COMPETITION-FRIENDLY INDUSTRIAL POLICY

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Industrial policy, essential for addressing market failures, encounters concerns regarding protecting inefficient firms. We advocate for competition-friendly industrial policies, underscoring the complementary relationship between industrial and competition policies and the benefits of targeted sector-specific subsidies. We emphasize the significance of market competitiveness for sustainable industrial development, drawing from theoretical models and empirical evidence from China. We argue that Europe's productivity decline relative to the United States since the 1990s can be partly attributed to the absence of a European counterpart to the United States' Advanced Research Projects Authorities ("ARPAs"), which foster frontier innovation. Their success, exemplified by the rapid development of COVID-19 vaccines through the Biomedical Advanced Research and Development Authority (BARDA, now ARPA-Health), underscores the importance of targeted sector-specific subsidies in overcoming coordination challenges. While the European Union has progressed in vaccine procurement, a genuine European ARPA equivalent remains lacking, hindering breakthrough innovation in strategic sectors.

I. INTRODUCTION

The discourse on industrial policy has evolved from discussions regarding its necessity to analyses of its optimal design and implementation. The widespread occurrence of market failures, from climate-related externalities to geopolitical uncertainties, renders industrial policy a crucial instrument. Although industrial policy potentially presents substantial advantages, a significant concern is the inclination to protect inefficient firms instead of promoting competitive dynamism. This paper examines the interaction between industrial and competition policies in general and then focuses on empirical cases from the pharmaceutical sector, namely COVID-19 vaccines and treatments for rare diseases. It calls for pragmatic, adaptable, strategically focused, and methodologically rigorous competition-friendly industrial policies.

Given the recent proposals following the Draghi report within the European Union (Draghi, 2024), this discussion is timely.[2] Indeed, whether governments should concentrate resources on specific sectors or adopt broader economic missions and whether industrial policy should be co-integrated with competition policy to advance innovation, economic productivity, and market stability remains contentious.

For instance, (Mazzucato, 2021) advocates for a mission-oriented industrial policy and draws parallels to historical and technological endeavors such as the Apollo program.[3] While targeted interventions may yield substantial advancements, one should not forget that they risk distorting competitive market mechanisms if not appropriately regulated and may result in suboptimal resource allocation, rent-seeking behavior, and regulatory capture. On the empirical front, an exhaustive review by Juhász et al. (2023) asserts that industrial policies can effectively achieve desired objectives, such as developing infant industries.[4] However, the review remains silent on its effects on competition policy, beyond stressing that successful examples of industrial policy, e.g. in east-Asian countries, have been "export-oriented" instead of going for "import substitution," thereby forcing domestic firms to compete on international markets.

The three of us contributed to a paper (Aghion et al., 2015) that provides theoretical and robust (China-based) empirical support for competition-friendly industrial policy, arguing that market competitiveness is integral to sustainable industrial development.[5] We summarize our findings in section II. In section III, we revisit the European strategy for innovation (following the Draghi report), highlighting the possibility of achieving some of its goals without conflicting with competition policy, stressing the role of the U.S. ARPA agencies, and detailing its success in recent COVID-19 vaccines. Finally, section IV concludes.

II. THE COMPLEMENTARITY BETWEEN INDUSTRIAL AND COMPETITION POLICIES

The stylized theoretical model presented in Aghion et al. (2015) examines the dynamics of two large firms, two product markets ranked by the marginal cost of innovation, and competitive fringes within each market.[6] The equilibrium mechanism works through two well-known main forces: the "replacement" effect, which says that a firm in a monopoly situation will invest less than when it faces competition, and the "escape competition" role of product differentiation. By the replacement effect, firms' incentives to innovate are reduced when they diversify (produce in different markets) compared to when they are present in the same market (especially when innovation has the lowest marginal cost). This divergence presents an opportunity for industrial policy intervention to foster innovation if the laissez-faire outcome is for firms to diversify. The policy disrupts the diversification outcome by "pushing firms," through a more favorable tax or subsidy regime, to "focus" on the high-innovation market. It promotes an equilibrium with higher innovation outcomes whenever firms cannot collude on prices easily when they are in the same market. The lower the probability of collusion (our proxy for more competition), the more innovation-enhancing the industrial policy.

In addition to this positive correlation between a market's competitiveness and the increase in innovation due to policy, our model leads to two other predictions. First, the tax/subsidy policy must target the market with high innovation benefits. Second, taxes/subsidies to only one firm will not affect the equilibrium outcome. Hence, the dispersion of tax/subsidies among firms is essential for a competition-friendly industrial policy.

These predictions are supported in our longitudinal analysis of Chinese companies covering the period 1998 to 2007, where we evaluate the impact of industrial policy on firm productivity. The results suggest that industrial policies that foster sectoral competition enhance pro-

2 Draghi, Mario (2024), "The Future of European Competitiveness Part A: A competitiveness strategy for Europe," report to the European Commission.

3 Mazzucato, Mariana (2021), "Mission economy: A moonshot guide to changing capitalism," *Penguin Books*.

4 Juhász, Réka, Nathan Lane & Dani Rodrik (2023), "The new economics of industrial policy," *Annual Review of Economics*, 16.

5 Aghion, Philippe, Jing Cai, Mathias Dewatripont, Luosha Du, Ann Harrison & Patrick Legros (2015), "Industrial Policy and Competition," *American Economic Journal: Macroeconomics*, 7 (4), 1-32.

6 *Ibid*.

ductivity. The Herfindahl index was used in this study to quantify market competitiveness, while industrial policies were split into four categories: direct subsidies, tax holidays, low-interest loans, and tariffs. The evidence indicates that policies encouraging firm entry and competition enhance overall market efficiency. These findings align with our theoretical model in which, in the absence of industrial policy, strategic entry by innovative firms into less competitive sectors may be profitable by diminishing market rivalry but reduce incentives for innovation. Well-structured industrial policies counteract this phenomenon by ensuring innovation remains crucial to competitive market dynamics.

In the example of China, the design of industrial policy mattered significantly.

- The instrument employed for policy is critical. Indeed, only two of the four industrial policies in the dataset (subsidies and tax holidays) positively correlate with our productivity ("TFP") measure.
- Like in the theoretical model, spreading subsidies out more improves company performance, even if giving subsidies to initially more competitive sectors doesn't boost productivity.
- Targeting smaller but not larger firms significantly enhances the positive impact of industrial policies on total factor productivity.

The empirical evidence suggests that introducing policies that increase competition leads to a rise in TFP. However, China's policy design does not appear to have aligned with this hypothesis. Notably, the Chinese government did not implement higher tariffs or subsidy levels in cities or industries characterized by higher levels of competition. One plausible conclusion is that if China had implemented an industrial policy that maintained and enhanced competition, it could have achieved even more favorable outcomes. The following section provides an example of an explicitly competition-friendly industrial policy that used dispersed subsidies rather than solely targeting incumbent firms.

Despite implementing a sectoral state aid policy, the challenge persists in minimizing the influence activities of sectoral interests. Competition-friendly policies can assist by allocating state aid to a less concentrated and more competitive sector. This reduces the number of firms in that sector that will lobby for assistance as they anticipate lower profits. In essence, political economy considerations should encourage the interaction between competition and the efficiency of sectoral state aid. A comprehensive analysis of the optimal governance of sectoral policies remains an area for further research.

III. THE DRAGHI REPORT AND THE ROLE OF U.S. "COMPETITION-FRIENDLY" INDUSTRIAL POLICIES

Until very recently, competition economists expressed strong suspicion vis-à-vis any form of industrial policy or sectoral state aid, on the ground that industrial policy tries, with limited success, to "pick winners," i.e. favor particular firms, thereby limiting competition.

Yet, over the past year, several strong advocates of competition policy have shifted their views and are now open to considering the possibility of suitably designed and governed industrial policy.

The first reason lies in the general observation that the competition that matters is increasingly *between* Europe and other economic powers, most prominently the U.S. and China, rather than *within* Europe, and both the U.S. and China are forcefully promoting industrial policies.

A second reason, closely related to the previous one, is that Europe has been experiencing a productivity decline relative to the U.S. since the 1990s, partly because it did not develop the equivalent of the U.S. DARPA (Defense Advanced Research Project Agency) to foster frontier innovation.

Institutions like DARPA (now "ARPA-Defense"), or BARDA ("Biomedical Advanced Research and Development Authority," now "ARPA-Health") in biotech, turn out to play a key role when coordination problems make it difficult to move from basic research to operational industrial innovation, in domains where urgency commands that concrete progress be made rapidly. An example in point is COVID-19 and BARDA: basic research produced the RNA messenger discovery, but, as discussed below, it took the BARDA machinery to turn this discovery into a mass production of new vaccines with a very short time scale.

Whether they arise between actors, between key sources of funding, or between layers when dealing with the transformation of a whole supply chain (see Aghion et al. (2024)),[7] coordination problems are a primary obstacle to breakthrough innovation. Horizontal policies alone fall

7 Aghion, Philippe, Lint Barrage, Eric Donald, David Hémous & Ernest Liu (2024), "Transition to green technology along the supply chain," LSE working paper.

short of overcoming them: a primary reason is that coordination problems give rise to multiple equilibria, and only vertical policies involving targeted sector-specific subsidies can succeed in selecting the efficient equilibrium.

The attractive feature of systems such as DARPA or BARDA is that they blend a top-down policy whereby the government selects particular missions in which to invest public funds and picks project managers – typically top scientists or entrepreneurs – with a bottom-up and competition-friendly approach whereby the project managers elicit several competing projects and approach several competing firms and labs to fulfill the missions.

The development of successful COVID-19 vaccines (which proved to be very safe and effective against the severe symptoms of the disease, even if they did not reduce contagiousness that much) in record time (less than a year) has proved to be a triumph of modern life science. As discussed in (Aghion et al., 2020)[8] and Dewatripont (2022),[9] the U.S., through BARDA, played a decisive role in this respect. Indeed, following the model of other applied R&D authorities, and in particular its defense counterpart DARPA, BARDA concentrated significant funding on a limited number of competing projects. In this case, it chose to allocate the following amounts to six projects based on three different technologies:

1. 1.95 billion $ to BioNTech (Germany) + Pfizer (U.S.).*
2. 2.48 billion $ to Moderna (U.S.).*
3. 1.46 billion $ to Johnson & Johnson (U.S.).**
4. 1.20 billion $ to Oxford/AstraZeneca (UK/Sweden).**
5. 1.60 billion $ to Novavax (U.S.).***
6. 2.07 billion $ to Sanofi/GSK (France/UK).***

(where * refers to the mRNA technology, **the viral vector technology, and ***the protein subunit technology).

This policy was exceptionally successful: all six projects led to vaccines authorized by the European Medicines Agency in the EU and/or the Food and Drug Administration in the U.S. We can talk about a massive industrial policy success that managed to "pick winners"!

And we can certainly talk about a competition-friendly industrial policy :

- These projects were all meant to deliver a "similar" product, namely a COVID-19 vaccine.
- Diversification occurred in that three technologies were chosen, with "dual sourcing" in each case.
- The whole world could enter the competition. For each technology, one non-U.S. project (funded by U.S. taxpayer money, during the first Trump Administration …) was chosen (from Europe in all three cases, taking into account that BARDA did not fund Pfizer, only BioNTech, Pfizer came along only at the later production stage).
- There was a big contrast between the identities of these six winners and those of the top vaccine leaders of the world pre-COVID-19 in the West: GSK, Sanofi, Pfizer, and MSD. The "best" vaccine technology, the mRNA one, was developed by biotech firms BioNTech and Moderna (which later teamed up with the Swiss pharma firm Lonza for production).

While the U.S. played a central role in the R&D stage of COVID-19 vaccines, the EU innovated in another dimension by introducing joint purchases of these vaccines. After an initial stage, four of its Member States (Germany, France, Italy, and the Netherlands) decided to join forces and bargain separately from the other 23 Member States. While agreeing to such a delegation did lead to some delay, it ensured more equal access to these vaccines to all Member States within the EU, including the less prosperous ones.

(Fischer et al., 2022) argue that such joint procurement could also improve the innovation/access tradeoff for treatments for rare diseases. It is well-known that such treatments are costly.[10] While high prices can be justified to some extent by low patient numbers, current trends show that rare-disease treatments already represent significant shares of public drug budgets overall. In this respect, joint procurement could be a way to introduce some buyer power to counter the well-documented tendency of global pharma companies to "play one country against another" in terms of price and speed of access to treatments (see Kyle (2007)).[11] Interestingly, this idea could be seen as another example of

8 Aghion, Philippe, Sofia Amaral-Garcia, Mathias Dewatripont & Michel Goldman (2020) "How to strengthen European industries' leadership in vaccine research and innovation," VoxEU, CEPR Policy Porta.

9 Dewatripont, Mathias (2022), "Which policies for vaccine innovation and delivery in Europe?," *International Journal of Industrial Organization*, 84.

10 Fischer, Alain, Michel Goldman & Mathias Dewatripont (2022), "Improving the innovation/access trade-off for rare diseases in the EU after Covid-19," VoxEU.

11 Kyle, Margaret K. (2007), "Pharmaceutical price controls and entry strategies," *The Review of Economics and Statistics*, 89 (1), 88-99.

competition-friendly industrial policy since, by further "completing the EU Single Market," one induces more firms to compete for what has become a larger pie (and thereby address complaints about market fragmentation).

Finally, in line with the model of (Aghion et al., 2015) one could combine the above ideas with authorization policies trying to limit the proliferation of "me-too drugs," marginal innovation strategies that prioritize incremental improvements over transformative breakthroughs (the latter being less profitable than the former, a phenomenon documented for the U.S. at least by Fojo et al. (2014)).[12] In this respect, stricter regulatory criteria for pharmaceutical innovation can ensure that research efforts are mainly focused on substantive advancements rather than rent-seeking behavior. Encouraging competition-friendly innovation while safeguarding affordability is crucial for sustainable advancements in rare disease treatments.

Let us end this section by stressing that these issues are relevant beyond the pharma sector. As convincingly argued in a recent report by Fuest et al. (2024),[13] nothing yet in Europe can pretend to be a true counterpart of DARPA or BARDA. In particular, the European Innovation Council focuses on helping small and medium-sized enterprises, which, in itself, is a commendable objective to pursue. Still, it has not achieved the goal of promoting breakthrough innovation. In contrast, by delegating decision-making and project management to top scientists and entrepreneurs and having the project managers elicit competing projects, the ARPAs have helped the U.S. government continuously stimulate disruptive innovation in strategic sectors. Among the famous successes associated with this strategy are the GPS, the Internet (derived from Arpanet), and, as we just mentioned, the COVID-19 mRNA vaccines.

IV. CONCLUSION

The opposition between industrial and competition policies is artificial; instead, these policies must be viewed as interdependent levers for sustainable economic growth. The Chinese experience in this matter, as well as that of ARPAs in the U.S. (with the recent success of COVID-19 vaccines) exemplify the viability of competitive-sensitive industrial policies. Moving forward, policymakers must prioritize frameworks that are not only pragmatic and adaptable but also structurally coherent and strategically nuanced. The future trajectory of European industrial policy will depend on its ability to balance these imperatives with precision and foresight.

12 Fojo, Tito, Sham Mailankody & Andrew Lo (2014), "Unintended consequences of expensive cancer therapeutics—the pursuit of marginal indications and a me-too mentality that stifles innovation and creativity," The John Conley Lecture, *JAMA Otolaryngology–Head & Neck Surgery*, Special Communication.

13 Fuest, Clemens, Daniel Gros, Philipp-Leo Mengel, Giorgio Presidente & Jean Tirole (2024), "EU innovation policy: How to escape the Middle Technology Trap," EconPol Policy Reports Report, ifo Institute - Leibniz Institute for Economic Research at the University of Munich.

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