

## **New Thinking in Industrial Policy: Perspectives from Developed and Developing Countries**

### **Policy Brief**

#### **Introduction**

For a long time, economic thought emphasized market efficiency over industrial policy, viewing government intervention in sectoral allocation and technology choice through industrial policy with skepticism. However, advances in economic theory and recent empirical evidence have challenged the assumption that markets are always efficient, particularly in areas affecting the pace and direction of innovation. Market failures, such as those related to climate change, exacerbate these inefficiencies. Today, there is a consensus that markets alone cannot efficiently address climate-related investments in R&D, and while a carbon price is necessary, it is insufficient to address market externalities. Therefore, industrial policy has become essential. Additionally, in an era of intense global competition, countries without strong innovation policies risk falling behind. Finally, the pandemic and its aftermath showed that markets on their own may not prove sufficiently resilient, again for reasons that advances in economic theory have elucidated.

In their opening remarks, Professors Joe Stiglitz and Eric Verhoogen emphasized the fact that the return of industrial policy in the political sphere has triggered a response in economics, political science, law, and many other disciplines to work towards a better understanding of how to make industrial policy more effective. Professor Verhoogen contextualized that this conference particularly is interdisciplinary in nature, in order to foster collaboration. Professor Stiglitz reflected on his time as the Chairman of the Council of Economic Advisors and Chief Economist at the World Bank, where industrial policy was in fact practiced, but not under that name; and that since his tenure in those positions, it has come back to the forefront of politics and economics. He discussed the importance of growing the knowledge base around industrial policy to address the questions of when and how to do industrial policy.

Climate change and global competition has created a sense of urgency; and this urgency underpins the adoption of the Chips and Science Act and the Inflation Reduction Act (IRA) in the United States, though political factors largely influenced their design, which may have limited their effectiveness from an economic standpoint—not only the bang for the buck but the extent to which they effectively address the twin challenges of climate and global competition. The long-standing aversion among economists to industrial policy left policymakers with little guidance in designing these strategies effectively. However, even under staunch free-market advocates such as Reagan and Thatcher, industrial policy persisted through defense spending and other strategic measures. Today, the debate has evolved from whether to use industrial policy to how to implement it effectively to address market failures and promote social welfare. Each presentation at the “New Thinking in Industrial Policy: Perspectives from Developed and

Developing Countries” conference, held at Columbia University on November 1st and 2nd, 2024, offered insights into the past, present, and future of industrial policy in the United States and globally.

Professor Dani Rodrik, in his keynote presentation “Remaking Industrial Policy: Avoiding Pitfalls, Meeting New Challenges,” argued that there is a broad case for industrial policy, including technology externalities, addressing coordination failures, providing missing public inputs, and second-best factors. Policymakers also have a diverse range of instruments.

Rodrik illustrated his points with examples of successful green industrial policies in China, which achieved remarkable growth in solar panel innovation and production. China’s approach involved a diverse toolkit beyond subsidies, such as directed credit, public investment in R&D, government procurement, industry consolidation, and a flexible implementation strategy. This approach featured collaboration across government levels and with private industry, allowing for adaptation and adjustment based on results.

Rodrik challenged economists to move beyond outdated caricatures of industrial policy. Instead of viewing it solely as a remedy for spillovers with rigid, arms-length conditions, he urged a move toward collaborative and interactive, flexible policies that embrace causal evidence of success. He highlighted the importance of iteratively engaging with the private sector to shape goals and continuously adapt strategies, as seen in successful local economic coalitions. With an iterative cooperation between the government and private sector, Rodrik argued that industrial policy could be effectively leveraged to address diverse market failures and achieve long-term social and economic benefits, especially in a global context where nations with robust innovation policies will gain competitive advantages. He also urged economists to embrace the recent causal evidence showing how and why industrial policy can be effective in addressing market failures and promoting structural change across a wide range of settings.

### **History of industrial policy - what has worked in the past and what hasn’t?**

The conference featured several speakers who focused on the lessons from past industrial policy experiences of both developed and developing countries. In the case of Malaysia, Raj-Reichert focused on the role of industrial policy in the semiconductor industry, emphasizing its legacy of policies since the 1970s designed to attract foreign firms through incentives such as tax exemptions and free trade zones. She noted that these policies led to Malaysia’s dependence on foreign companies for industrialization, particularly in the semiconductor sector, with Penang becoming a major electronics cluster. Her analysis also highlighted how recent developments, including the COVID-19 pandemic and US-China trade tensions, reinforced Malaysia’s position in the global semiconductor value chain, attracting new investments. Moreover, she argued that Malaysia’s National Semiconductor Strategy of 2024 introduced

conditions on investments to encourage higher-skilled jobs and local vendor development, signaling a shift towards a more proactive and strategic industrial policy.

Fieldhouse assessed the impact of government-funded research and development (R&D) on productivity growth in the US, focusing on the effects of federal R&D appropriation shocks. The findings showed that nondefense R&D funding significantly boosted productivity and innovation, accounting for an estimated 20-25% of total factor productivity (TFP) growth in the postwar period. Moreover, the results revealed high economic returns on nondefense R&D, estimated at 140-240%, underscoring the critical role of government support in advancing technological progress. By contrast, defense R&D did not show similar impacts on productivity growth, which could be due to its focus on weapons development with limited spillovers to the civilian economy.

Focusing on the South Korean experience, Jaramillo examined the impact of the G7 Program, South Korea's first large-scale, mission-oriented R&D initiative aimed at advancing technological capabilities to compete in high-value markets. Launched in the 1990s with over \$7 billion in funding and involving around 100,000 researchers, the program selected 18 megaprojects targeting frontier technologies. Jaramillo's findings revealed that by the 10th year after receiving support, targeted technological classes had doubled their patenting output and tripled exports compared to control classes, indicating a significant boost to innovation and economic outcomes. The study also found that the G7 Program shifted South Korea's innovation trajectory, yielding high returns with a benefit-cost ratio of 3.3 and an internal rate of return of approximately 21%.

In another study focusing on South Korean industrial policies, Barteska examined the role of bureaucratic capacity in driving South Korea's export growth, specifically through the activities of the Korea Trade Promotion Agency (KOTRA). His research highlighted that individual bureaucrats had a significant impact on export outcomes, with a one-standard-deviation increase in a manager's ability boosting exports by 37%. Barteska found that the effect of industrial policies depended heavily on the implementing capacity of these bureaucrats. Office openings under KOTRA led to a 38% increase in exports, and bureaucrat experience influenced the success of specific product categories, suggesting a path-dependence effect. The study concluded that the success of South Korea's export-oriented policies was strongly linked to the skill and experience of the bureaucrats executing them.

Examining Italy's experience with a regional development program, Cerrato analyzed the long-term macroeconomic effects of the Cassa per il Mezzogiorno (CasMez) initiative, which targeted industrial development in southern Italy from 1950 to 1992. His findings highlighted that CasMez significantly boosted local manufacturing output and employment, helping reduce the economic divide between the industrial North and agrarian South. The program facilitated infrastructure development and attracted firms through subsidies, leading to increased labor mobility and higher population retention in the South. However, there were notable crowding-out effects on

nearby non-targeted regions. Overall, Cerrato calculated a regional multiplier of 1.7 for manufacturing output, showing that place-based industrial policies can yield self-sustaining regional growth, albeit with substantial costs per job created.

To understand the effects of industrial policy of one nation on the production of another, Professor Sharon Traiberman looked at sabotage as a form of industrial policy. The model used considers sabotage as a shift in foreign productivity due to policies by the planner in a domestic country. Small changes in sabotage do not shift production, but if the change in production is sufficiently large, then production shifts, leading to increased wages in domestic and loss in efficiency in foreign. Adapting this to semiconductors and other trade models, the key takeaway was that small sabotage lowers real income and comprehensive sabotage raises real income. Traiberman concluded by presenting potential expansions of the model regarding mechanisms for sabotage and adding more realistic features.

### **Current state of industrial policy- what has been implemented and how is it doing?**

Throughout the two days of the conference, many speakers focused on current cases of industrial policy around the world, and provided insights into what these policies look like in practice and how effective they have been. A major theme that connects many presentations had to do with industrial policy in the technology sector, looking mainly at microchips and green technology.

#### *Microchips*

Hassan Khan, Director of Economic Security at the CHIPS Program Office, discussed how the CHIPS Act in the United States is playing out on the government level and explained many of the provisions of the act. The CHIPS Act sets economic and national security as priorities, such that every project that applies for funding must have a clear plan to improve the priorities. So far, the awards have been well spatially distributed, bringing manufacturing to places that previously never had it or where there had been de-industrialization.

Using a cross-country lens, Professor Jeff Thurk contextualized the US CHIPS Act further, and shows how it stacks up to other countries. China specifically has been catching up to Taiwan, the current leader in semiconductor fabrication, which is due in large part to its large expenditure on industrial policies boosting semiconductor production. Thurk concluded by looking at the effects of learning by doing; he finds large learning by doing rates across firms.

#### *Green Technology*

To evaluate US policies on electric vehicles (EVs), Professor Susan Helper characterized what goals were set by the Biden administration and how much has been accomplished. The Biden administration set a target that 50% of vehicle sales in the US would be EVs by 2030, and planned to achieve this through supply and demand side subsidies, regulations, and tariffs. So far, we have seen that auto employment is at its highest since 2006, annual EV sales are ahead

of projections, and manufacturing investments have increased largely thanks to national policy. Important takeaways that Helper emphasized are that investment has crowded in due to joint goal-setting and identification of bottlenecks, the importance of active stakeholders and state capacity in increasing benefits, and that the policies so far have not fully incentivized organizational/supply chain transformation.

Shifting towards the EU, Pálma Polyák of the Max Planck Institute for the Study of Societies discussed the battery policy in the EU, focusing on Hungary. Hungary under Prime Minister Orban has put forth a goal of becoming the 3rd largest battery producer in the world (it is currently 4th behind China, the US, and Germany), despite not having many of the resources necessary domestically in Hungary. The EU's objectives regarding battery production have been climate neutrality, strategic autonomy, and promoting industry and jobs. The EU has largely been supportive of Hungary's ambitions, but there are contradictions with their objectives, notably unclean practices in Hungary's production and reliance on foreign firms (who own 100% of battery capacity in the country, versus Sweden's 100% domestic ownership). This disconnect shows that through the EU's weak enforcement, the battery production in Hungary has many issues regarding democracy and the green transition as a whole.

When looking at the policies and implementation on their own, many speakers pointed out the situation in the EU as being inefficient and undergoing transformation and other roadblocks for effective industrial policy.

#### *European Union*

In the EU, funding can come from many different sources due to the complex structure of European governance, and Professor Tobias Wuttke discussed the EU's Important Projects of Common European Interest (ICPEI) tool. ICPEIs have many conditions attached to them, such as needing to cover several member states, ex-ante conditionalities, and a lengthy negotiation stage regarding the selected member states and firms. The complexity of this funding mechanism has led to perverse outcomes, such as member states turning to alternate sources, including the EU Chips act (which allows funding to go to a single member state). These barriers lead to less coordination on the European level, and call into question how industrial policy in Europe can be effectively implemented.

Professor Kathleen McNamara used a political science lens to explain the transition to market activism. The EU was built for neoliberalism, meaning a strong promotion of free trade and less market regulation, and in this new era of industrial policy, the EU has reevaluated its place in the economy and the goals it sets. The current goals of the EU, shaped by industrial policy, can best be understood as aspirational, which includes decarbonization, the green transition, and the digital transition, and competitive/strategic, which includes technological innovation, supply chain resilience, and weaponized interdependence. Going forward, the EU will need to adjust its tools and capacity to enforce and achieve these goals through the reshaping of institutions, coalitions, and powers.

### *Roadblocks*

An important aspect of implementing industrial policy relies on the regulatory tools used and the ownership of firms that are involved, as discussed by Ishana Ratan, Ph.D. candidate at the University of California, Berkeley. Ratan discussed the case of Colombia, who had a bright future in solar energy when they approved 90 projects to compete in the renewable energy auction. However, it was found that foreign firms were quick to abandon projects when regulatory barriers were too high. Local firms, since they often have no choice but to remain, work with the government to improve regulation, which is a key process in effective industrial policy. The evidence shows that growth from domestic investment is slower, but more constant while growth from FDI scales faster but plateaus. The ideal future has some sort of cooperation between both foreign and domestic firms, as well as responsive but firm governance.

In making effective industrial policy, many mechanisms are used, and looking at the effect of certain policies on efficiency and innovation provides insight on ways we can better support firms to achieve society level goals.

### *Efficiency*

On the firm level, supporting firms directly through tools like referrals, as discussed by Professor Jing Cai, can improve both efficiency and quality of products. Cai's study focuses on the effect of reducing barriers to connecting suppliers and clients, through a system of referrals, which take the form of information on new suppliers for clients and information and a subsidy on new suppliers for clients. Client firms that were growth oriented saw the biggest effect of the program, especially in terms of connecting with the referred supplier firm and maintaining that relationship after the subsidy was given (for firms that received one). By reducing friction in valuation and contracting, upgrading is more likely to occur and allow client firms to create higher quality products for cheaper prices.

### *Innovation*

Using technological protectionism, the mobile app industry in China, under the "Great Firewall," has had an increase in innovation, as discussed by Jie Zhou, job market candidate at MIT. The protectionist policies around the internet in China means that many apps developed and used in the US and the rest of the world are not available in China, leaving a gap in the market once they are restricted in the country. This blockage leads to increases in demand, in-house technology usage, increase in use of domestic app libraries, and an expansion of the domestic ecosystem. These effects are not limited to China, many apps foreign to China use Chinese app libraries and there are increases in use of these apps, especially within Asia. The canonical view on technology transfers and diffusion is that trade increases diffusion, but evidence from Brazil, presented by Gustavo de Souza (Federal Reserve Bank of Chicago) challenges this assumption. By looking at the effect of tariffs on technology transfer and exports, it was found that a higher import tariff leads to more diffusion of technology, since it is cheaper for a foreign firm to transfer its technology than to export. The opposite is true when tariffs are lower, foreign

firms are more likely to export directly to Brazil than to transfer their technology. The exports entering the market on their own do not facilitate diffusion.

### **The way forward- how can we improve industrial policy?**

Synthesizing the growing body of knowledge on industrial policy, many presenters proposed ways forward for industrial policy, suggesting ways we can reframe our thinking to better achieve the goals of industrial policy. As we have seen, implementation and the structure of the policies themselves can hinder otherwise effective industrial policy. Focusing on how we can use the industrial policy in practice, and modeling it after frameworks that have worked in the past can make for more impactful industrial policy.

#### *Implementation*

Looking at industrial policy from a legal lens, specific challenges and recommendations begin to emerge, as presented by Joel Michaels (Law and Political Economy Project). Industrial policy presents unique challenges that do not cleanly fit in the democratic framework that has developed over time, as tools like loans, grants, and procurements have become standard in administering industrial policy. Going forward, there need to be clear doctrines that outline the balance of power between the government and its agencies, as well as the firms receiving funds.

#### *Models for industrial policy*

Professor Christopher Snyder looks at Operation Warp Speed, the response to Covid-19 and the creation of its vaccine, and how applicable this framework of accelerated development is to industrial policy and the issues it aims to solve. These innovation missions have occurred a few times throughout US history, and they are characterized by prodigious spending, multiple shots on goal, long shots, push and pull funding, and leadership and coordination. Issues that are of national importance, time sensitive, require uncommon coordination, have a well-defined technical goal, and are inadequate for the commercial market prove to be the best candidates for innovation missions. Snyder concludes by evaluating atmospheric carbon removal as a potential issue for an innovation mission, saying that it could work, especially since the efforts that we have implemented thus far have proven too slow to keep up with the rapidly evolving and growing issue of climate change.

When looking at the organization of industrial policy and how to coordinate it among industries, we have to consider all parts of the supply chain especially when it comes to the green transition, Professor David Hémous outlines. It is the consensus that we need to increase the speed of the green transition, but the debate often falls onto the how, especially in terms of carbon pricing and industrial policies. When looking cross-sector along the supply chain, evidence suggests that there is a network argument to start downstream, and small nudges (small and temporary sectoral subsidies) to key sectors can have large long-run effects, meaning a “big-push” is not necessarily the only way to support the green transition.

### *Thinking*

As the academic discourse continues to arise and develop, it is important to standardize the language we use regarding industrial policy in every discipline, and Professor Ann Harrison provided a simple, yet effective framework. Harrison proposed the 4Cs: correct, consult, compete, and conclude. To evaluate industrial policy, we can ask if it is correct (does it address the market failure we are targeting), if it consults the right people (strong institutions and embeddedness), if it competes (allowing for national and global competition to correct failures), and what we can conclude from it.

In order for industrial policy to be actionable and effective, Professor Mariana Mazzucato proposed that we use mission-oriented thinking for industrial strategy. Mazzucato opened with the example of the moon landing, how the overarching mission was to get to the moon and back in a short period of time, which was further broken down into many projects with outcome oriented procurement. In this case, it was bottom up, and spun off into twenty different projects each with their own spillovers. An important takeaway from this analogy is that it is important not to pick winners, but to reform procurement and see solutions coming from the inputs towards the outcome oriented goal. Mazzucato also points to the fact that we have been able to have this level of coordination during war time (and by extension through DARPA), so it is possible and we need to turn global issues (i.e. climate change) into urgent priorities. Finally, for these global issues we face, we need global cooperation, something that has started to become an issue with the IRA, due to Africa losing many green industries to the US.

### *Future for developing and developed countries*

Zooming out towards the state of green industrial policy on the global level, there are different stories for developing and developed countries as discussed by Tim Sahay (Net Zero Industrial Policy Lab). Green industrial policy has been around for a few decades at this point, starting in the mid-1990s in China, and moving to Germany, the UK, Korea, and Japan in the 2000s. With this perspective, the IRA is a relatively late entrant, and the US is playing catch up with China in the green transition. However, for developing countries, industrial policy has long been suppressed by global organizations like the World Bank, IMF, and WTO, which is only now starting to lift the structural roadblocks. Even with the changing landscapes, many developing countries do not have enough domestic revenue to pursue investment the way that developed countries have. Because of this, many developing countries have tried to negotiate with the developed countries to gain access to the funds and technologies of the green transition. There is a growing debate regarding the future of AI and how to regulate it, which keynote speaker Professor Alondra Nelson outlined and proposed answers to in her talk. AI is a technology with a diverse set of use cases, many of which are net good for society, including in science, expanding accessibility, and boosting efficiency. However, these positive outcomes are not the inevitable outcome for the future of AI. Through government stewardship, which can add friction, it is possible to guide AI towards those positive outcomes. So far, the Biden administration has issued an executive order and an outline for an AI bill of rights, both of which



are intended to steer the development of AI towards trustworthiness and social good. Nelson argued that science and technology policy is industrial policy, and we need to consider it in the growing discussion on industrial policy. Existing policies on technology are equipped to handle the rise of AI to certain extent, but there is room for new and innovative policies that will ensure the positive development of AI and allow the US to maintain its competitive advantage in the technology.

## **Conclusion**

Evidently, there is a promising future for industrial policy given the wide range of scholarship presented at this conference. By looking at the past, present, and future of industrial policy, we allow ourselves to move past the question of whether or not we should use industrial policy to the question of what effective industrial policy is and how we can implement it.

Looking at the body of work presented regarding other countries that have achieved growth through industrial policy, there are many lessons that we should consider in the implementation of industrial policy here in the United States. Common trends emerged throughout the presentation: the importance of private-public partnerships and relationships, the high returns to funding research and development, and the necessity for effective governance. Internalizing these lessons in the U.S., through revising current policies to fit the needs of targeted industries and supporting government agencies with knowledge generated through research, will allow for industrial policies that can achieve the set goals and address key market failures.

This conference highlighted an important nuance that we must consider in the growing discussion on industrial policy—an interdisciplinary conversation. Hearing from not only economists, but legal scholars, political scientists, and government officials, can broaden the scope of research that each participant can carry out. Holding space and facilitating these discussions among researchers from all different backgrounds has proven fruitful in generating ideas and moving the literature forward.

In their concluding presentation, Professors Joseph Stiglitz and Martin Guzman provided a concise argument against the notion of free trade that had long been championed by the west and ask important questions that will shape the future of industrial policy. Stiglitz and Guzman presented a model that demonstrates the implications of free trade without transfer of knowledge between countries in economies with learning by doing. The key takeaway from this model is that global GDP is lower in the long run and inequality between the two countries will increase in the presence of free trade. Applying this to where we are today, imposing free trade on disadvantaged and developing countries would replicate trade patterns that existed during colonial times, thus reinforcing the neocolonial trends that neoliberalism upheld. As it stands, the US wrote the rules against industrial policy, and we have started to use it once again, while developing countries do not have the resources to compete. We now need to shape institutions

and the global architecture to facilitate the transfer of information and technology to allow for a more level playing field and faster global growth.

In his concluding remarks, Professor Stiglitz reflected on how the intellectual discourse surrounding industrial policy had left and now returned, and that the richness of discussion over the course of the conference shows that there is still so much to be said about industrial policy. The opportunity for many disciplines beyond economics, including political science and administrative law, to come together allows for a more complete understanding of industrial policy, and in turn shape industrial policy that is more effective and equipped to address global issues.