



Using Industrial Policy for Productive Transformation: Three Lessons from Development Economics for US Industrial Strategy

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Introduction

The latest US experiment with industrial policy, embodied in the Inflation Reduction Act (IRA), the CHIPS and Science Act, and the Infrastructure Investment and Jobs Act (IIJA), comprises historic public investments in domestic manufacturing, infrastructure, and energy. These emerging policies have sparked a range of reactions—from outright opposition to any use of industrial policy, to pleas for restraint, to calls for far more ambitious action.

Underlying much of this disagreement is a lack of consensus about the nature of the challenges that US industrial policy could or should address: Those who oppose any use of industrial policy seem to deny that the US faces problems that might benefit from industrial policy solutions, while those who argue for greater ambition recognize that the US faces myriad challenges—not least the existential challenge of climate change—that are unlikely to be met without profound transformation of the production systems that make up the US economy.

In the sections that follow, I argue for a broad understanding of the intersecting challenges that US industrial strategy could and should address, and offer some timely lessons from an academic field devoted to the problem of productive transformation: development economics.

What Problem(s) Should US Industrial Policy Try to Solve?

“Industrial policy” in its broadest sense refers to the deployment of policy tools with the intent of influencing how we create value—what goods (and services) we produce and how we produce them. As Tucker and Sterling (2021, 3) point out, there are varied scholarly understandings of industrial policy. Economist Ha-Joon Chang (2003, 112), for example, describes it as “a policy aimed at particular industries (and firms as their components) to achieve outcomes that are perceived by the state to be efficient for the economy as a whole.” Mario Cimoli, Giovanni Dosi, and Joseph Stiglitz (2009, 7-8) argue that industrial policies “come together with processes of ‘institutional engineering’ shaping the very nature of the economic actors, the market mechanisms and rules under which they operate, and the boundaries between what is governed by market interactions, and what is not.” The common thread in different understandings of industrial policy is a recognition of the role of government as a key actor in shaping the world of production in line with a public purpose.

Although neoliberal ideology attempted to frame industrial policy as a renegade measure undertaken only by nations that unwisely refuse to leave the functioning of the economy to the “free market,” today there is growing awareness that all nations use industrial policy on an ongoing basis, whether or not they acknowledge it as such. Many conventional policy measures—from public investment allocations and trade measures to environmental regulations and public procurement rules—influence which industries and production methods thrive or decline, which economic (and social) actors win or lose power, who creates value, and who captures it. Therefore, whether or not policymakers frame such policy measures as industrial policy, that is precisely what they are.

The specific uses of industrial policy, however, vary widely. States have historically deployed industrial policy for a wide range of purposes, from narrow objectives like temporarily ramping up production of a strategic good (e.g., masks during a pandemic), to far broader and more ambitious missions, like winning wars or transforming poor countries into rich, industrialized ones (I return to this in a moment).

At this historic juncture, there are compelling reasons to think that the intertwining societal challenges the US faces call for similarly ambitious, transformative use of industrial policy—albeit one guided by more constructive objectives.

The most salient reason is, of course, the existential threat of climate change and environmental degradation, rooted in a system of production that has been unambiguously diagnosed as terminally self-destructive from a range of scientific perspectives. The way we make useful goods—from steel for housing to fertilizer for food—uses natural resources unsustainably and produces all manner of air, land, and water pollution that severely undermines human health and the ability of the planet to support life in the long run.¹ The hurricanes, heat waves and wildfires ravaging the globe are only the earliest symptoms of dysfunction of a productive system designed to prioritize short-term profit over long-term value or human survival. In other words, it's unlikely that our species will survive without an ambitious industrial policy capable of swiftly reshaping productive systems to deal with a range of existential environmental vulnerabilities.

The emerging US industrial strategy recognizes climate change as a central industrial policy problem and has the potential to make significant progress toward climate targets—as long as policymakers are capable of ensuring that clean energy investments are actually clean ([Stokes 2023](#)). Yet, the full scope of existential environmental threats we face (e.g., biodiversity loss, soil depletion, water pollution) have yet to be integrated as priorities of US industrial strategy.

¹ See, for example, [Environmental Protection Agency \(EPA\) 2022](#); [Manthiram and Gibkoff 2021](#).

Moreover, if we raise the bar from "ensuring species survival" to ensuring survival, in decent conditions, for more than a privileged few, a host of other productive transformation challenges come into view.

First, it has long been evident that the burden of environmental degradation falls much more heavily on poor Black, Brown, and Indigenous communities ([Zwickl, Ash, and Boyce 2014](#)). If we aspire to less racist and inequitable outcomes, environmental injustice has to be integrated as a priority problem in the redesign of production systems.

If we raise the bar further to the still-modest goal of ensuring that all human beings have access to basic necessities for a healthy life, a host of additional challenges emerge that require industrial policy as part of the solution: In the US, more than [137 million people](#) breathe unsafe air and [30 million people](#) lack reliable access to safe drinking water, mostly as a result of the methods we use to produce goods—both useful and superfluous. And yet tens of millions lack access to those goods: [37 million people](#) live in poverty, more than [38 million](#) experience food insecurity, and at least [half a million](#) go without shelter each night—all while a mere [50 billionaires](#) hold more wealth than the poorest 165 million Americans. This systematic misallocation of resources also has deep implications for the kinds of goods our society makes—evidenced, for example, by an abundance of unutilized vacation and [secondary homes](#) alongside shortages of affordable [\(or free\) housing](#).

It goes without saying that such deep and intertwined societal challenges cannot be solved exclusively through industrial policy—they require a broader program of economic transformation—but considering that dysfunctional production systems are at the core of many of these problems, an ambitious and transformative industrial policy needs to be part of the solution.

However, transformative industrial policy is no easy task. As US policymakers undertake the challenge, they can draw many valuable insights from the global history of industrial policy experiences. The sections that follow highlight three timely lessons.

The Perils of Underestimating the Scale of Necessary Policy Interventions

One of the key takeaways from the development economics scholarship is that productive structures (a country's collection of technological-productive capabilities) are highly persistent across time. Studies of long-run trade dynamics have shown that countries

specialized in exporting low-value-added products are very unlikely to shift toward specializing in more sophisticated products ([Gala et al. 2017](#)). Moreover, this global pattern of productive specialization has been largely persistent over two eras of globalization with far-reaching impacts on economic outcomes: as economists studying historical trade patterns have shown, the economic divergence between rich and poor countries that emerged during the first era of globalization resulted from unequal gains from trade between exporters of raw materials and manufactured goods ([Weber et al. 2021](#)).

The difficulty in transforming a nation's productive structure has been evident to policymakers since well before the industrial revolution, and sensitivity to the scale of the challenge motivated ambitious industrial policies in the countries that would become protagonists in that process. France's Finance Minister Jean-Baptiste Colbert (1619-83), for example, [banned imports of Venetian glass](#) to protect the state-owned glass manufacturer that today is the construction materials multinational St. Gobain. Long before that, England began to experiment with industrial policy in the 14th century, when King Edward III (1327-77) sought to develop local wool manufacturing capabilities by importing Flemish weavers (the leaders in the industry at the time), banning the import of woolen cloth, and even wearing English cloth to set an example (Chang 2002, 19).

The origin stories of today's industrialized economies are variations on this theme of ambitious, path-defying policies,² including in the US, which began by promoting "infant industries" in textile and steel manufacturing when Alexander Hamilton (as Treasury Secretary)³ defied British pressures—[and advice](#) straight from the mouth of Adam Smith—to continue specializing in raw materials and leave manufacturing to Britain. Much like these early industrializers, the few countries that have managed to achieve path-defying change in the 20th century (e.g., South Korea, Taiwan, Japan, and China) have done so not by allowing preexisting market dynamics to determine their productive structures but by reshaping those structures using a range of tools—from price management and public enterprises to trade management and workforce planning (Weber 2021; Wade 2004; Chang 2002; Amsden 1989).

Today's existential challenges call for a productive transformation at least as profound as these historic processes of industrialization.

² For detailed discussions on this, see Chang 2007 and 2002.

³ Hamilton articulated his arguments for nurturing and protecting new industries in his Report on Manufactures (1791), and the thesis was later developed by Friedrich List (1885) (Chang 2002, 25-6) and complemented by the insights of the classical development economists in the 20th century, such as Albert Hirschman, Arthur Lewis, and Raul Prebisch.

US industrial strategy already features vigorous deployment of public investment and [complementary "carrots,"](#) but pathbreaking change will entail more extensive use of the tools that have been historically required to fundamentally reshape economies:⁴ For example, "sticks" like industry-wide rules to bring pollution levels in line with climate and human health targets may be less politically tractable than "carrots," like grants and procurement preferences, but they will likely be needed to achieve meaningful change.⁵ And more potent tools and institutions from the industrial policy toolbox, like price management, public banks, public enterprises, and public equity stakes will likely be needed sooner or later—using them sooner could help mitigate the scale of the damage; but eventually they'll be used regardless to manage the crises we're not able to prevent.

The Perils of Sidelining Human Well-Being in Industrial Strategy

The field of development economics emerged as a response to what it deemed "the economic problems of poor countries." Motivated by a concern of expanding consumption capacity, classical development economists focused on questions related to how states could achieve capital accumulation for technological change, economic diversification, industrialization, and, as a result, per capita growth.⁶ Though these economic processes were seen as "means" to the "end" of increasing living standards, the relationship between "growth" and "living standards" was largely unexamined: Rising living standards, it was assumed, would be the natural byproduct of increasing per capita income through industrialization.

However, mounting evidence that growth often did not improve human well-being gradually forced development economists to broaden their framework for understanding the problem of "development." Mahbub ul Haq, who would later champion the "human development" approach in the United Nations, succinctly describes this shift: "When rapid economic growth during the 1960s failed to translate into improvements in the lives of Pakistan's masses, I was forced to challenge many of the premises of my initial work" (Haq 1995, xvii).⁷ Similarly, reflecting on the early stages of his economic thinking, Raul Prebisch—one of the key figures of the structuralist development economics and Latin American development—writes:

⁴ For some immediately applicable ideas, see [Datta et al. 2022](#).

⁵ For a broader discussion of these tools, see [Tucker 2019](#).

⁶ See for example, Hirschman, Albert O. 1958. *The Strategy of Economic Development*. Yale University Press; Lewis, William Arthur. 1954. "Economic Development With Unlimited Supplies of Labour." *Manchester School of Economic and Social Studies*, 22(2), 139–191; Myrdal, Gunnar. 1957. *Economic Theory and Underdeveloped Regions*. London: G. Duckworth; Prebisch, Raúl. 1984. "Five Stages in My Thinking on Development." In G.M. Meier & D. Seers (Eds.), *Pioneers in Development* (pp.173-204).

Up to this stage, I had not paid sufficient attention to the problem of income disparities [nor] to the fact that growth had not benefited large masses of the low-income population, while at the other extreme of the social structure high incomes flourished. Perhaps this attitude of mine was a remnant of my former neoclassicism, which assumed that growth in itself would eventually correct great income disparities through the play of market forces. ([Prebisch 1984](#), 181)

The spirit of Prebisch's and Haq's self-critiques is reflected in the evolution of development economics, which gradually expanded its normative gaze to include issues like inequality, unemployment, and the fulfillment of basic human needs. Nobel Laureate Amartya Sen's *Development as Freedom* (1999) cemented a humanist turn in development theory—a shift toward a human-centric perspective on development that built in part on the "basic needs" scholarship. The "human development and capabilities" scholarship centers questions of how policies can expand human capabilities (or freedoms), and more recently has begun to explore how that expansion can be achieved within ecological boundaries ([Balogun et al. 2023](#)). The shift away from growth-centric models is also reflected in the proliferation of metrics that add to—or altogether displace—growth as a proxy for societal prosperity.⁷

This evolution of development economics can be read as a record of a gradual realization that (i) an economic transformation that expands growth does not necessarily expand well-being; (ii) the expansion of well-being also involves policies that have little or nothing to do with growth; (iii) policies for economic transformation need to center the objective of improving human well-being; (iv) those policies need to be consistent with ecosystem boundaries to ensure species survival.

Though these lessons are still often forgotten or marginalized in policy design, they can have profound implications when taken seriously.

First, they call on policymakers to articulate a vision for industrial policy that centers well-being as its ultimate objective. As Todd Tucker and Steph Sterling ([2021](#)) suggest, "Perhaps the most important question for policymakers when developing industrial policy is whether it is promoting the industries we need most to allow all members of our society and country to flourish." And as Mariana Mazzucato (2021) explains, the realization of a vision also implies the articulation of clear "grand challenges" and "missions" that reflect shared societal priorities.

⁷ For a review, see: Costanza, Robert, Maureen Hart, John Talberth, Stephen Posner. 2009. "Beyond GDP: The Need For New Measures of Progress." *The Pardee Papers No. 4 (January)*; Stiglitz, Joseph, Amartya Sen, and Jean-Paul Fitoussi. 2009. *Report by the Commission on the Measurement of Economic Performance and Social Progress*. European Union.

In the absence of a holistic vision and missions for a "well-being-oriented" industrial policy (i.e., a national development strategy), basic principles can serve as heuristics to help clarify how policymakers can make "the perspective of freedom coherent and cogent" (Sen 1999, xi-xiii) in policy design and execution. Even general foundational principles like equity, human rights, ecological sustainability, and democratic accountability can do a lot for the quality of policy design if seriously considered and consistently applied⁸—for example, principle-driven investment standards and guardrails (such as wage floors of community benefit agreements) can help incorporate these principles into different kinds of industrial policies.

Second, much like development scholars use the principle of "**exhaustiveness**" to ensure that their analyses holistically examine the impacts of each policy intervention on the full range of critical human capabilities ([Ibrahim 2014](#); [Robeyns 2017, 2003](#)) industrial policy design—from vision-building to implementation to impact analysis—should be guided by a concern for well-being in all its dimensions.

Third, from the normative perspective of well-being, the principle of **efficiency** calls for the optimization of collective well-being (rather than the optimization of financial return). Efficiency from this standpoint means using as few financial, environmental, and institutional resources as possible to advance a well-being-driven vision (such as ensuring access to basic necessities for all people) and grand challenges instrumental to that end (e.g., ensuring economic resilience and a stable climate). A useful corollary to the principle of efficiency is **synergy**: the imperative to try to meet multiple missions at once in a way that amplifies positive outcomes (e.g., investing in projects that *simultaneously* lower greenhouse gas emissions, create good jobs, lower toxic emissions, and increase equity).

Finally, the principle of **systemic coherence** can prevent the pursuit of one mission from creating direct or systemic effects that gratuitously undermine other public interest objectives. For example, the EU Taxonomy of Sustainable Activities uses a "[do no significant harm](#)" principle to help prevent one "sustainable activity" from undermining other environmental objectives (e.g., more batteries for clean energy in exchange for more water pollution in an environmental justice hot spot).

The principle of systemic coherence can help craft an industrial strategy that accounts for the systemic effects of policymaking and recognizes that every industrial policy is also an environmental policy, a distributional policy, a natural resources policy, a labor policy, a

⁸ See Tucker and Sterling ([2021](#)) and Tucker ([2019](#)) for a broader discussion on foundational industrial policy principles.

health policy, etc. In other words, attaining systemic coherence entails being responsive to the reality that our efforts to influence what and how we produce don't just influence which industries survive and thrive and which decline. They influence power relations and distributional outcomes—who gets or loses access to clean air and water; who keeps or loses their homes, jobs, or livelihoods. This means that an industrial strategy designed around well-being needs to evaluate how different industrial policy pathways—no matter their sectoral specificity or their core mission—affect a broad set of public interest challenges and well-being objectives.

For example, the IRA's [investments](#) in decarbonization of highly polluting industries like steel, aluminum, and cement could enhance well-being outcomes by targeting the broader environmental and health impacts of industrial production (e.g., aiming to reduce toxic air, land, and water emissions, not just greenhouse gases), as well as the cumulative impacts of pollution on those most severely impacted by industrial pollution—largely, Black, Brown, and Indigenous communities ([Zwickl, Ash, and Boyce 2014](#); [Kassem and Estevez 2022](#)). Similarly, such investments could be distributed with preferences for projects that also advance broader equity objectives, for example by including equitable hiring standards and community benefit agreements.

The Perils of Compromising Democratic Engagement

Since productive transformation is a political process as much as an economic one, the viability of transformative policies is contingent on buy-in from critical stakeholders. Failure to manage class politics to secure a supportive political coalition has historically been a common pitfall of industrial policy ([Chang et al. 2016](#)). Conversely, successful economic transformations have featured far-reaching political interventions, such as measures to neutralize hostile economic elites vested in the preservation of the status quo. South Korea's land reform in the 1940s and 1950s, for example, weakened the political power of the landlords, clearing the way for the rise of a pro-industrial policy regime in the 1960s. In the Prussian "marriage of iron and rye," Bismarck provided protections to the landlord class (the Junkers) in exchange for their acquiescence to industrial policy measures, including tariff protections for the emerging heavy and chemical industries ([Chang et al. 2016](#), 49).

In the US, the recent success of major renewable energy investments is partly a product of protracted coalition-building between labor, certain sectors of the environmental movement, and sectors of the capitalist class that stand to gain from producing renewable energy technologies—coupled with political negotiation to neutralize hostile interest groups. However, the limited scope of the IRA relative to the Biden administration's Build Back Better

Agenda (or more ambitious projects advanced by civil society groups)⁹ is a symptom of the endurance of interests opposed to more far-reaching economic transformation. In this context, the implementation phase of the trifecta of US industrial policy legislation presents an opportunity to use democratic engagement as a tool to strengthen a coalition capable of propelling lasting and pathbreaking change.

Effective engagement with stakeholders—particularly those who have historically been marginalized from large-scale transformative change—is also a means of ensuring the impact and public purpose of policies: that is, policies' ability to achieve their core missions, and to do so in coherence (or ideally in synergy) with other well-being objectives, like increased equity, less poverty, cleaner air, and more opportunities for fulfilling work.

Conversely, failure to engage civil society carries risks. As Sen (1997, 5-7) reminds us, the humanist turn in development theory was partly a reaction to "attitudes" that were all too willing to accept sacrifices like "low welfare, high inequality [and] intrusive authoritarianism" to achieve "development" in "the future." In today's context, similar attitudes are emerging around the need to privilege speed of deployment of renewable energy and the construction of new infrastructure and manufacturing capabilities over other well-being objectives advanced by civil society stakeholders—for example, [criticisms](#) of the CHIPS and Science Act's labor, childcare, and community benefit conditionalities due to concerns that higher costs may hamper rapid buildout of chips manufacturing capabilities and the [outright exclusion](#) of childcare provisions from the final version of IRA, which had been proposed in the Biden administration's original Build Back Better proposal.

As policymakers seek to balance speed and impact, they face the creative challenge of crafting implementation in a way that makes "the perspective of freedom coherent and cogent" (Sen 1999, xi-xiii) at the procedural level, on a case-by-case basis. Notwithstanding the need for speed, as Sen notes, the procedural aspects of policy can be just as important when it comes to delivering outcomes that effectively expand people's freedoms: Procedures define the degrees of agency different groups of people have in the design, execution, administration, and oversight of the institutional arrangements that structure their societies (Sen 1999, 17-18). To deliver equitable well-being outcomes, policymakers need to ensure access to decision-making in a way that compensates for existing power asymmetries. Failure to create institutional safeguards—from governance mechanisms to investment standards—that proactively push against those asymmetries risks delivering an industrial

⁹ For a granular comparison of the scope of the IRA relative to the Build Back Better Agenda and the THRIVE Act proposed by civil society groups, see [Beachy 2022](#).

policy that exacerbates inequities and further concentrates benefits (and power) in a vicious cycle.¹⁰

The Challenges Ahead for US Industrial Policy

It's difficult to deny that the intertwining societal challenges the US faces call for a transformative use of industrial policy.

The success and viability of an economic system is reflected in its ability to deliver broadly shared prosperity—or well-being. To survive and thrive, human beings need certain essential resources, like nutritious food, clean air and water, and safe housing; and for us to survive in the long term as a species, our economy needs to function in a way that ensures the survival of the ecosystems that support human life and make it possible to produce (or preserve) those essential resources. Our current economic system has failed so profoundly on both counts that the fate of our species now [hangs in the balance](#).

The survival of the human species—as well as the ability of human beings to access essential necessities—now depends on a profound reshaping of production systems that only a transformative industrial policy can achieve.

However, several pitfalls stand in the way of a transformative agenda. First, efforts at economic transformation have historically been curtailed by grave underestimation of the necessary scale and scope of the policy interventions, and US policymakers risk falling prey to this pitfall if they give in to pressures to deploy industrial policy narrowly, relying on a limited set of policy tools. Second, great economic transformations have often sidelined or (sometimes indefinitely) deferred human well-being objectives in favor of other strategic priorities. Policymakers should be wary to design industrial policy with a more humanist sensibility. Third, failure to effectively manage class politics and secure buy-in from a broad range of stakeholders can both undermine the viability of industrial policy and hamper its ability to properly assess public interest challenges to deliver on public interest objectives. Conversely, effective democratic engagement can help policymakers better diagnose problems and build buy-in and momentum for transformative change.

With the emergent US industrial strategy still in flux and growing awareness of the need for deep productive transformation, policymakers face a unique opportunity to build a broad

¹⁰ Analysis by the Sierra Club based on modeling by UMass Amherst shows how many investments in manufacturing and infrastructure will reinforce existing inequities in the absence of countervailing standards. See "Who Benefits: Racial and Gender Distribution, Educational Background" on p. 9 of Ben Beachy's [How to Build Back Better: A 10-year Plan for Economic Renewal](#) (2021).

and powerful coalition for a transformative industrial strategy on the scale of today's critical societal challenges.

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