# The Resurgence of Industrial Policies in 21<sup>st</sup> Century

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## 1. Introduction

The idea that industrial policy was harmful was somewhat codified in the so-called "Washington Consensus (Williamson (1990))," which insisted that minimization of government intervention would help achieve rapid economic development. Opponents warn that government intervention can lead to inefficiencies and undermine market autonomy. In addition, the WTO agreement established in 1995 reduced the scope for industrial policy, and the regional trade agreements, of which 386 were in force as of January 2023, restrict the role of government than the WTO. Consequently, the scope for implementing industrial policy has further diminished, so industrial policy has been forgotten.

Economists in favor of industrial policy often argue that government intervention can compensate for market failures, enhance the competitiveness of strategic industries, and spur technological innovation. In recent years, industrial policy has been resurged. As to the background to this, Aghion et al. (2015) point out that the need for industrial structure change in developing countries, the long-term deterioration of labor markets and financial crises in developed countries, and technological changes. They also point out the existence of China as a factor that is related to all of these. Furthermore, the development of empirical research methods in economics based on econometrics has enabled the rigorous and quantitative identification and evaluation of the effects of industrial policy.

The structure of this paper is as follows. Section 2 reviews the definition and rationales of industrial policy. Section 3 summarizes the current state of industrial policy. Section 4 examines the industrial policy of the USA, China, and Japan focusing on the semiconductor industry, and finally, Section 5 concludes the paper.

## 2. The Definitions and Rationales of Industrial Policy

### 2.1 The Definitions of Industrial Policy

There is no commonly agreed definition of industrial policy. The existence of diverse definitions is due to the fact that industrial policy varies based on the needs and characteristics of specific industries or time periods, and it has been implemented based more on practical needs rather than theoretical economic analysis. Therefore, the concept of industrial policy is difficult to define uniformly, and many definitions exist.

Komiya (1988,p.2), a pioneer in research on industrial policy, defines industrial policy as "Government policies such that, if they had not been adopted, there would have been a different allocation of resources among industries or a different level of some aspects of economic activity of the constituent firms of an industry. In other words, industrial policy increases production, investment, research and development, modernization or restructuring in some industry or industries, and decreases them in other industries." Reich(1982), the most prominent proponent of industrial policy in the USA, is defined industrial policy as favoring promising industries, creating skilled workforces, developing infrastructure, and regional policy. Pack and Saggi (2006) define "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". Lane(2020) offers a broader definition, describing industrial policy as "an intentional political action aimed at changing the industrial structure of an economy". Juhasz, Lane, and Rodrik(2023) provide a more specific definition than Lane(2020), describing industrial policy as "a government action that explicitly seeks to transform the structure of economic activity in pursuit of some goal".

The concepts of industrial policy presented above are so broad that it feels like all policies affecting economic development and industrial structure are referred to as industrial policy. Juhasz, Lane, and Rodrik(2023) point out that industrial policy overlaps with regional policy(Slattery and Zidar, 2020), place-based policy(Neumark and Simpson, 2015), and innovation policy (Mazzucato, 2014). Defining the scope of industrial policy too broadly and listing its objectives and means can actually obscure the concept of industrial policy.

It is significant that Chang(1994) has further narrowed the concept of industrial policy. He defines industrial policy as "a policy aimed at particular industries to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole". He characterizes his definition of industrial policy as having four distinct features. Firstly, he emphasizes the words particular industries, and therefore exclude policies designed to affect industry in general (for example educational investment, infrastructural development). Secondly, by mentioning efficiency, it emphasizes that the clear principle of industrial policy is efficiency. Thirdly, by emphasizing the economy as a whole, he clarifies that industrial policy aims to enhance the overall efficiency of the economy, not just the efficiency of specific industries. Fourthly, by stating that the phrase perceived by the state, it clear that industrial policy does not need to be justified as fair or right for everyone.

I will synthesize several definitions of industrial policy and define industrial policy in my own way. Industrial policy refers to a government-initiated strategy aimed at addressing market failures in specific industries at particular points in time, with the goal of enhancing overall economic efficiency and achieving desired outcomes.

## 2.2 Rationales of Industrial Policy

In cases of market failure, most economists agree that government intervention is necessary. Market failures can occur due to the presence of economies of scale and learning effect, externalities, asymmetric information, and excess competition.

## (1) Economies of scale and learning effect

Economies of scale refer to a situation where average costs decrease as production increases. When economies of scale are realized, firms can produce at the most efficient scale, which can limit the number of competing firms. As a result, there is a high possibility that a monopoly or oligopolistic market structure will be formed in which the decisions of individual firms affect prices and production. This creates a disparity between the socially optimal

prices and production levels under perfect competition and those under monopoly or oligopolistic market structure, providing a justification for the implementation of industrial policy. Horstman and Markusen(1986) validated that with the implementation of industrial policy, as more firms enter the market, each firm produces at inefficient scales, resulting in higher average costs. Therefore, the government should not only select which firms to allow entry but also limit the number of new entrants.

Learning effects refer to the cost reductions achieved through experience gained from actual production. Lieberman(1984) estimated the learning effect in 37 chemical plants and found the slope of the learning curve to be 20%. Baldwin and Krugman(1987) also estimated the slope of the learning curve in the semiconductor industry to be 28%. This indicates that when cumulative output more than doubles, production costs decrease by 20-28%. This is similar to economies of scale, where average costs decline as output increases. The learning effect can thus be considered a dynamic scale economies since the unit of production cost decreases as experience accumulates.

When both static and dynamic economies of scale exist, monopolistic market structures can form not only within a country but also in international markets. The rationale for implementing industrial policy to facilitate the entry of domestic firms into international oligopoly markets is that the income of a country includes the profits earned by its domestic firms abroad. Therefore, if industrial policy enhances the sales and profits of domestic firms, the country's income will increase. A prominent example of this is Europe's Airbus entering the commercial aircraft industry, which is a good example of the reality of industrial policy.

#### (2) Externalities

Externalities arise when the actions of one firm impact the benefits of other firms without going through market mechanisms. When externalities occur, private marginal benefits and costs do not align with social marginal benefits and costs, preventing efficient resource allocation through market mechanisms. According to the Coase Theorem, even if externalities exist, well-established property rights can facilitate appropriate compensation, allowing market mechanisms to mitigate externalities. However, considering the costs related to information acquisition, negotiation, and contracting, it can be impractical to address externalities within market mechanisms. Therefore, the problem of externalities should be resolved through industrial policy.

A prominent example of externalities is the new knowledge generated through research and development activities. Knowledge possesses three characteristics: first, it is non-rivalrous, meaning that multiple firms can utilize the knowledge simultaneously. Second, it has non-excludability, as the developing firm cannot fully exclude others from using the knowledge. Third, knowledge exhibits a high degree of complementarity; most knowledge gains significance when combined with other knowledge. The first two characteristics reflect public goods traits. When the production of knowledge, which has public goods characteristics, is left to market mechanisms, it is generally supplied in quantities below what is socially optimal. To address this problem, the government needs to implement industrial policies that maximize the social benefits of R&D while minimizing individual firms' disincentives to invest in R&D. Furthermore, the emergence of platforms due to advancements in digital technology provides a significant basis for implementing industrial policies, particularly in relation to network externalities.

#### (3) Asymmetric information

Advanced manufacturing industries require significant amounts of capital. Firms need to borrow not only to cover the losses incurred during the initial stages of production but also to finance the substantial costs arising during the production process. If firms could borrow funds from the capital market at an interest rate that reflects a reasonable premium for the risks associated with new ventures, combined with social costs, the capital market could be said to function efficiently. However, in reality, the capital market is inefficient. This inefficiency arises because asymmetric information is a common phenomenon in capital markets. Borrowing firms are well aware of their capabilities, accumulated experience, and technological levels, as well as the risks and potential of the ventures they wish to undertake, while lenders, such as banks, can only make educated guesses.

Stiglitz and Weiss (1981) and Flam and Staiger (1989) demonstrated that when there is asymmetric information between financial institutions and firms, capital allocation can become distorted. Firms are likely to seek funding for higher-risk projects even at higher interest rates. This is because the firm gets to keep most of the profits when the risky business succeeds, while most of the losses incurred by the firm take the form of the borrowed capital when it fails. Consequently, firms are inclined to pursue higher-risk projects. This problem of adverse selection results in the private costs of borrowing exceeding the social costs. Therefore, the implementation of industrial policies to address problems arising from this asymmetric information is justified.

#### (4) Excess Competition

In traditional economics, it is a common understanding that more competition increases welfare for the economy as a whole. However, Suzumura and Kiyono (1987) demonstrated that intensified competition may not increase welfare, indicating that government intervention is necessary in cases of excessive competition.

Two Situations can be identified as examples of excessive competition. First, excessive competition occurs when, as a result of competition, most firms find that their operating costs exceed their profits, even when fixed costs or entry costs are not taken into account. This phenomenon often arises when demand sharply declines, leading many firms to enter the market despite anticipating short-term losses because they believe there will be long-term profitability. It can also occur when firms expect high demand, leading many to enter the market, but the demand ultimately proves insufficient for all firms to achieve profitability. Second, the sunk costs associated with capital investment become zero in opportunity costs once the investment is completed, and these costs cannot be redirected for other purposes or sold to others. After the completion of capital investment, if a firm's capacity utilization is low during the production and sales phase, it may generate positive operating profits but still yield investment returns below the market interest rate. In some cases, firms may even find themselves earning returns that fall short of their capital investment costs. Such scenarios are indicative excessive competition. Therefore, in cases of excessive competition, the argument for government intervention to alleviate competition is justified.

## Current Status of Industrial Policy

Figure 1 illustrates the trend in the number of industrial policy implemented by G20 countries. It shows a sharp increase after 2018, when the global financial crisis occurred. It is evident that industrial policy has indeed resurgent.

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Figure 1. Time Trend of Industrial Policy



Source) Juhasz, Lane, and Rodrik (2023) "The New Economics of Industrial Policy" NBER Working Paper Series.



Figure 2. Industrial Policy by Region

Source) Juhasz, Lane, and Rodrik (2023) "The New Economics of Industrial Policy" NBER Working Paper Series.

This resurgence of industrial policy is likely influenced by several factors, including the global financial crisis, digital transformation (DX), China's successes, security concerns, and pandemic. In particular, during the global financial crisis and the pandemic, there were numerous criticisms regarding the insufficient role of government. This raised calls for a stronger governmental presence and intervention in the economy.

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Figure 3. Proportion of Industrial Policy by Motivation

Source) Evenett, Jakubik, Martin, and Ruta (2024) "The Return of Industrial Policy in Data" IMF Working Papers.

Figure 2 illustrates the breakdown of industrial policy by region. As shown in the figure, it is clear that developed countries are more proactive in implementing industrial policy compared to developing countries. The interesting aspect is that industrial policy is overwhelmingly more used in Western countries compared to East Asia, including China.

Figure 3 breaks down the motivations for implementing industrial policy. Interestingly, 37% of industrial policy is implemented with the goal of enhancing competitiveness, while the remaining 63% aim to address climate-related concerns, supply chain resilience, and geopolitical concerns and national security concerns. This indicates that developed countries are leading the resurgence of industrial policy.

## 4. A Brief Review of China, USA and Japan's Industrial Policy on Semiconductor Industry

All countries engage in various industrial policies irrespective of economic system and stages of development. This section will briefly examine the industrial policy of the USA, China, and Japan regarding the semiconductor industry, which is becoming a bottleneck in manufacturing production activities. Semiconductor is increasingly concentrated in specific countries, making it one of the most critical items for economic security. The USA, China, and Japan are actively implementing industrial policy to secure advanced semiconductors.

#### (1) USA

Becker (1985) stated that the best industrial policy is to do nothing. This argument has long been supported in the USA academic community. However, initiatives such as the Defense Advanced Research Projects Agency (DARPA), which has contributed to advancements in computers, jet engines, nuclear power, and lasers; the Small

Business Innovation Research (SBIR) program, which supports high-tech firms with an annual budget of over 240 billion yen; and the National Nanotechnology Initiative (NNI) have been implemented. In line with this tradition, the CHIPS and Science Act was enacted in August 2022, focusing on supporting semiconductor production. It authorizes over \$52 billion for supporting the semiconductor industry, and an additional \$200 billion for supporting USA science and innovation. The first part of the CHIPS and Science Act lays out policies to support the primary objective of bolstering USA semiconductor manufacturing. The US Department of Commerce has set goals for 2030, including the establishment of a large-scale cluster of at least two advanced logic semiconductor factories within USA and the enhancement of production capacity for current-generation and mature-node semiconductors.

In addition, the CHIPS and Science Act includes guardrail provisions related to national security. The US government, through the guardrail provisions, aims not only to prevent the outflow of critical semiconductors and related technologies to concerned countries such as China and Russia, but also to enhance the resilience of global supply chains by collaborating with allied nations on semiconductor policies. After all, Recipients of CHIPS funds are prohibited from expanding manufacturing capacity in foreign countries of concern for ten years. They are also restricted from signing joint research or technology licensing efforts with foreign entities of concern.

I think this is an important sample case showing that specific industries can be grown using industrial policy that set a strong policy direction for government financing.

#### (2) China

China has been a prominent user of industrial policy. It has achieved remarkable economic growth thanks to its industrial policy. Recently, the Chinese economy has been facing significant challenges due to its low self-sufficiency in semiconductors, which are essential for production process, as advanced countries like the USA have restricted semiconductor equipment and technology because of national security. Thus, in China Manufacturing 2025, the Chinese government has set the goal of increasing semiconductor self-sufficiency to 75% by 2030. In 2014, it launched the National Integrated Circuit Industry Investment Fund (139 billion yuan), and in 2019, the second phase of this fund was raised, amounting to 204 billion yuan. Additionally, in August 2020, the government announced support measures that include a 10-year exemption from corporate income tax for integrated circuit production firms that meet certain criteria, starting from the year they become profitable. Furthermore, the Chinese government is moving toward the third phase of the National Integrated Circuit Industry Investment Fund, which is expected to reach 300 billion yuan, more than the first phase in 2014 and the second phase in 2019. The Chinese government will likely continue to increase its investment in the semiconductor industry. In other words, China is aggressively implementing industrial policy for the semiconductor industry not merely to catch up with the technological gap with Japan and USA, but to gain an advantage in advanced technologies such as 5G, AI, robotics, and quantum computing.

## (3) Japan

Japan's industrial policy played a significant role in the catch-up phase. A typical example is the Five-Year Plan for Economic Independence, which was decided in 1955. This was often imitated in Korea and China. However, large-scale national projects such as the Fifth Generation Computer beginning in 1982, the software production industrialization system starting in 1985, and Real World Computing initiated in 1992 ultimately ended in failure,

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leading to a pessimistic outlook regarding industrial policy. As competition between the USA and China in the semiconductor industry intensifies, Japan, in December 2021, the "Act on Promotion of Development, Supply and Introduction of Specific Advanced Information and Communication Technology Systems, etc." was enacted, which stipulates measures to promote investment in production facilities for high-performance semiconductors, and went into effect in March 2022. Semiconductor manufacturers wishing to receive support under this law may apply to the Minister of Economy, Trade and Industry for a "Specific Semiconductor Production Facility Development Plan". If the plan is approved as contributing to the stable production of high-performance semiconductors, the firms can receive subsidies through NEDO. So far, 1.66 trillion yen has been granted to TSMC, Micron, and Kioxia. In particular, Japan has offered 1.2 trillion yen in subsidies, which accounts for 73% of the total 1.66 trillion yen, to attract the TSMC Kumamoto plant.

Japan's support for the semiconductor industry is not as substantial as that of the USA and China. The Japan Electronics and Information Technology Industries Association has argued that Japan should support the semiconductor industry on a scale similar to that of the USA and China. However, the Japanese government faces tight fiscal constraints, leaving little room for such initiatives. This situation suggests that fiscal conditions are likely to be a significant constraint when implementing industrial policy.

## 5. Conclusion

This paper shows that industrial policy has experienced a resurgence. In particular, I found that the resurgence of industrial policy is being driven by developed countries, not developing countries. In order to be desirable industrial policy that maximizes benefits and minimizes risks, Tirole (2024, i994) proposes the following eight recommendations.

- (1) Identify the market failure, so as to design the proper policy
- (2) Use independent high-level experts to select the projects and the recipients of public funds
- (3) Pay attention to the supply side (talents, infrastructure) and not only to the demand side
- (4) Adopt a competitively neutral policy
- (5) Do not prejudge the solution, but rather define objectives
- (6) Evaluate ex post, disseminate the results and include a 'sunset clause' in each program, forcing its closure in the event of a negative assessment
- (7) Involve the private sector in risk taking to avoid white elephants
- (8) Strengthen universities and bring them closer to the start-up world

Today, the challenges facing the world are too large to be solved by any single nation. To address issues such as the widening income inequality due to technological innovation, climate change, pandemics, and stagnating economic growth, we need an international industrial policy that collaborates with partners who pursue similar values, rather than a policy confined to one country. This emphasis on international cooperation is a characteristics of  $21^{st}$  century industrial policy that differs from  $20^{th}$  century industrial policy.

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