

# 6 Green industrial policy: the necessary evil to avoid a climate catastrophe

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## 1 Introduction<sup>36</sup>

Industrial policy is a term that is often interpreted differently depending on the audience. The fact that it cuts through a variety of economic policy tools, ranging from innovation programmes and tax policy, to trade and foreign direct investment (FDI), makes the matter even more complex. It lends itself to easy misinterpretation. At its core, it refers to “*any type of selective intervention or government policy that attempts to alter the structure of production toward sectors that are expected to offer better prospects for economic growth than would occur in the absence of such intervention*” (Pack and Saggi, 2006). This might include sectors/technologies in which leadership might have geopolitical, security and military implications. The concept builds on two fundamental elements: (i) production in some sectors is more desirable than in others (Hausmann *et al*, 2007), and because of this, (ii) governments should make an active effort to nudge the production structure in that direction.

It is important to note that, irrespective of simplistic characterisations (eg capitalism vs socialism) or standard economic modelling of markets under perfect conditions, practically all countries, including the United

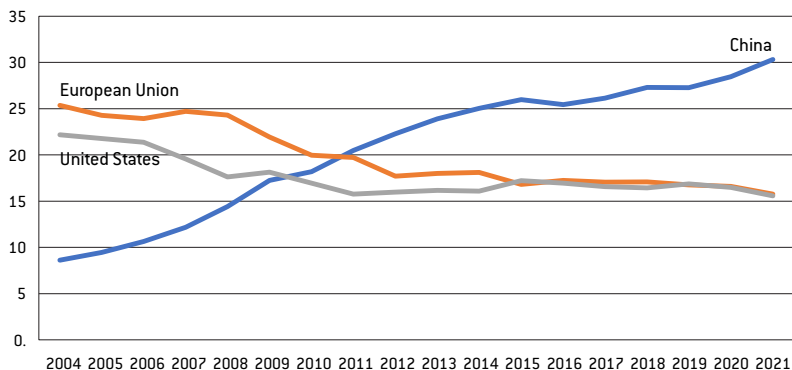
<sup>36</sup> The views expressed here are the author’s and do not necessarily represent those of the institutions to which he is affiliated.

States, the UK, France, China, Japan, Taiwan and South Korea, engage in various forms of industrial policy, and always have (Rodrik, 2009; Terzi *et al*, 2022).

Nonetheless, it is true that over the past few decades there has been a generalised reduced use of industrial policy, which has moved to the margins of mainstream economics. As this principle became embedded in policymakers' minds, it was framed under the narrative that governments cannot pick winners in a market economy, and rather they are at high risk of being captured by interest groups (Rodrik, 2014a). And of course, narratives eventually shape policies (Shiller, 2019).

Moreover, industrial policy was seen as harmful to the pursuit of a more globalised world economy, which to some extent became a leading objective in and of itself (Rodrik, 2011). In the service of a rules-based global trade order, richer nations of the West sided against a preponderant role of governments in altering production in a certain direction, rather allowing comparative advantages to manifest themselves freely. If that meant the relocation of manufacturing to China and away from the US and Europe, this was to be welcomed in the face of the associated gains from trade and specialisation (Figure 1).

**Figure 1: Manufacturing, share of world total (%)**



Source: World Bank.

The idea that industrial policy was unhelpful was to some extent codified in the so-called 'Washington Consensus', or else the idea that a small government (together with open current and capital accounts) was instrumental in achieving rapid development. As such, the resistance to industrial policy was exported to the Global South, in particular during macroeconomic adjustment programmes (Boccaletti, 2021).

Over the last few years, however, what has facetiously been called "*the policy that shall not be named*" has returned to the main stage of economic policy (Cherik and Hasanov, 2019). There are several reasons for this. First, and most prominently, China has been making extensive use of industrial policy, experiencing meteoric growth in the process. Moreover, the fact that the country's access to the World Trade Organisation in 2001 did not prod it to abandon such practices effectively invalidated the argument for others to favour the safeguarding of a level playing field at global level. Second, COVID-19 required a large degree of government intervention in the economy, including for the stockpiling and provision of personal protective equipment and the fast development and production of vaccines. And, of course, in the moment at which global supply chains came to a grinding halt because of COVID-19-induced restrictions, there was a sudden realisation of the central role that microchips play in today's economy, from cars to military applications. Lack of access to them could be weaponised, because artificial intelligence and the digital economy will play a crucial role in defining military supremacy in the twenty-first century.

Finally, the returning appeal of industrial policy is due to climate change, defined as the greatest market failure the world has ever seen (Stern, 2006), and thus questioning the narrative that market forces should be left largely unfettered. In this chapter, we focus narrowly on the latter aspect, namely what comes under the name of 'green industrial policy', aimed at accelerating decarbonisation.

## 2 Green industrial policy and its intended consequences

If global warming is an externality problem, no matter how big, then the standard textbook solution to it should be to price emissions, in a way reinserting them into the market economy. Carbon pricing must be a crucial element in any credible pathway towards net zero (Tagliapietra, 2020). However, even the High-Level Commission on Carbon Prices, put together to identify the optimal price of carbon to achieve fast decarbonisation, eventually concluded that carbon pricing alone will not be sufficient to address climate change (Stern and Stiglitz, 2017). This is because there are other market imperfections that work against speedy decarbonisation (Stern and Stiglitz, 2017).

An example of this could be technological path dependency, meaning that innovation tends to build on pre-existing knowledge, which generates a bias towards fossil fuels (Aghion *et al*, 2019). Another example could be risk aversion combined with lack of perfect information about the technology that will prevail in a green economy, leaving firms in a wait-and-see mode (Rodrik, 2014a). Due to the same problem, firms are particularly wary of investing in green technologies that are far from marketable, such as decarbonised steel and cement production, carbon capture and storage, and carbon-free aviation (Gates, 2021). Finally, for political-economy reasons, it could very well be that the optimal level of carbon pricing cannot be achieved, in part because of the large redistributive implications it would have<sup>37</sup>. When that is the case, a more active role of government can be envisioned, including by means of industrial policy, which has been shown to complement carbon pricing, increasing the speed of the transition (Acemoglu *et al*, 2012).

There is another reason related to climate change that, in my view, drives the current push for industrial policy: effectively reaching net zero will require a complete restructuring of production, consumption,

37 John Van Reenen, 'The Case for Green Industrial Policy', *ProMarket*, 14 February 2023, <https://www.promarket.org/2023/02/14/the-case-for-green-industrial-policy/>.

transport, housing, agriculture and more because we live in a fossil-fuel civilisation. In other words, the green transition has historical resemblances to an industrial revolution (Terzi, 2022a). When that is the case, comparative advantages will be reshuffled across companies and countries, based on the (general purpose) technologies that will become the bedrock of the future green economy. It should thus come as no surprise that governments will use all policy tools available to try and develop an edge in the key technologies of the future, and secure the long-term prosperity of their country, as they did in the early phases of past industrial revolutions (Beckert, 2015; Rodrik, 2011).

This competitive argument in favour of industrial policy would not apply in a first-best world in which decarbonisation was planned in an optimal way at the global level, and where positive and negative spillovers between countries could be internalised. However, the urgent need to tackle catastrophic climate change will not lead to the end of geopolitics. Decarbonisation policies must rather be designed in a way that is incentive-compatible with a world in which policies will primarily be designed at the national level<sup>38</sup>, and where nation states will continue to scramble for economic and military primacy. In this context, green industrial policy in the service of national interest should be seen as suboptimal but necessary.

Terzi *et al* (2022) discussed the design characteristics an effective industrial policy should have in order to minimise the risks that it will not deliver its intended effects at home. The remainder of this chapter will instead focus on the unintended effects if it does indeed succeed, particularly on other countries.

38 The European Union is perhaps a notable exception in this respect, having substantial policy competence with respect to climate and environment issues.

### 3 Unintended consequences

First, it is important to realise that even mainstream experts are generally in favour of R&D subsidies or tax credits. However, the use of such active industrial policy at a multi-billion-dollar scale will effectively plant the seed for the defensive side of industrial policy, meaning trade and investment restrictions, which is the type normally considered negative or protectionist (Poitiers *et al*, 2023). This is almost inevitable, particularly in a post rules-based world trade order (Terzi, 2022b): if billions worth of taxpayers' money is being used, the political-economy forces pushing for restricting it to domestic firms and jobs will be strong. The US for instance is openly celebrating how the Inflation Reduction Act (IRA) is "*prioritising American jobs*"<sup>39</sup>.

Effectively, this means that a more active use of (green) industrial policy at home is bound to spark an international subsidy race. To some, this is a good result because it will fast-track decarbonisation and the development/deployment of new green technologies<sup>40</sup>. The reality is however that only countries with deep pockets and wide access to financial markets will be able to engage in it, as already well noted by Kleimann (2023). These are likely to be high-income countries, but it is not limited to those and encompasses also a small set of large and rapidly emerging economies, including China and India. At a rough estimation, it will encompass most G20 economies, with the notable exception perhaps of Argentina and South Africa. The others will suffer its consequences or do the only thing they can with

39 Aime Williams and Derek Brower, 'US Makes 'No Apologies' for prioritising American jobs, Clean Energy Tsar tells EU', *Financial Times*, 24 February 2023, <https://www.ft.com/content/cb0a8ddf-6b32-49d8-8870-d1384580e9c9>.

40 Arvind Subramanian, 'Global Cooperation Is Not Necessary to Fight Climate Change', *Project Syndicate*, 10 November 2022, <https://www.project-syndicate.org/commentary/multilateral-cooperation-climate-change-unnecessary-inflation-reduction-act-by-arvind-subramanian-2022-11>, and Gernot Wagner, 'The Clean-Energy Race Is On', *Project Syndicate*, 15 August 2022, <https://www.project-syndicate.org/commentary/inflation-reduction-act-global-clean-energy-race-by-gernot-wagner-2022-08>.

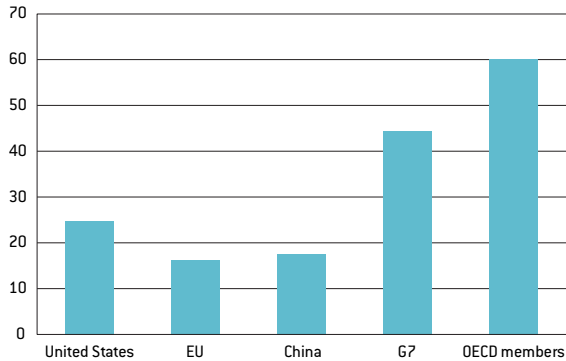
no immediate costs for the public coffers, ie increase trade barriers to try and protect domestic production along the lines of 'infant industry protection.' These are likely to be less-developed economies and some emerging markets, which are far from the technological frontier and will hardly benefit from having to develop innovation at home rather than exploit technology transfers associated with imports, especially of capital (Aiyar *et al*, 2023).

### 3.1 Investment and production

In terms of investment, there is likely to be a wave of re-shoring as a result of the ramp up of active and defensive industrial policy, accompanied by national security concerns in an increasingly fractured geopolitical world. Up to now, much of the focus in the media has been on whether the IRA would draw European firms and their production plants to the US<sup>41</sup>. As Europe will set up its own response, in equilibrium, what will be lured will mostly be investment that could have otherwise taken place in third countries, especially emerging markets.

The active use of subsidies to attract production and FDI, combined with trade and investment barriers, means that production will relocate closer to demand. Note that OECD countries currently command 60 percent of world demand (Figure 2). This number goes down to roughly 45 percent for G7 countries only, and 62 percent if China is added to the G7, ultimately reflecting the great degree of income inequality between a small group of larger, richer economies and the rest (Milanovic, 2019).

41 Sam Fleming, Alice Hancock and Javier Espinoza, 'Can the EU Keep up with the US on Green Subsidies?' *Financial Times*, 31 January 2023, <https://www.ft.com/content/85b55126-e1e6-4b2c-8bb2-753d3cafcb5>.

**Figure 2: Gross national expenditure, share of world (%)**

Source: World Bank. Note: Gross national expenditure (formerly known as domestic absorption) is the sum of household final consumption expenditure, general government final consumption expenditure, and gross capital formation. Underlying data are in constant 2015 prices, expressed in US dollars.

As these reflections will apply to a variety of sectors, including electric vehicles, solar panels, green hydrogen, wind energy, heat pumps and possibly also raw materials that are critical for the green transition, they will ultimately imply less trade<sup>42</sup>. Most of this trade is of the standard manufacturing type, requiring limited advanced education and therefore suitable to propel growth in less-developed economies that want to move away from agrarian societies (Rodrik, 2014b).

### 3.2 Development and global income convergence

Effectively, industrial policies and in particular those with local content provisions, will reduce global trade, which is fundamental for rapid development. To understand why, it is worth going back to the so-called *Growth Report* (World Bank, 2008). In 2008, a group of 19 policymakers, mostly from developing economies, headed by two Nobel economics laureates, put together a report analysing the

42 Martin Wolf, 'The New Interventionism Could Pose a Threat to Global Trade Receive Free Protectionism Updates', *Financial Times*, 14 February 2023, <https://www.ft.com/content/3bc33cc4-1ee9-42ce-bcc2-2ba2a483e8ce>.



experiences of 13 countries that had managed to sustain high GDP growth since the 1950s. Drawing on the input of over 300 academics, on top of the personal hands-on experiences of the policymakers, the report sifted out the common traits of successful cases. Of the 13 episodes of ‘miracle’ development, which came with sharp reductions in extreme poverty, from China to post-war Japan, and including South Korea, Indonesia, Malaysia, Brazil and Taiwan, literally all relied on a fast expansion of exports. This is for two reasons. First, low trade barriers give access to markets where demand is large or rapidly expanding, whereas demand at home in a poor country is limited by definition. Second, exports loosen the current-account constraint, allowing countries to obtain hard currency, import foreign advanced machinery and move up the value chain.

The implication is that an aggressive use of green industrial policy in countries that can afford it will come to the detriment of the global income-convergence process. This was already running out of steam (Rodrik, 2016), so effectively industrial policy will compound this problem.

To sum up, even if inspired by the genuine desire to tackle a global challenge like climate change, strong use of green industrial policy will ultimately contribute to deglobalisation. Combined with the fact that production and investment will locate closer to where demand is found, widening inequalities between countries can be expected or, at the very least, a halt to the so-called “*great income convergence*” (Baldwin, 2016).

### 3.3 Prices and innovation

A variety of factors already distort prices at global level, but the use of policy tools to distort prices even more and twist production in a certain direction could easily imply that citizens at home will pay more for a set of products than they would have otherwise. This is something that has already been seen when trade tension and barriers increased during the Trump Administration (Cerutti *et al*, 2019). Ultimately,

this is the other side of the coin to the so-called ‘gains from trade’ that classical economists Adam Smith and David Ricardo were already describing three centuries ago. We could define them as losses from protectionism.

At the same time, however, inflationary losses from protectionism will be counteracted by the speed at which innovation proceeds in green sectors, notably walking down cost curves at a fast clip. This leads us to the aspect that deserves the closest attention: the degree to which active (and especially defensive) industrial policy leads to a slowdown in the rate of innovation at the technological frontier. This is particularly crucial because catastrophic climate change can be avoided only if the speed of the development and deployment of green technology and innovation ramps up enormously (Terzi, 2022b).

This concern might be overstated, however. Taking a long-term perspective, it is not trade that has generated the acceleration in innovation associated with industrial revolutions (Mokyr, 2016). And therefore, unsurprisingly, for economies at the technological frontier, gains from trade are comparatively small relative to overall cumulative rates of growth<sup>43</sup>. In fact, it could very well be that investment in and urgency of innovation picks up as a result of great-power rivalry – accelerations of innovation have happened typically at times of geopolitical confrontation (Moretti *et al*, 2019). To an extent, the US Defense Advanced Research Projects Agency (DARPA), which is now celebrated as the mother of many crucial inventions, including the internet, GPS, touch screens and voice recognition, is the product of US industrial policy in response to the Soviet Union launch of the Sputnik

43 Looking at the US for instance, it is estimated that the 12 bilateral free trade agreements (FTAs), plus two regional FTAs (the North American Free Trade Agreement and the Dominican Republic-Central America-United States Free Trade Agreement), resulted in the US economy being one half of a percent bigger than what it would have been without the agreements in place (Russ, 2021). To put this into perspective, since the NAFTA came into effect in 1994, US real GDP has grown by 89 percent.

(Mazzucato, 2013). The Apollo Project, often given as a commendable example of public-sector-driven innovation, generating waves of secondary innovation for decades, was only possible because of the space race with the Soviet Union during the Cold War (Mazzucato, 2021).

However, what should instead not be overlooked is that competition plays a crucial role in fostering innovation, and as such should be safeguarded even in the face of increasing trade barriers (Aghion *et al*, 2023). This, incidentally, is why competition policy should not be loosened in the name of industrial competitiveness and creating national champions (Terzi *et al*, 2022). And state aid should be deployed only with great care.

#### **4 Policy implications**

It should be evident that the use of industrial policy will come with some significant downsides, especially for less-developed countries. What is particularly ironic is that for a long time a more forceful use of industrial policy in the rich world has been a trope of left-wing thinkers, which would prioritise to an equal extent the rapid development of the Global South. Now that industrial policy is starting to be used forcefully, it will come to the detriment of the latter.

This consideration is not meant to discourage the use of industrial policy. Overall, the pursuit of a green transition powered by national interest is suboptimal, but is the only path likely to obtain it at a fast enough speed. To a certain extent, this comes to the benefit of the Global South in that many poorer nations are likely to be impacted most and earliest by extreme weather events associated with unfettered global warming (Carleton *et al*, 2020). However, this benefit is indirect, and will therefore likely go missed in global negotiations, which are instead set to become more tense in the face of more evident direct costs for poorer nations (Kleimann, 2023; Terzi, 2022c).

Policymakers must be aware of these negative effects so that the renewed interest in industrial policy does not lead to an excessive enthusiasm with this policy tool, which, as the title of this chapter

suggests, should at best be considered a necessary evil to avoid catastrophic climate change.

In particular, in the face of what will represent a scaling down of international cooperation, policymakers should avoid as much as possible measures that risk harming innovation. International scientific cooperation and migration policies, for example, are conducive to the attraction of talent and must be ringfenced as much as possible, so they do not fall prey to broader protectionist reflexes (Neufeld, 2022).

On the international front, countries should be mindful of the repercussions of their national industrial policies. International negative spillovers are to a degree inevitable, but in principle allies and like-minded countries should be spared them as much as possible. This is particularly so in an increasingly fractured geopolitical scenario, if foreign policy alliances are to remain solid. Even just from a political-economy perspective, one cannot expect to impose economic damage on a trade partner on one hand, and expect deep political or security cooperation on the other. Moreover, the national security argument for industrial policy does not really hold relative to trusted partner countries, while the general principle of gains from trade and comparative advantages do.

Instead, in order to prevent allied countries from being forced to engage in a wasteful subsidy war or to raise trade barriers, blunting the positive effect of national industrial policies at home, international economic agreements should be sought. This idea may not be new, but rather responds to the logic of growing regionalisation, which many, including US Treasury Secretary Janet Yellen<sup>44</sup> and European Central Bank President Christine Lagarde (Lagarde, 2022), see as the natural response to safeguard what can be saved as the world moves away from the multilateral trade order (Evenett, 2022). It is in this spirit that the EU and the US should, for example, seek an agreement on sourcing

44 Remarks by Secretary of the Treasury Janet L. Yellen on Way Forward for the Global Economy, 13 April 2022, <https://home.treasury.gov/news/press-releases/jy1425>.

green minerals, which could potentially extend to the G7 as a whole, and then extend to partnerships with Chile, Australia and other like-minded nations.

Building on this idea, and in an effort to expand alliances, nations pursuing aggressive industrial policies at home should reinforce their international climate finance and climate-linked aid to less-developed economies, in particular to fast-track the rollout of green technologies in the Global South, in line with the bilateral agreements with South Africa, Indonesia and Vietnam as part of the international Just Energy Transition Partnerships.

In such a scenario, it is possible to imagine that firms that have developed a technological edge in green sectors will be on the benefiting end of these large decarbonisation investment projects, extending even further the benefits of industrial policy for home-based companies. However, they will also provide local (green) jobs and some much-needed technological transfer to the Global South in a win-win fashion (Tagliapietra and Veugelers, 2021). Benefits to lower-income countries will also come from the fact that these green technologies will be available at a cheaper and more developed stage, also thanks to industrial-policy efforts in richer economies.

All in all, a more aggressive use of industrial policy at home should warrant more active engagement outside national borders to engage partner countries, establish broad economic alliances and mitigate the international economic and political fallout from industrial policy, and to prevent a green transition pursued in the name of national interest from ending up isolating a country at global level, straining much-needed strategic alliances, and creating lost decades of development for the world's poorest.

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