5 Cooperation or conflict? Will industrial policy produce solutions or generate unmanageable conflicts?

Laura Tyson and John Zysman

1 The core of the matter
Industrial policy is back on the political agenda in the United States. The CHIPS and Science Act (Chips Act), the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Bill pursue significant national policy goals, in particular national security and climate goals, by nurturing particular sectors. The tools used – subsidies and tax credits to promote business activity, investment and demand – are standard industrial policy tools, designed to foster research, production and employment by the private sector in the United States in the targeted sectors. In this chapter, we examine the implications for the global economy and for the international political economic order of the move to overt industrial policy by the US.

We argue that the return of American industrial policy – which we classify into the two categories of ‘chips’ and ‘green’ – raises several potential tensions with US allies and trading partners. The Chips Act is at once both a geoeconomic and a geostrategic initiative. It is a response to substantive state actions abroad that have made the US reliant on semiconductor fabrication by a few major suppliers headquartered in Asia. It focuses on China’s industrial policies and on the inherent national security risks for the US. But industrial policies in Taiwan have also played
a significant role in the emergence of TSMC (Taiwan Semiconductor Manufacturing Company) as the major global supplier of advanced semiconductors for both defence and non-defence purposes (Breznitz, 2011). Competitive advantage in the semiconductor industry has been shaped by industrial policies around the world, and the Chips Act signals that the US will join the competition, using industrial policy levers to make the US a desirable location for the industry.

The goal of ‘chips’ is to ensure continuation of national, or at least allied, industrial and security leadership in this critical ‘dual-use’ technology sector. In semiconductors, as in other key technologies including quantum computing, AI and clean energy, the goal of US industrial policy is to maintain as large a technological lead as possible, while impeding technological advances in China, Russia and other countries that pose national security risks. Export controls and restrictions on inflows and outflows of investment to keep advanced technologies out of the hands of geopolitical rivals are complementary tools to achieve this goal.

The green bills in the US, in contrast, are designed to foster the production of green technologies and products in the US to speed and scale the transition to a low-carbon economy, a move from one energy and economic equilibrium to another. This requires a global, not just national transition, one that forces open the questions of who gains from the transition and who bears the costs domestically and internationally.

The success of both the chips and green industrial policies depends on cooperation with US allies. Cooperation, however, is complicated by the fact that US policies will affect the gain/cost calculus of allies and their own industrial policy goals. Moreover, the alliances required for chips and green goals are different. The pursuit of the different alliances required for the chips and green goals raises the question of how the choices of one state (or in the case of the EU, an association of states) influence the gain/cost calculus of others. Achieving the goals of the Chips Act requires cooperation between friends and allies. The climate goals of the ‘green’ bills require cooperation around the world.
Taken together the American initiatives raise broader questions\textsuperscript{23}. In this chapter, we set aside the normative question of the role of the ‘state’ in domestic economic policy: whether it should extend beyond making the rules to shaping markets to actual intervention to overt support for particular firms and sectors. Industrial policies involve picking winners: with chips, the semiconductor industry, and with the green bills, the energy and climate mitigation and adaptation sectors. For the United States, overt industrial policies would seem to be a shift in the terms of debate and discussion. The US has certainly had extensive policies of sector-focused intervention, arguably very successful, for example, in the health sector and, of course, in defence-related technologies and sectors. Government policies to foster R&D and technological breakthroughs, and to provide demand, have been critical in the development of the commercial aircraft industry, the biotechnology industry and the internet. The rapid development of COVID-19 vaccines is the most recent dramatic example of industrial policy intervention and success in the US.

Generating domestic political support for overt intervention tilts policy choices towards favouring of national firms over foreign firms, or at least towards production on national soil. That distinction matters. It is reasonable for nations to use their own resources to encourage research, production and employment at home to benefit directly their own communities, and this inevitably raises issues with trading partners, and has done so even when embedded in defence policy. These activities, however, can be done by both domestic and foreign firms; industrial policies need not disadvantage foreign firms relative to domestic firms. The goal need not be to create national champions or to prefer national firms, but to promote economic activities in preferred sectors at home.

The success of the green and chips policies will require allies. For allies to adopt complementary policies, their governments will likewise

\textsuperscript{23} We wrote about many of these same issues in 1983. It was a radically different political and economic time, but many of the issues continue to be relevant. See Tyson and Zysman (1983).
need to create advantages and benefits for their local communities. This raises another issue. Overt national favouritism forces the issue of how to reconcile in international commerce and rule-making the diverse, competing, national objectives and varied national policy strategies to promote national firms or local production.

International economic negotiations always involve balancing benefits, but those negotiations are likely to be more difficult, and more public, when favouritism of national players or locations is direct, as in industrial policy. The initial disagreement between the US and France over the Chips Act and Inflation Reduction Act is a clear signal of the frictions likely to arise among allies and trading partners. The old international political economic order anchored by the United States was ‘rule bound’. Although the rules themselves were built from debates about who would capture advantage, the new fragmentation and disorder are centred on national competitive advantage and self-sufficiency through onshoring, nearshoring and friend shoring. And the new economic nationalism is reflected in growing impediments to trade and global capital flows.

Negotiations about the several national industrial policies are likely to be even more difficult because enduring commercial and national advantage will be created in both green industries and in semiconductors. These considerations are not far from policymakers’ minds. That comparative advantage can be created is evident in the Taiwanese success with TSMC and advanced foundries, and in China’s success in solar panels. Another more mundane example is how Danish policies supporting early deployment of digital hearing aids helped Danish firms

24 Certainly differences in national policies, even policies without direct trade or development intent, can spill over into international trade conflicts. The case of the European steel cartel is a perfect example; see European Commission press release of 4 April 2011, ‘Antitrust: Commission fines prestressing steel producers € 269 million for two-decades long price-fixing and market-sharing cartel’, https://ec.europa.eu/commission/presscorner/detail/en/IP_11_403.

in global markets. Familiar mantras like ‘we’re all in this together’ justify compromises to achieve the needed alliances, yet national interests in national champions and local production are real and will cause tensions. The new twin US industrial policies, green and chips, are likely to exacerbate such tensions.

Now as the US pursues broad security and climate goals, albeit goals shared by different sets of economic and political allies, it also overtly seeks competitive advantage and industrial leadership in chips and green technologies. There was a time when the US would rail against the ‘state actions’ of France, Japan and other market economies to create competitive advantage for their firms. Now the US is turning to the lessons from China’s successful industrial policies to justify its own actions. There is a clear shift in US policies from trade policies to stem imports from China and other developing economies, based on their labour-cost advantages and state policies of industrial promotion, to industrial policies to bolster innovation, investment, production and employment in the US. Is the new US industrial policy irreconcilable with existing trade and foreign direct investment rules that the US has helped write and enforce? The competition among nations for both green industries and semiconductors will make establishing a new rule-bound order much more difficult. Will it make it impossible? Does the green/chips duality of US industrial policy show that the existing order is dead and gone? If so, what takes its place?

This new iteration of American industrial policy forces us to consider two seemingly competing logics. First, the green transition requires the needed technologies to be produced as fast and at as large a scale as possible. Second, fear of great-power conflict or other supply chain disruptions requires friend shoring, nearshoring or onshoring of production of critical technologies (semiconductors being the most complex and systemically important), including climate technologies. Impeding technological development by geopolitical rivals is a key goal, certainly of the US semiconductor policies and arguably of green policies as well. But autarky is both impossible and undesirable and working with allies is essential. Complicating matters is that China is a rival in the chip world
and must be in some sense an ally in pursuing global climate objectives. Before delving more deeply into the two cases, let us consider industrial policy itself.

2 Situating industrial policy

Industrial policy justifications are traditionally associated with national competitiveness, jobs and technological advancement. Those goals are to be achieved by nurturing a particular sector/industry in a place, country, region or sphere. Importantly, it is not just about nurturing a sector/industry and, often, specific firms, but about nurturing them in a specific place, a particular nation. State action is intended to alter the market results of firms and sectors, to achieve outcomes that are unlikely otherwise in the market. The objective is changing, or maintaining the economy’s production profile, for example, by moving from agriculture to industry, or in the case of China moving from labour-intensive sectors to technology-driven sectors. Sometimes industrial policy is a story of broad transformations and sometimes it is a story that focuses on particular problems or sectors. Industrial policy instruments are as diverse as the actual policy goals. Many policy instruments are available to achieve these goals: subsidies, tax incentives, R&D support, trade and foreign direct investment restrictions that discriminate in favour of local production, whether by domestic or foreign firms, and against foreign competitors. The goals and purposes, not the tools in particular, define industrial policy.

We should situate industrial policy in an historical context. Industrial

26 Of course, nurturing particular firms makes the policy open to corruption, that is for those with access to government, and the capability to influence its decisions, to direct the benefits of the policy to themselves. Arguably all economic policy, from tax and savings through regulation, has the same ability to benefit some firms and sectors differentially. However, industrial policy, which rewards as a goal particular sectors and firms, makes the link to political influence direct.

27 In a sense it is a shift from one equilibrium to another, and the incentives in an initial equilibrium may not induce the better outcome. Hence the question then becomes how to get from a less-attractive equilibrium to a better one.
policy has long been associated with a drive toward national power, whether in seventeenth century France with Colbert, nineteenth century Germany with List, or indeed – less well known – sixteenth century Britain when the need for wood for ships began a policy push to shift from wood to coal (Gerschenkron, 1962). More recently, French strategies after the Second World War to move from a predominantly agricultural to a modern industrial economy were about structuring market incentives to favour the modernisation of firms and activities (Zysman, 1983). The Japanese modernisation in the nineteenth century and its restructuring after the Second World War similarly were rooted in the objective of establishing, and re-establishing in Japan’s case, a global economic position. After the Second World War, the United States was the dominant economy, and the dominant Western political force. It led the construction of a neo-liberal system of global trade/finance rules, which it is now regularly violating, and it reconciled both its geopolitical, strategic objectives and its domestic economic and political goals with these rules. Consistent with these rules, the US responded to import pressures in a wide variety of sectors from shoes to televisions, and from a wide variety of trading partners, through trade protections, often in the form of anti-dumping measures and voluntary export restraint agreements. These measures allowed the US to espouse free trade while restricting market access in sharply impacted sectors. But, importantly, direct market intervention to support domestic firms was limited and even trade-adjustment assistance, announced firmly, was limited and used ineffectively. Companies, workers and communities were left to bear the costs of lost production and lost markets from low-cost imports and export competition. The local costs were concentrated and devastating, gradually undermining political support for free trade and stirring the rise of populist ‘nationalist’ movements on both the left and the right (Autor et al, 2016).

Arguably hypocritical, these restraints were triggered at a much high level of imports than would have been tolerated in other polities.
The track record of industrial policy is mixed. Certainly, the cases of Germany, France, Japan and now China contain successful stories of economic transformations steered by the state. They make clear that policies of purposeful development and creating competitive and comparative advantage can succeed. At the sectoral level there are European successes such as Airbus, to set alongside the questionable Concorde project. The failure of Minitel, or the French Machine Bull efforts, need to be set alongside France’s success in high speed railways. In the case of the US, the defence-driven creation of the internet and the emergence of the biotechnology industry are two outstanding success stories. But most of the other specific industrial policies to protect employment in sectors or firms from import competition have been expensive failures (Hufbauer and Jung, 2021). What might be expected, then, from green industrial policy with its goal of fundamental economic transformation aimed at containing global warming? Can the chips industrial policy succeed in its geostrategic move to maintain for the US, or the US and its allies, leadership in a critical dual-use technology as a foundation for success in the rest of their chip-dependent digital sectors? What will be the consequences of these industrial policies for international trade and investment? Are the twin goals in inherent conflict: green requires everyone; chips is intended to contain China, Russia and other strategic rivals?

3 A green transformation
Green industrial policy in the United States is aimed at generating and accelerating an economic transformation, a transition from a carbon-based energy system to a green/alternative energy system. In a simple real sense, this involves electrifying everything and decarbonising electricity. History is replete with other energy system transitions, from wood to coal to steam to oil to electricity. Each has involved both markets and governments, prices and policies. The current transition, however, is particularly urgent: there isn’t time to rely on markets to drive the transition from fossil fuels to renewables and more efficient uses of energy resources to achieve the net-zero commitments made by the US and the
majority of UN countries. Green policy in the US and abroad is driven by the assumption that markets alone will not get to the goal of decarbonisation at sufficient speed and scale to realise these commitments and avoid climate disaster.

The US has defined its green goal in the IRA as a 40 percent reduction in carbon emissions compared to 2005 levels by 2030. The strategy is to use a variety of specific policies to achieve this goal: generous incentives on both the supply side, for firms, state and local governments, for R&D and for talent development, and on the demand side for consumers. Certainly, some of the subsidies for green tech, development and deployment can be viewed as offsetting ongoing policy support for the fossil-fuel energy system. Tit-for-tat green subsidies are likely around the world. The EU is already considering a European version of the IRA to allow its member states to counter the competitive challenges posed by US policies, and many other nations are making investments to speed the transition to green energy. Many of the poorest countries facing the greatest threats from climate change, however, do not have the financing to make such investments.

Securing a stable global climate – combating climate change – is a shared goal to provide a global public good of a sustainable climate. Coordinated policies of nations around the world are required to achieve this goal. That said, ‘green policy’ in each country, as is evident in the IRA in the US, also pursues nationally specific objectives of local production and jobs. US policy is aimed overtly at assuring that green technologies, products, production and employment are developed in the United


30 There are significant historical parallels in which massive state involvement and investment was part of transformations altering the underlying infrastructure of the economy, including the interstate highway system driven in part by defence justifications, the railroad system and the electricity grid.
States, whether by US or foreign firms. US policy is also driven by making certain that China does not dominate green technologies and products. But US green industrial policies to make the US the competitive location for green technologies and products can conflict with the objectives and goals of US allies, whose own energy transformations are essential, and who likewise want to pursue national advantage in green sectors and technologies.

A purely national or autarkic success, even if possible in industrial terms, will not address the global climate challenge: success requires all nations to participate. There will however be rivalries over who wins and loses in the process of building the new energy systems. Consequently, a significant challenge for green industrial policies will be building coalitions both at home and abroad to share the economic adjustment costs and benefits of the transition. Global coalitions will require the engagement of China, India and Russia, posing very different coalitions that reconcile ambitions amongst like-minded allies.

A core challenge will be building domestic coalitions for the energy transformation that also permit, if not facilitate, global alliances. Certainly policy must support and reward the emerging green technologies. But there are losers as well as winners. Who will pay the costs of transition? Will the losers be compensated? The fossil-fuel sector will continue to fight to maintain its position, arguing in some settings that the climate challenge is exaggerated or unreal. The French gilets jaunes movement is about resistance against higher prices that reflect the carbon costs of those who use fossil-fuel products. Since time is of the essence, delay is a profound challenge. The losers will not easily be displaced. Can they be bought off at a price and within a timeframe that allows nations to honour their commitments to net zero? The necessity of building domestic coalitions for green industrial policies means that each nation will seek to shape such policies to reward their local

constituencies. Indeed, building domestic coalitions for the green transition seems likely to generate conflicts among nations about industries and competitiveness, conflicts that make building global coalitions on a shared public good more difficult. The challenge of harmonising national competitiveness and economic goals in green sectors with global climate goals should not be underestimated.

At stake in the transition is who will control the industries of the future. In theory, the development of green technologies and products in one country can benefit all countries, speeding and scaling the global energy transition. In practice, however, the rise of one nation’s green industries can undermine the same industries in another nation. Consider China and solar panels. Chinese producers, supported by generous state industrial policies, drove down costs, making solar energy much less expensive. But the subsidised rise of China’s solar panel industry also damaged actual and potential producers in the US and elsewhere. That is not just a market issue of lost domestic producers and production, but the loss of potential allies in domestic green industries in a domestic coalition to offset the political weight of domestic fossil-fuel producers.

There are many distinct yet crucial sectors in the energy transition. Supplying electrical energy involves wind and solar equipment, batteries and critical minerals required for those systems. Adapting energy use to electricity involves, as examples, transportation goods, from cars and trucks today to perhaps aircraft tomorrow, and heating systems for offices and homes. Diverse and complex, widely dispersed, global supply networks in the materials and components are involved. One consequence is that a policy drive toward predominance in one sector – say electric-vehicle design and assembly – risks retaliation in others. There are choke points throughout whether, as examples, those are the materials that go into products, the components of full systems, or mastery of battery manufacturing\(^\text{32}\). Targeting domestic firms alone or

\(^{32}\) Choke points in a supply network occur when one firm or one country has an effec-
local production exclusively assures international conflicts, higher costs and slower transition. Green policy must find political solutions and coalitions at two levels: domestic and international\textsuperscript{33}. In the effort to find solutions that will ensure domestic support and avoid damaging trade conflicts that undermine the collective good of a green transition, existing products and technologies must be distinguished from the development of new next-generation technologies. Existing technologies are about who produces for today’s markets. Existing products and technology – electrical generation, batteries, wind, solar power and the like – as well as the conversion of products to electrical operation, entail direct market competition. Next generation breakthrough technologies, in contrast, might be a basis for joint pre-commercial development.

Reconciling the several national green policies is essential to accelerate the transition. There are no panaceas. As a starting point, creating and maintaining a green roadmap that identifies potential choke points, and seeking cooperative solutions to them or identifying lines of potential collaborative pre-competitive research, might be useful first steps. But those who control current or future choke points are not likely to give them up willingly, and as technological breakthroughs come closer to market implementation, collaboration will not necessarily be comfortable. Since carbon-related border taxes are on the table, certainly seeking a tax deal, global or between friends, should be considered. Another option worth considering is the development of a sectoral trade agreement that covers trade in green products and services. Some would consider the IT sectoral trade agreement that began in 1996 and today has 82 participants and covers 97 percent of global trade in IT products to be an example of a successful sectoral trade agreement that has fostered trade and reduced barriers. Another option worth consideration

tive monopoly or dominates the market, creating leverage. Examples can be found in materials, components and final products, such as solar systems.

\textsuperscript{33} The classic statement of this is in Putnam (1988).
is joint pre-competitive research and funding by the US and its allies on green breakthrough technologies, such as nuclear fusion and carbon sequestration.

4 Chips with everything
The chips story poses very different problems to the green story. The Chips Act is focused both on maintaining US and allied leadership and on impeding China’s advances in one sector – micro-electronic components. Semiconductors are essential dual-use technologies, inputs throughout much of the economy and critical to security concerns. Advanced countries have national economic and security interests in nurturing a resilient, secure supply of both mature and cutting-edge chips to meet growing non-defence and defence demand. Remaining at the frontier of technological change in chips requires semiconductor production: technological change and production go hand in hand. A nation needs a strong production base to remain at the technological frontier of chips: “you can’t control what you can’t produce” (Cohen and Zysman, 1987).

But, technological and market autarky will not be possible in this sector. In the words of Morris Chang, founder of TSMC: “If you want to re-establish a complete semiconductor supply chain in the US, you will not find it as a possible task”34. Consequently, market and policy alliances will be needed. In foundries, where leading-edge chips are produced, Taiwan’s TSMC is dominant with Korea’s Samsung and perhaps the US’s Intel as enduring scale players. Production equipment, apart from the materials that go into production, is widely dispersed across Europe, the US and Asia with the Dutch company ASML dominating the essential domain of advanced lithography. ASML has announced that it will limit exports of its most advanced equipment to China, consistent with the goals of US policy to slow the growth of China’s semiconductor industry.

Japan has also announced that it will limit exports of such equipment to China. In design, the US has very strong positions with companies like Qualcomm. Europe’s ARM, still owned by Japanese holding company SoftBank, is a major player.

We have previously defined the economic and geostrategic goals of US industrial policy in the semiconductor industry in the following way:

“For the sake of both national and economic security, the United States needs a multifaceted strategy for providing a competitive, resilient, secure, and sustainable (CRSS) supply of semiconductors. Such a strategy must address all parts of the industry, from design, fabrication, assembly, and packaging to materials and manufacturing equipment.

“Each of these elements of the supply chain is critical. Competitive market conditions must prevail throughout the industry, because excessive market power in any one segment can jeopardize supply. The system must also be resilient to shocks like fires, droughts, earthquakes, and geopolitical tensions and upheavals. And it must be secure in two senses: the US must maintain reliable access to cutting-edge chips and the means of producing them, and chip supplies need to be protected from threats like counterfeiting, theft, cyberattacks, and espionage. Finally, the supply must be sustainable, accounting for the significant environmental and energy costs of chip production.

“CRSS does not mean national autonomy in the semiconductor industry. That goal would be neither feasible nor economically rational, given the complex global supply system and the dispersion of industry knowledge, talent, and production. What CRSS does mean is that the US should cooperate closely with the European Union, Japan, Singapore, Israel, and others who form core parts of its secure supply base” (Tyson and Zysman, 2021).
The American calculus is driven principally by the national security concerns of maintaining substantial leadership over China – indeed, of rapidly moving the US and allies forward while slowing the Chinese. Not all countries share the US view of China, or at least they calculate their national interests differently. Many US allies and other nations are as concerned about the dominance of US tech companies as they are about the China challenge. Our concern is that competing national industrial policies, however well motivated, can quickly lead to counterproductive and wasteful tit-for-tat bidding wars of the sort we have seen before, both among US states and among European countries. The recent downturn in semiconductor demand will make this more acute. Governments will both be called on to support sagging companies while political pressure from the chip customer base will ease. The cyclical character of the industry makes sustained support both tricky and important. In contrast, collaborative policy could include pre-competitive public-private R&D partnerships to share equipment and other costs among participants. Perhaps a similar ‘commons’ approach could be extended to chip production as well. Further along the collaboration development chain, there may be possibilities in defining together the needs of sectors such as the automotive sector for semiconductor chips that differ from those that have been driven by the needs of the leading US tech companies. Finally, there is a need for allied coordination of export controls and controls over foreign direct investment in semiconductors and other strategic sectors and technologies.

5 Conflict or collaboration?
With ‘industrial policy’ resurgent, several questions arise. First, are the goals and policies of green and chips industrial policy in inherent conflict with each other? Green has the objective of a universal energy transformation. That requires a broad alliance, including China, even with competitive conflicts in green production and employment. Chips requires a more restricted alliance of allies and friends that confront
China, in which the underlying purposes of the allies are not all the same. China’s ambition to establish leadership, indeed dominance, in crucial digital technologies is both a security and an economic challenge. For the United States, the security challenge is primary. The choices are not straightforward for other countries, which are trying to ensure in the name of ‘sovereignty’ their capacities for sustained autonomous technology development, to keep pace with US technology firms, while maintaining access to the Chinese market for their exports. An overarching question is whether the US-driven policy of containing China in the semiconductor industry will undermine China’s willingness to participate in global solutions and trading rules in green technologies and products. If China is identified as an enemy in the semiconductor industry, will it be an ally in green industries?

Second, a more general problem is how to manage the conflicts generated by competing national industrial policies, and more specifically by the policies adopted by the United States. The existing trade and foreign direct investment rules do not provide comfort. The dispute settlement mechanism of the World Trade Organisation is moribund, killed off by the United States. The American ability to use access to its domestic market as leverage in international negotiations has dwindled in its effectiveness. The US sometimes applies its trade restrictions on an extraterritorial basis, applying them to both US and foreign firms doing business with China in violation of global trading rules. Does the US move to overt industrial policy require new trading rules and the revitalisation of the WTO dispute settlement mechanism to enforce these rules? Without these changes, the open trading order is likely to be undermined by wasteful beggar-thy-neighbour industrial policies that encourage onshoring, nearshoring and friend shoring and that further fragment the global

---

35 A cynic might remark that in the era of the Washington Consensus and a neo-liberal order, we were in fact both protectionist and promoting our own interests when speaking of global trade. Our cynic would accuse us of saying ‘do as we say, not as we do’. The response of others was often that we hid strategies pursuing our particular advantage in deals covered with the ideology of free trade.
economy. Such fragmentation will drive up costs, restrict the development options of emerging economies and slow global growth. Such fragmentation will also thwart the global cooperation necessary to speed and scale the transition to a sustainable green future. The climate challenge is a global one that requires coordinated global action supported by new global trade and investment rules and a new international order.

References


