Pinelopi Goldberg

Industrial Policy in the Global Economy

On Thursday, May 8, Pinelopi Goldberg joined Markus' Academy for a conversation on "Industrial Policy in the Global Economy." Goldberg is the William Nordhaus Professor of Economics and Global Affairs and an Affiliate of the Economic Growth Center at Yale University.

A few highlights from the discussion.[1]

- **A summary in three bullets**
  - Economists have traditionally been skeptical of industrial policy (IP), but attitudes have shifted recently for several reasons, including the presence of market failures (e.g. climate change), political economy considerations (e.g. concern for domestic producers and workers), and dynamic externalities (e.g. learning-by-doing in technologically innovative sectors)
  - In mature sectors like shipbuilding, IP mainly steals market share, while in newer sectors like EVs, semiconductors, and renewables, it can promote learning and global spillovers—sometimes turning national IPs into global complements
  - Domestic content rules and home bias, however, dampen these benefits. In sectors like semiconductors industrial policy has only succeeded when paired with access to foreign frontier technology. Export controls appear effective

- **[0:00] Markus' introduction**
  - What are the rationales for industrial policy (IP)? Correcting externalities, both static or dynamic (learning-by-doing), addressing coordination failures, or exploiting increasing returns to scale
  - Geostrategic motives include improving the terms of trade, enhancing national security, building choke points against other countries (or defend yourself against others' chokepoints), supporting the green transition, and increasing economic resilience
  - IP can exploit the free trade system. How should a country respond? Should one passively benefit from the lower prices due to others' subsidies, or adopt one's own IP? Would a global social planner implement industrial policy?

- **[5:09] How should international economists think about industrial policy?**
  - There has been a resurgence of IP since 2021 worldwide.
  - Economists have traditionally been skeptical, viewing it as vulnerable to capture by special interests, ineffective at "picking winners," and potentially triggering races to the bottom

[1] Summary produced by Pablo Balsinde (PhD student, Stockholm School of Economics)

    - International economists have taken a more nuanced attitude, acknowledging that governments are free to pursue it—even inefficiently— as long as it doesn't impose negative cross-border externalities
    - Indeed, the cross-border spillovers of IP are often positive, leading to lower prices for consumers in other countries
    - The general view is that, in contrast with tariffs and other trade barriers, IP and subsidies are not sufficiently regulated at the WTO, and this may have contributed to the backlash against multilateralism. Export and import substitution subsidies are prohibited, but notification requirements are not enforced
    - Why have attitudes changed recently?
        - (1) Political economy matters: even if other countries' IP creates global welfare gains, domestic constituencies may suffer
        - (2) Market failures like climate change may justify IP
        - (3) There may be externalities in production, such as learning by doing and dynamic comparative advantage
        - (4) Production is organized by global value chains; IP targeting one link can have complex and unintended effects elsewhere
        - (5) National security
    - There is a demand for a new policy design. With the WTO in crisis, this is a good time to think about questions like: Should the WTO devise rules to regulate IP? How should these rules be designed?

- **[17:08] Four case studies: insights and measurement challenges**
    - A working group including R. Ossa, G. Grossman, A. Sykes, B. Staiger, D. Trefler, and P. Goldberg is exploring these issues systematically
    - On the empirical front, and focusing on cross-border spillovers, they examine four sectors relevant to advanced economies:
        - (1) Shipbuilding (Kalouptsidi 2018; Barwick et al. 2024, 2025),
        - (2) Electric Vehicles (Barwick et al. 2025, 2025; Li et al. 2021)
        - (3) Semiconductors (Goldberg et al. 2024)
        - (4) Renewables (Gerarden et al. 2024)
    - Measurement is often a challenge for 4 main reasons:
    - (1) Support targeted at plants or firms is hard to measure, as it takes many forms such as grants or below-market financing (and it is not always clear what the market interest rate is or how "below market equity financing" should be measured)
    - (2) There is a difference between announced policies and the support that is actually taken up by firms, so ex-ante figures can be misleading
    - (3) In some cases, we observe annual flows of support, but lack data on past interventions. If policy effects accumulate over time, especially through dynamic comparative advantage, the stock may matter more than the flow
    - (4) In countries like China, policies are announced at the national level but implemented by provinces, making them hard to track and often leading to double counting when using firm-level data
    - In the Global Trade Alert dataset, Europe has the highest number of IP measures in the semiconductor sector, with China ranking fourth. However, China leads when looking only at national-level policies. This reflects the fact

that Europe/US tend to target specific firms while China implements broad big-push strategies with implementation delegated to provinces
    - There are six major subsidizing countries or regions in semiconductors: China, Japan, S. Korea, Europe, the US, and India. All but India are established producers
    - Interestingly, Taiwan has not engaged in traditional IP in semiconductors since 2011. It subsidized heavily in the 1990s, but no longer needs to do so. This highlights the importance of distinguishing between the stock and flow of IP
    - In EVs and renewables, IP is not as hard to measure, as it often takes the form of demand-side subsidies and domestic content requirements
    - China began subsidizing EVs early and at scale, but per-vehicle subsidies have declined and are now lower than in many other countries. A domestic content requirement was in place from 2016 to 2019
    - Even when subsidies are well measured, it is difficult to assess their magnitude or effectiveness. For example, China's total support may appear large but it is comparable to other countries' when measured relative to its GDP or population
    - In shipbuilding and semiconductors, the literature has used model-based approaches to infer the size and effectiveness of subsidies
    - The idea is to develop structural models of the sector to estimate firm costs, taking into account dynamics, following the IO tradition of backing out unobserved costs using the model structure
    - If these costs appear systematically lower for one country or a subset of firms, this provides strongly suggestive evidence that they are receiving subsidies
    - However, results depend heavily on modeling assumptions, and the approach cannot identify which specific policies are responsible for observed outcomes or whether they are WTO-compliant.
    - As a result, the approach works well when there is a clear policy "smoking gun," as in China's shipbuilding, and so is particularly effective when combined with descriptive evidence.

- **[41:43] Cross-border spillovers of industrial subsidies**
    - From a welfare perspective, industrial policy often has positive effects due to increased product variety and lower prices. However, the impact on producers and labor is more nuanced
    - The effects differ across sectors. In mature industries like shipbuilding, where there are few production externalities, subsidies tend to steal market share without generating productivity gains
    - This is what we saw when China entered the shipbuilding market in the early 2000s. The business-stealing effect against Japan and S. Korea dominated, though there was a 6% decline in freight rates due to the subsidies
    - In contrast to mature sectors, newer industries exhibit learning-by-doing and dynamic externalities, which can justify subsidies
    - In EVs, demand subsidies (which all major countries implement) facilitated learning by doing, which benefited many countries through the supply chain linkages. As a result, subsidies can be global complements

    - However, domestic content requirements—such as China's from 2016 to 2019—restrict learning-by-doing benefits to domestic firms at the expense of foreign producers
    - Home bias in EV purchases also leads to larger benefits for the subsidizing country. It is an open question whether home bias is due to preferences or the result of past industrial policies
    - Renewables generally exhibit large positive spillovers in production. For solar panels, there are also local labor spillovers due to the required on-site work in installation
    - It is hard to study the solar panel industry without coming to the conclusion that the Chinese have done a great service to the world by subsidizing solar panels
    - From an energy security perspective, wind and solar enhance energy security by avoiding the supply risks associated with fossil fuel dependence
    - The semiconductor supply chain is globally fragmented but geographically concentrated: design and software are in the US, some specialized equipment is produced in the Netherlands (ASML), manufacturing is in Taiwan, South Korea, Japan, and China, while assembly and testing are in Malaysia and Thailand
    - Goldberg et al. (2024) provide two main insights:
    - (1) Industrial policy has only succeeded when paired with access to foreign frontier technology. For example, TSMC advanced through close cooperation with leading firms in the US. In contrast, China, despite its large market share in legacy chip production, has struggled to catch up in frontier technologies. Export controls appear effective in slowing technological progress
    - (2) Learning by doing is substantial and driven by international learning spillovers. Price data show that countries entering production with a 2–3 year delay benefit from the cost reductions achieved by the early movers

- **[1:07:03] Industrial policy for developing countries**
    - The four case studies have limited relevance for low-income countries, but there is concern that advanced economies are leading by bad example
    - The challenges facing developing countries are fundamentally different. With a few exceptions, the relevant sectors are traditional (e.g., agriculture), where externalities like learning-by-doing are unlikely.
    - Still, there may be other reasons favoring industrial policy. Developing countries lack the fiscal space to implement broad-based industrial policies, so sector selection is critical
    - Reed (2024) argues that while governments may not be able to pick winners, they can avoid picking losers. He outlines four criteria: (1) international market growth, (2) international competition, (3) comparative advantage, and (4) technological relatedness
    - In traditional industries, industrial policy can generate negative spillovers on other countries by triggering a race to the bottom, strengthening the case for international coordination
    - Forced foreign direct investment may work but only in large countries. Minnich (2023) shows that even in China, technology extraction was harder in sectors where Chinese firms relied on foreign import suppliers and foreign

buyers and had limited bargaining power due to the small size of the domestic market at the time

Timestamps: