervention.

Table 1: Definitions of Industrial Policy

1. Reich (1982): Industrial Policy favours business segments that promise to be strong international competitors, while promoting the adjustment of labour to structural changes in the world economy.
2. Neely (1993): Industrial Policy is a set of policies designed to promote promising industries, while easing the fall of declining industries.
3. Schultze (2016): Industrial policy aims to channel the flow of private investment towards some firms and industries and away from others.
4. Tucker (2019): Industrial Policy encourages resources to shift from one industry or sector to another.
5. Hufbauer and Jumg (2021): Industrial Policy encompasses government efforts to support and nurture favoured economic sectors.
6. Lincicome (2021): Industrial Policy is trageted government intervention intended to achieve specific, market-beating industrial and commercial domestic outcomes.
7. Agarwal (2023): Governemnt efforts to shape the economy by targeting specific industries, firms or activities.
8. Siripurapu and Berman (2023): Government efforts to support particular industries that are considered strategically important.
9. Jukasz, et. al. (2023): Policies that explicitly target the transformation of economic activity in pursuit of some public goal.
10. Wraight (2024): Government designates target industries and supports their growth.

anticipating and promoting the growth of firms and industries that are technologically promising from a commercial perspective, while also helping workers transition from declining industries to sunrise industries.[8] A second is that more recent studies identify ESG-related objectives as being important priorities for industrial policy.[9] In particular, the recent literature on industrial policy highlights policies that encourage a transition away from fossil fuels to green energy. One also sees a greater number of direct and indirect

8 Wraight (2024) summarizes the objectives of industrial policy by advocates in the early 1980s as government identifying so-called sunrise sectors with high potential to create productivity spillovers and supporting those sectors, while identifying sunset sectors and implementing longer term plans to modernize and restructure them.

9 ESG is an acronym for corporate practices related to a company's environmental, social, and governance performance. Dudash (2016) is arguably one of the earlier proponents of industrial policy to identify improving environmental standards as an objective of industrial policy along with boosting the growth prospects of specific sectors. Mazzucato (2015) calls for an entrepreneurial state to generate new and innovative approaches to tackle pressing problems such as climate change mitigation and poverty alleviation.

Table 2: Focus of Industrial Policy

1. Reich (1982): Reduce the short-term costs of capital and labour for emerging industries and assist workers forced to retrain or relocate.
2. Neely (1993): Promote the development of new technology with commercial possibilities and retrain workers displaced in declining industries.
3. Schultze (2016): Provide direct and indirect assistance to existing firms and new entrants in cutting-edge sectors and support and rehabilitate major declining industries.
4. Alternburg and Rodrik (2017): Reduce regional disparities; encourage labour-intensive industries and small businesses; promote environmental sustainability.
5. Bivens (2023): Address climate change, the shortage of child and elder care and the fragility of supply chains.
6. Agarwal (2023): Enhance national security; support job-rich and inclusive growth; revitalize left-behind communities.
7. Siripurapu and Berman (2023): Promote industries critical for national security; encourage innovation.
8. Van Reenan (2023): Promote transition to green energy.

references to policies targeted at addressing inequalities related to the location, occupation, or demographic status of specific sets of workers.[10]

In summary, the main ostensible objective of traditional industrial policy is technology-led economic growth, with a related objective of mitigating the economic harm that workers in sunset industries suffer, primarily by providing temporary income support and retraining. While promoting innovation and economic growth is also a focus of newer models of industrial policy, the latter also highlight ESG-related objectives, particularly the transition to a green economy.

Academic discussions of industrial policy identify a wide variety of policy tools. They include financial subsidies, tax incentives, protective trade barriers and regulations, government-funded infrastructure, government-mandated buy-domestic programs, and research and development support.[11] Earlier vintages of industrial policy tended to emphasize trade-related measures including protective tariffs and subsidies to so-called infant

10 A focus on addressing inequalities is embedded in the term "inclusive growth" explicitly used by Agarwal (2023). In the context of a new industrial policy Tucker (2019) discusses selecting industries for favourable government treatment based partly on their employment of women and people of colour.

11 See Tucker (2019) and Agrawal (2023) for a discussion of the range of tools.

industries, particularly directed at stimulating domestic manufacturing industries.[12] More recent proponents of industrial policy tend to emphasize the role of the state in promoting innovation and entrepreneurship by shaping investments in technology, including through major R&D programs such as those that facilitated the US moon landing or the development of the Internet.[13]

While preferences regarding which specific tools of industrial policy work best differ over time, the differences are not as prominent in their implications as in the proposed scope of industrial policy, as well as the implied relationship between governments and private sector participants. In broad terms, traditional industrial policy did not encompass national economic planning. Indeed, one of the most well-known proponents of traditional industrial policy, Robert Reich (1982), argued that industrial policy was not national planning but rather a process for making the economy more adaptable and dynamic. More recently, however, Tucker (2019) posits that it is impossible to have an effective industrial policy without an economy-wide planning process with a strong national mission at its centre. Tucker further argues that mission-oriented industrial policies must foster interaction involving many different groups in society, so that formal and binding five- and ten-year indicative government planning is advisable.

12 See Reich (1982) for a discussion of how US politicians saw Japan's trade practices as a rationale for US import-substitution initiatives to promote domestic manufacturing industries. Juhász, Lane, and Rodrik (2023) posit that government subsidies and export-related measures together account for most industrial policy interventions in recent years. Populist politicians in the US have returned to the theme that domestic manufacturing industries should be protected from "unfair" foreign competition.

13 See, for example, Schwab and Malleret (2022). As noted above, trade protection seems to be returning as a prominent tool of industrial policy, particularly directed by western governments against Chinese products.

3. Arguments For and Against Traditional Industrial Policy

The fundamental rationale for industrial policy is the same broad rationale for any form of government intervention into private market transactions, namely, that such intervention will improve social welfare. Both traditional and newer arguments for industrial policy draw upon presumed imperfections in private markets that lead to too much or too little of some specific activity being carried out from the perspective of society's overall welfare. Alternatively, the imperfection may be an undesirable geographic location of an activity or an undesirable unequal income distribution resulting from economic activity.[14]

One specific market-failure-based rationale for industrial policy is the existence of public goods. These are goods or services characterized as being non-exhaustive and for which exclusion for non-payment is difficult or impossible. Non-exhaustive means that increased consumption of the good or service does not necessarily cause increased scarcity. Put differently, non-exhaustion refers to situations where increased consumption of the good or service by one group of consumers does not result in less of it being available to other consumers, holding total cost constant. National security is the classic example of a public good. By definition, securing a nation from external threats means providing security to its entire population. Increased security for one citizen does not translate into less for another. Government-funded basic research is another example of a public good, since fundamental scientific insights, once put into the public domain, are available for unlimited use. That is to say, the use of insights from basic science to advance the innovative process in one set of industrial activities does not diminish the availability of that same knowledge to advance innovations in another set of industries.

Non-excludability means that it is not economically feasible to meter the use of a service in order to price its use and exclude non-payers from accessing the service. National security is again put forward as an example of the non-feasibility of using the price system

14 The decline of Rust Belt states in the United States and the accompanying concentration of technology clusters in coastal cities has been cited by some, including current Republican vice-presidential candidate J.D. Vance, as necessitating government industrial policies to promote investment in manufacturing industries in midwestern states. For some proponents of industrial policy, the "need" for industrial policy is premised on a multi-dimensional failure of private markets. For example, Altenburg and Rodrik (2017) argue that the unfettered market-based allocation of resources is unlikely to foster structural change in a socially optimal manner that allows for high-productivity, broad-based societal inclusion and environmental sustainability.

to ration consumption and exclude non-payers. Since national security is supplied on an "all or nothing" basis, price has no obvious role to play in rationing consumption. Similarly, once basic scientific information is in the public domain, there is no economic justification for rationing its use, and it would be prohibitively costly to monitor and charge for its use even if it were desirable to do so.

Few economists would dispute that financing and, in some cases, providing public goods is a potentially legitimate activity for government. However, most would argue that "supplying" national security or basic scientific knowledge should not be characterized as industrial policy, since the supply is not targeted at specific industrial sectors, geographical regions, or segments of the population. For example, Lincicome (2021) argues that all government actions taken to advance the interests of the economy as a whole should not be understood as industrial policy. This would include not only public goods but also interventions such as free trade agreements or the distribution of vaccines to suppress epidemics such as COVID-19. Prominent supporters of industrial policy such as Bivens (2023) and Altenburg and Rodrik (2017) agree that supplying public goods should not be part of any academic debate about the merits of industrial policy, since industrial policy is mostly about "correcting" the private sector's misallocation of resources across product and geographic markets.

Addressing income and wealth inequality as well as health care, food, and housing insecurity is another prominent rationale for government economic intervention in wealthy countries (Bivens, 2023). In most cases, income transfers are implemented through dedicated programs such as Old Age Security (OAS) in Canada or Medicaid in the US. However, in some cases, government programs to promote specific economic activities, such as starting new businesses, will have conditions or set-asides to advantage particular groups, such as women or Indigenous peoples. Whether income and wealth inequality should be characterized primarily as a market failure or a consequence of misfortune or some other non-market-related cause can be debated. Whatever the causes of income and wealth inequality, Lincicome (2021) and other industrial policy skeptics argue that it is an unreasonable extension of the concept of industrial policy to identify it with programs that are primarily aimed at redistributing income as opposed to promoting faster economic growth or higher real wages.

Externalities are a second and more ubiquitous source of market failure associated with a misallocation of resources across economic sectors. Externalities arise when the private costs or benefits of specific market activities differ from the social costs or benefits. For example, calls for government policies to promote environmental sustainability are

defended on grounds that unless such policies are implemented, market participants will ignore the environmental costs of their actions as they affect other segments of society. As a result, market participants will overestimate the net social benefits of their activities and produce "too much" output from an overall social welfare perspective. Most economists accept the relevance of environmental externalities. Most also acknowledge a role for government in addressing environmental externalities. What is contentious is the appropriate form of government intervention, as well as when specific interventions constitute industrial policy.

In this regard, critics such as Lincicome (2021) would not consider a carbon tax that is applied to all participants in an economy to be industrial policy, even though carbon-intensive activities would obviously be more affected by a carbon tax than would other activities. On the other hand, extending government financial subsidies to manufacturers of batteries for electric vehicles, or to companies that mine for minerals used to produce electrical vehicle batteries, would be characterized by most policy analysts as industrial policy, since the government's actions are explicitly targeted at specific sectors of the economy in order to address what it sees as an economy-wide issue. The key distinction is that in the case of a carbon tax, the reallocation of resources is in response to changes in relative prices, i.e., the prices of carbon-intensive outputs would increase relative to non-carbon-intensive outputs, such that consumers will voluntarily shift their purchases away from the former and toward the latter, while producers would be motivated to implement less carbon-intensive production and distribution technologies into their business models. In the case of financial subsidies, government officials substitute their judgment regarding how to reduce environmental externalities for that of market participants responding to price signals.[15]

To my knowledge, there is no explicit discussion in the industrial policy literature *per se* focusing on why a carbon tax is inferior to government subsidies to participants in the green energy supply chain as a policy approach to reducing the use of carbon fuels.[16] Altenburg and Rodrik (2017) suggest one reason: they posit that consumers do not respond perfectly to price signals. Specifically, they assert that even when new products exist that are cheaper and better than existing products, many consumers stick to the "bad, old" alternatives because they do not understand the choice situation well or simply out of

15 In a later section, we will expand upon and address arguments that have been made for why bureaucratic decision-making is a more efficient mechanism than the price system to address externalities.

16 McKitrick (2013) makes the case for a carbon tax being more efficient than what he characterizes as a mishmash of regulations.

force of habit. As a consequence, industrial policy is presumably preferable to waiting for markets to reward superior energy alternatives.

Productivity spillovers are another prominent externality featured in debates about industrial policy. Productivity spillovers are a major contributor to external economies of scale. The latter arise when increases or decreases in economic activity in one segment or sector of the economy affect productivity growth in other segments or sectors. Bartelme, Costinot, Donaldson, and Rodriguez-Clare (2021) assert that the textbook case for industrial policy exists if some sectors are subject to external economies of scale, whereas others are not. In such cases, they argue that a *prima facie* conceptual case exists for government to subsidize the first group of sectors at the expense of the second.

The productivity spillover concept as it appears most typically in the industrial policy literature encompasses so-called external (or agglomeration) economies that have been identified in studies of regional and urban innovation clusters. The basic notion underlying the relevance of geographical clustering is that as more activity of a specific type takes place in a geographical location, the more profitable it is (up to a point) for future activity to be undertaken in that location.

While there are different sources of external economies, a major source is technology spillovers which exist when scientific, engineering, and organizational innovations implemented by one or more firms are adopted by other firms without the innovating organizations being fully compensated by the beneficiaries for the efficiency (and presumably profitability) gains that are generated by copying or reengineering the original innovations. The implication of external economies is that as more activity of a specific type takes place in a geographical location, the more profitable it is (up to a point) for future activity of that type to take place in that location. However, innovative organizations that are potential first movers may not make the necessary initial investments at scale given the risks associated with being a first mover, as well as the likely competition from fast followers who can be expected to copy or reengineer the new techniques or business practices introduced by the first movers.

Since existing evidence suggests that technology spillovers tend to be confined to relatively circumscribed geographical areas, e.g., a portion of a census metropolitan area such as downtown Toronto or the San Francisco Bay area, public policies to promote technological change frequently intersect with regional development policies.[17] However, what

17 For a discussion of the geographical scope of productivity spillovers with an empirical application to the Canadian software industry, see Globerman, Shapiro, and Vining (2002).

makes industrial policy distinct from regional development policy is the notion that government planners can identify economic activities characterized by significant external economies of scale and implement industrial policies that promote increased investment in those activities, thereby effectively moving productive resources from slower growing to faster growing industries and locations.

The relatively strong empirical evidence in support of the relevance of technology spillovers related to the geographical clustering of firms and skilled scientists and engineers is a potentially strong rationale for government intervention of some sort. Even so, a relevant point of contention between proponents and opponents of industrial policy concerns whether government intervention targeted at promoting specific sectors, regions, and producers will stimulate technological change more efficiently than policies focused on improving the environment for innovation broadly, i.e., across all firms, industries, and locations, e.g., through general tax policy, support for public education, intellectual property protection, and so forth.

To extend the market-versus-bureaucrat decision-making dialectic, lower capital gains taxes, stronger intellectual property protection, increased supplies of skilled scientists and engineers, and private property rights effectively make innovation a more profitable market activity, either by lowering input prices and/or by increasing the net profit margin associated with innovating. This should encourage more innovation activity generally, and thereby increase technology spillovers, particularly in industrial sectors and geographical locations where entrepreneurs believe it is most efficient to carry out innovative activities. The industrial policy approach would have government officials extend direct subsidies or tax incentives to specific firms engaged in particular activities and in specific locations. A recent example of the latter is the hefty subsidization by the federal and provincial governments in Canada of EV battery production and mining of critical minerals in specific locations, e.g., southwestern Ontario and Quebec, respectively.

It is possible to debate whether and when economically significant external economies exist such that there is an opportunity to create net social benefits through industrial policy. In this regard, a criticism of industrial policy is that policymakers employ exaggerated estimates of production externalities in many, if not all cases (see Bartelme et. al., 2024). As a result, government intervention often ends up having net costs to society. A related and important caveat is that secure private property rights can facilitate the internationalization of potential technology spillovers. For example, transportation infrastructure creates economic opportunities for new businesses located near that infrastructure including property developers and retailers. Fees charged directly for the relevant transportation

services will not fully capture the economic value created by the transportation infrastructure, which has been an historical argument for governments to subsidize railroads, port facilities, and the like to encourage infrastructure investment. However, in many cases, companies developing infrastructure can potentially invest in activities that benefit from economic spillovers if they are not prevented from doing so by regulations or competition policies. To the extent that market solutions to internalizing spillovers are feasible and not restricted by laws or regulations, the spillover argument for industrial policy becomes more tenuous.

A more general criticism of industrial policy is that government officials have insufficient information to deliver net social benefits through selective industrial policy initiatives. That is, policymakers are insufficiently informed about where major industrial growth opportunities exist in the economy. A related concern is that the reallocation of productive resources resulting from industrial policy will be unduly influenced by political lobbying such that productive resources are wasted, and governments will be captive to entrenched interests, often specific firms and industry groups, so that inefficient patterns of production created by industrial policy are perpetuated for long periods of time.[18]

Holcombe (2013) discusses the phenomenon of "crony capitalism" in which government relies on business expertise to design and implement regulations, as well as direct and indirect government subsidies to the private sector. Since industry participants have more information than do government bureaucrats about the industry, they will steer public policy in directions favourable to the industry and not to the general public. Furthermore, the increased profits from initial government policies will be capitalized in the prices of assets once they are sold by the original beneficiaries. The buyers of those assets will then have strong incentives to lobby for the continuation of policies that created the additional profitability in the first instance. This dynamic contributes to the perpetuation of lobbying for inefficient interventions into the private sector by government, as well as the perpetuation of the underlying policies.[19]

Prominent advocates of industrial policy such as Altenburg and Rodrik (2017) acknowledge that policymakers are, at most, no better than entrepreneurs at anticipating commercial opportunities. Moreover, they concede that markets encourage the creativity of individuals who take personal risks in pursuit of profits. Nevertheless, they argue that "improved" models of industrial policy can address the acknowledged weaknesses of

18 For a discussion of these various criticisms of industrial policy, see Lincicome (2021) and Hufbauer and Jung (2021).

19 Holcombe (2013) references an extensive literature on regulatory capture to support this line of argument.

traditional industrial policy. We discuss and evaluate proposed new versions of industrial policy in Section 5. In the next section, we review some empirical evidence on the effectiveness of industrial policy.

4. Some Evidence on the Effectiveness of Industrial Policy

There is a substantial literature focused on evaluating industrial policy, and it is beyond the scope of this study to provide a comprehensive review of this literature. Table 3 provides a brief review of some studies of industrial policy focused primarily on promoting specific industrial sectors and regional clusters. Specifically, table 3 summarizes a number of studies that assess different government initiatives targeting specific industries, geographic locations, or firms.[20] In the table, a plus or minus sign indicates whether the author(s) of the relevant study concludes that the industrial policy in question was an economic success or failure, respectively, given the policy's objectives. A combined plus and minus sign indicates that the economic outcome of the policy in question was mixed or that the author offered an equivocal assessment of the policy.

The broad takeaway from table 3 is that the evidence on the outcome of industrial policy is mixed, although the majority of studies summarized in the table offer a negative assessment. In particular, industrial policies promoting individual companies tend to fare badly (Hufbauer and Jung, 2021). Table 3 identifies several assessments of attempts by governments to create a "national champion" in specific industries. Agarwal (2023) discusses the cases of Airbus and COMAC. The Airbus consortium was created in Europe in the late 1960s and received direct government subsidies, as well as a government commitment to absorb financial losses. As is well known, Airbus became a formidable competitor to Boeing, although the company continued to receive subsidies for decades after it was established. Conversely, the Commercial Aircraft Corporation of China (COMAC), a state-owned company, has yet to have its commercial airliner certified by any major aviation authority outside of China, notwithstanding government investments of up to US$70 billion. Hufbauer and Jung (2021) identify the US government's financial support of Solyndra, a manufacturer of solar cells, as a notable failure at using financial incentives to promote an individual company. Conversely, Warwick and Nolan (2024) argue that the rise to prominence of the Korean electronics firms Samsung and LG in the 1990s can be

20 Warwick and Nolan (2014) note that most evaluations of industrial policy focus on industries or sectors. They also discuss in detail the challenges associated with evaluating the success or failure of industrial policies. It should be acknowledged that the studies summarized in table 3 might overrepresent or underrepresent evidence of successful industrial policy. However, the sample of case studies is relatively large and therefore likely to reflect a consensus in the literature.

Table 3: Some Findings on the Impact of Industrial Policy

	Country Level	Industry Level	Firm Level
Agarwal (2023)	European Consortium		Airbus + COMAC –
Siripurapu, et.al. (2023	Japan South Korea Taiwan	Steel + Semiconductors + Semiconductors ? Semiconductors ?	
Hufbauer & Jung (2021)	U.S.	Military Technology + Research Triangle Park + Steel – Textiles – Semiconductors – Solar Panels	Solyndra –
Lincicome (2021)	U.S.	Semiconductors	SEMATECH –
Neely (1993)	Japan	Steel – Oil –	Honda – Sony –
Lechevalier, et al.	Japan	Robots +/ –	
Stern, et al. (2013)	Sweden	Competence Centres Program +	
Martin, et al. (2011)	France	Local Productive Systems –	
Bellago, et al. (2013)	Sweden	Poles of Competitivenss Policy –	
Nishimura and Okamura (2011)	Japan	Industrial Cluster Project –	
Engel, et al. (2012)	Germany	Biotech +	
Viladecano-Marsal, et al. (2012)	Spain	Cluster Initiative +/ –	
Danish Agency for Science (2011)	Denmark	Cluster Policies +	

traced to financial support provided to those companies by the Korean government in earlier decades.

A larger number of studies focus on sectoral industrial policies, especially as implemented by European and Asian governments, and particularly by Japan. Neely (1993) disputes the notion that industrial policy was primarily responsible for Japan's economic success. Indeed, she highlights cases where industrial planning would have gotten things spectacularly wrong had it actually been implemented, such as the efforts of Japan's Ministry of International Trade and Industry (MITI) to discourage Honda from getting into the automobile industry and Sony from getting into the consumer electronics business. Lechevalier, Ikeda, and Nishimura (2010) discusses public programs aimed at supporting

the emergence of next generation robots in Japan in the early 1990s. The programs apparently had a positive effect on the research productivity of participating firms but failed to stimulate the emergence of a Japanese robotics industry, other than in a few niche applications. Neely (1993) identifies steel and oil as two of the many Japanese industries that have received government financial support but that have been a drag on the Japanese economy. Nishimura and Okamura (2011) evaluated the impact of Japan's Industrial Cluster Project on the R&D productivity of company participants. They concluded that participation in the initiative did not affect the R&D productivity of participants. More generally, Beason and Weinstein (1996) and Lee (1997) failed to find a clear association between government sectoral support and total factor productivity growth in Japan and Korea, respectively.

Cohen and Noll (1991) examine six US federal government industrial policy programs originating in the 1960s and 1970s and found that none were successful.[21] Similarly, Hufbauer and Jung (2021) identify a number of US industries, including steel, textiles and apparel, automobiles, and semiconductors, that received trade protection and government financial support but could not meet foreign competition or improve productivity.

To be sure, there are studies that identify successful industrial policy initiatives, particularly policies designed to promote technology clusters. For example, Engel, Mitze, Patielli, and Reinkowski (2013) conclude that German government initiatives aimed at fostering inter-firm collaboration in the biotech sector gave rise to increases in biotech patent applications.[22] Falck, Heblich, and Kipar (2010) evaluated the 1999 Bavarian High Technology Cluster initiative in Germany. This government program aimed to increase innovation and competitiveness in the region of Bavaria by stimulating co-operation between universities, businesses, and financial institutions in five target industries. The authors found that the initiative increased the probability that firms in a target industry would innovate. The Danish Agency for Science, Technology and Innovation (2011) evaluated cluster policy in Denmark and found strikingly positive program impacts in terms of the increased probability of participating firms being innovative. Hufbauer and Jung (2021) identify the North Carolina Research Triangle Park and Florida's Biotech Center as successful examples of government policies to promote technology clusters.

21 The six programs involved federal government financial support for the supersonic transport, the space shuttle, communications satellites, the breeder reactor, photovoltaics, and synthetic fuels. In the authors' opinion, the programs suffered from unsustainable annual budgets made worse by the fact that they continued to receive financial support long after they should have been terminated.

22 Conversely, Wong (2011) discusses the billions of dollars that Korea, Taiwan, and Singapore poured into commercial development of biotech with no significant resulting commercial success.

Conversely, Viladecans-Marsal and Arauzo-Carod (2012) assess a policy implemented in Barcelona, Spain, aimed at forming a cluster of knowledge-based firms. The authors found that the cluster initiative did increase the share of knowledge-based firms in the locality but only modestly. Moreover, the effect stagnated over time, and at least some of the positive effects might have come at the expense of neighbouring areas. Martin, Mayer, and Mayneres (2011) evaluated the Local Productive Systems in France which was aimed at supporting inter-firm cooperation across a range of economic sectors. The policy was found to have no effect on employment or exports. Nor did it reverse declining total factor productivity in industries suffering from weak productivity growth. Also, the authors found no significant effect with regard to enterprise survival rates. France launched a subsequent policy that involved government financial subsidies for innovative projects managed collectively by the research departments of selected companies and universities. Bellago and Dortet-Bernadet (2013) assessed this policy. Their evaluation found that firms targeted by the policy increased their R&D spending more than similar firms not targeted. However, targeted firms did not enjoy increased sales, patents, or exports compared to other similar firms.

Broad evaluations of industrial policies at the national level also offer conflicting conclusions regarding their effectiveness. Again, a major focus of these broad evaluations is on East Asian countries. Juhász, Lane, and Rodrik (2023) assert that many regional specialists ascribe at least part of the East Asia region's economic success to the strong hand of the state during industrialization.[23] However, most mainstream economists hold the view that industrial policies were, at best, ineffective and at worst harmful. In a similar vein, Siripurapu and Berman (2023) note that while many experts contend that industrial policy stoked the East Asian miracle, others maintain that the effects of industrial policy on economic growth are overstated or mistaken. For example, a number of economists have argued that the economic success of South Korea and Taiwan is the result of their embrace of international trade, not industrial policy.

Cheang (2024) also questions the relevance of industrial policy to Singapore's remarkable record of economic growth following its independence in 1965. While he does not reject the contribution of industrial policy, he highlights the importance of the government's open international trade policy and its receptiveness to inward foreign direct investment as contributors to its success. He identifies the rule of law and a relatively

23 Juhász and Lane (2024) specifically argue that South Korea's Heavy and Chemical Industry government program in the 1960s that set out to transform the nation into a heavy industry powerhouse drove increased output and export development in the targeted sectors.

corruption-free government as factors encouraging the capital investment that has been a major contributor to Singapore's impressive economic growth.[24]

South America also receives attention in the industrial policy literature. Siripurapu and Berman (2023) capture the broad conclusion of the relevant studies in their observation that governments in the region have sought to promote domestic industries by discouraging the importation of manufactured goods through tariffs and other trade restrictions. Some new industries and successful companies have been formed, but industrial policy has also resulted in corruption, inefficiency, and unsustainable government deficits.[25]

In summary, the empirical evidence regarding the economic benefits and costs of industrial policy is not definitive, although it provides strong grounds for skepticism about whether the current enthusiasm among Western governments for major industrial policy initiatives is justifiable as good public policy.[26] Notwithstanding the empirical evidence discussed above, proponents of so-called "new" industrial policy argue that past failures of industrial policy reflect poor design and implementation, and that the shortcomings can be remedied. In the next section, we discuss and evaluate this argument.

24 Chang cautions that to the extent industrial policy was successful in Singapore, that success might be specific to institutional features of Singapore's economy. Others have raised similar cautions about drawing inferences about the success or failure of industrial policy based on the experiences of specific countries.

25 Kedrosky (2022) identifies the Canadian National Policy of 1879–1895 as a successful instance of the deliberate protection of infant industries using tariff protection to develop a national manufacturing sector. However, in many secondary manufacturing industries in Canada, productivity performance has been relatively poor such that policymakers came to see trade liberalization with the United States, in particular, as a necessary remedy. On the latter point, see Head and Ries (1999).

26 Juhász, Lane, and Rodrik (2023) argue that new studies employing sophisticated econometric techniques provide more favourable support for industrial policy success than older studies, although they acknowledge that success is dependent upon the policy's goals and the instruments used. Ilyana, Pazarbasioglu, and Ruta (2024) cite analysis by the International Monetary Fund (IMF) of industrial policy initiatives worldwide in 2023, which concludes that industrial policy is frequently captured by special interest groups, as critics of industrial policy warn. The IMF also found that policies implemented by individual countries lead to trade and subsidy-related retaliation by other countries.

5. Features of New Industrial Policy and an Evaluation

Whereas traditional industrial policy was motivated primarily by perceived specific market failures that potentially justified government intervention, more recent arguments for industrial policy emphasize the prominent role that government plays in the economy by providing public goods, regulating specific business practices, financing and carrying out research and development, and so forth. It therefore makes sense for the extensive interactions between the public and private sectors to be coordinated with due consideration to the ongoing overall "competitiveness" of the private sector.[27]

In this regard, a notable distinction between traditional and new industrial policies is the latter's embrace of public-private partnerships to promote social goals rather than top-down government directives. In an early example, Rodrik (2004) posits that the right model for industrial policy is not that of an autonomous government applying taxes, subsidies, and other policy instruments, but of strategic collaboration between the private sector and the government with the aim of uncovering where the most significant obstacles to restructuring lie and what types of interventions are most likely to remove them. He goes on to argue that the right way of thinking about industrial policy is as a discovery process where firms and government learn about underlying costs and opportunities and engage in strategic coordination.

Altenburg and Rodrik (2017) characterize the collaboration between the private sector and government as "embeddedness," whereby government policymakers maintain close relationships with the private sector and other stakeholders in order to acquire a deep understanding of how specific economic sectors function, what the business rationale of private actors is, and where bottlenecks exist to achieving optimal outcomes in the public interest. They go on to say that industrial policy is about facilitating stakeholder dialogues on the direction of structural change, moderating different viewpoints, finding compromise, and creating consensus on broadly defined development pathways. In short, industrial policy, in this newer formulation, should be perceived as a collaborative process in which public and private sector stakeholders closely interact and continuously negotiate

27 To be sure, references to addressing market failure through industrial policy still resonate in the recent literature on industrial policy, especially related to climate change as discussed earlier. See, for example, Altenburg and Rodrik (2017).

and adapt their contributions to industrial development and particularly to technological innovation and entrepreneurship.[28]

Altenburg and Rodrik (2017) acknowledge the risk that collaboration between private sector stakeholders and governments could encourage and facilitate rent-seeking by stakeholders that harms productivity and generates subsidies for narrow private sector interests at the taxpayers' expense. However, they argue that governments can draw a line between collaboration in the public interest and favouritism by implementing clear and transparent rules regarding who makes what decisions and the criteria by which decisions are made.[29] They also argue that policymakers can be held accountable for their industrial policies by disclosure requirements that can be audited by central auditing authorities and challenged in independent courts.

It is difficult to criticize a suggestion that governments should be better informed about how specific laws and regulations will affect private sector activities. Nor is it particularly controversial to posit that broad public policy goals such as reducing the use of carbon fuels in favour of wind and solar energy sources should be determined through the democratic process in which voters choose political representatives whose positions best align with theirs on specific policy goals. Rather, the relevant issue surrounding the new industrial policy is whether and to what extent stakeholder-government partnerships will enable government to more efficiently accelerate innovative and sustainable real economic growth by identifying and promoting specific industrial sectors and technologies rather than by broadly encouraging innovation and entrepreneurship through instruments such as the tax code, trade and investment agreements, funding and carrying out basic research, immigration and education policies, and so forth.

In this regard, the experience of public-private partnerships (PPPs) can be informative. PPPs are partnerships between the public sector and the private sector for the purpose of developing a project or a service traditionally provided by the public sector. The claimed advantage of PPPs is that private sector managerial skills and financial acumen will create better value-for-money outcomes for taxpayers when proper cooperative arrangements

28 Mazzucato (2015) has been especially prominent in calling for a "developmental network state" in which government facilitates collaboration among a range of actors with diverse specializations and technical capacities to help generate new and inventive approaches to ensuring innovative growth. Juhász and Lane (2024) acknowledge that effective collaboration likely requires substantial investments in creating administrative capacity.

29 Altenburg and Rodrik (2017) suggest using independent scientific and engineering expertise to evaluate proposed industrial policy initiatives as one safeguard against specific interest groups "capturing" government policies. See, for example, Hufbauer and Jung (2021).

between the private and public sectors exist. They involve the type of embeddedness of government in private sector activity that is a feature of new industrial policy.

To be sure, PPPs are much less ambitious than industrial policy that aspires to transform whole sectors of the economy, as the former are typically focused on specific and well-defined projects such as building a road or a port facility.[30] They also involve fewer stakeholders than the transformative agendas that are featured in initiatives such as Green New Deals. Hence, to the extent that PPPs are not generally successful in generating enhanced value for taxpayers' money, there is ample reason to be skeptical about how successful ambitious industrial policies will be in achieving accelerated rates of innovation and real economic growth on an economy-wide basis.

As in the case of industrial policy, the literature on PPPs provides an ambiguous assessment. For example, Casady, Verweij, and van Meerkerk (2022) review a number of studies evaluating PPPs in different industrial sectors and across a range of countries. They conclude that the evidence for a cost-performance advantage for PPPs is mixed. However, there is clearer evidence that PPPs have a performance advantage in time and service quality. Wang and Zhao (2018) also highlight a mixed result for a sample of five Virginia PPP highway projects. Specifically, the projects were successful in accessing innovative finance, but their performance was largely unsatisfactory in terms of reducing contracting cost risk.

Ontario 360 (2023) provides a less equivocal evaluation of PPPs. This report notes that for the past two decades, PPPs have been the favoured model for delivering large-scale infrastructure in Canada, including public transit lines, highways, bridges, and hospitals. It asserts that PPPs have become synonymous with some of the worst performing infrastructure projects in the country. In particular, projects in the transit sector increasingly appear to be unaccountable and unmanageable.[31]

Vining, Boardman, and Poschmann (2005) present and discuss a model that identifies the serious challenges to successful collaboration between the public and private sectors for PPPs. Specifically, PPPs can often be prone to conflict between the contracting parties, as well as high contracting costs and opportunism, where the latter phenomenon refers

30 The "counterfactuals" are also different when comparing PPPs to industrial policy. In the former case, the counterfactual is the government sector financing and operating the relevant infrastructure asset(s). In the case of industrial policy, the counterfactual is that investment and innovation decisions are directed by market forces and not by consultation with government accompanied by direct or indirect government financial incentives.

31 Chong, Huet, Saussier and Steiner (2006) examine a database of 5,000 French local authorities to explore the impact of PPPs focused on water distribution where the performance measure is consumer prices. They conclude that conditional on the choice of a PPP, consumer prices are higher on average for PPPs than for government financed and managed systems.

to one or the other party to a collaboration seeking to renegotiate more favourable terms to the original agreement. They provide case study evidence from six major infrastructure projects in Canada, as well as a summary analysis of PPPs for prison systems in the US. The cases cited confirm the difficulties associated with cooperation based around contracting, particularly in the presence of complexity, uncertainty, and the requirement for one or another party to invest in assets that are specific to the project in question. Asset specificity creates the potential for opportunism which, in turn, often undermines the necessary ongoing cooperation between the contracting parties.

The challenges associated with public-private sector coordination in pursuit of industrial policy goals such as transformational innovations or eliminating the use of carbon fuels or remedying income inequality across gender and racial lines, are orders of magnitude greater than those facing conventional PPPs of the types briefly reviewed above. As discussed earlier, proponents of a new approach to industrial policy characterize it as a process of discovery through close interaction between public and private sector participants who must continuously negotiate and adapt their contributions to industrial development and/or to achieving broad environmental or social goals.

The need for even periodic renegotiation of terms of agreement between parties to PPPs is a major hurdle to the success of PPPs, even when the project's objective is well defined and the underlying technology is well understood. The broader and less easily measured goals of recent and suggested industrial policies compared to PPPs, along with the increased number of likely participants, and the much greater technological and economic uncertainty surrounding so-called "moonshot" public policy initiatives, make it very unlikely that many of the relevant initiatives will be successfully and efficiently carried out.

6. Concluding Comments

Industrial policy, while not always identified as such, has been practiced by governments for decades if not centuries. The focus and specific features vary over time, but the enduring principle underlying industrial policy is that the government should, directly or indirectly, promote the expansion of specific activities (e.g., Artificial Intelligence) or broad sectors of the economy (e.g., the Electric Vehicle supply chain), while "cushioning" or facilitating the orderly contraction of other, less economically promising or otherwise undesirable activities or sectors (e.g., oil and gas exploration, extraction, and refining). Historically, industrial policy has focused on encouraging the growth of specific manufacturing and advanced technology sectors. More recently, a major focus of industrial policy in developed countries is to encourage the electrification of their economies in pursuit of climate change goals, although populist politicians in the US have made the reshoring of manufacturing a prominent recent feature of their support for industrial policy.

An enduring criticism of industrial policy is that capital markets and not government officials are best positioned and have the greatest incentives to determine how financial capital and other productive inputs should be allocated in order to promote real economic growth and higher standards of living. Private investors, including operating businesses, have the incentive to identify and finance economic opportunities in pursuit of increased wealth, and to defund investments that prove to be financially unpromising. While proponents of industrial policy argue that bureaucrats can be made financially accountable to taxpayers in the same way that companies and investment managers are accountable to their shareholders and clients, the fact that government employees have no residual claim on any net economic benefits linked to their decisions regarding resource allocation is a critical feature of government funding that distinguishes it from private investing.

In fact, proponents of new approaches to industrial policy do not argue for displacing private sector decision-making with decision-making by government officials. Rather, they argue that the public and private sectors should effectively act as partners to identify opportunities for transformational innovation and economic development, as well as to identify and implement broad initiatives and specific actions that will ensure that financial and other productive resources are made available for the expansion of prioritized sectors and activities. They further argue that while embedding the public sector into private sector decision-making presents challenges, the resulting partnership can improve upon the autonomous decisions and actions taken by private sector managers and investors.

The limited success of PPPs, which are far more narrowly focused in their objectives and circumscribed in scope compared to the transformational changes envisioned for recent industrial policy initiatives or in calls for future attempts at moonshot innovations, is a reason for strong skepticism about whether new industrial policies will be any more successful than earlier versions. In particular, the broader, less well-defined, and more complex the tasks that must be defined and accomplished, the more likely it is that the parties to the relevant activities will be less accountable and act more opportunistically—which is a recipe for policy failure.

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