The Effect of Industrial Policy on Technological Companies: Evidence from China

Yuqing Ying*

Beijing 21st Century School, Beijing, 100142, China

*Corresponding author Email: yingyuqing211411@163.com

Abstract. Under background of China has implemented frequent industrial policy on technological companies, this paper employs DID empirical method to evaluate the policy effect. I use the daily stock market transition data, and use stock performance of relevant companies as the proxy of policy effect. I find that the industrial policy significantly increases the price of relevant companies and thus benefit those companies' performance. My study has significant policy implication on the implementing of industrial policy.

Keywords: Industrial Policy, DID, Technological Companies

1 Introduction

In economics, the classic Solow model demonstrates the critical role of technology in economic growth. In today's era of rapid technological development, industrial technological transformation and the development of high-tech products have become indispensable components of economic growth. In that case, governments are facing unprecedented policy challenges, that is, how can they implement effective policies to promote technological innovation and drive economic development? This study focuses on the stimulus industrial policies for technological companies implemented in China, evaluating their impact on the stock performance and thus providing guidance for future policymaking.

The industrial policies on technology firms were implement after 2022, with different implement date in different provinces. In this research, technology firms targeted by these industrial policies serve as the treatment group, while other technology firms act as the control group. Data on stock performance, including closing prices and daily transaction volumes, is sourced from the A-share Wind dataset. Since provinces implemented incentive policies at different times, the dates of policy implementation were manually collected from government documents available online. A Difference-in-Differences (DID) model and regression analysis are used to assess the effectiveness of technological policies in China.

The result shows that compared to other technological companies, those enjoyed incentives has experienced a significant increase in stock prices, daily transaction volumes and cumulative return rates. Since my dataset is daily frequency, I can identify

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the casual effect of the industrial policy on technological companies' finance. For the policy implication, local government, in the future, could reference to existing policies on technological firms to improve their competitiveness.

The rest of this paper is organized as follows. Section II summarize the relevant literature. Section III presents the empirical method and section IV shows empirical results. Finally, section V concludes this paper.

2 Literature Review

Developing countries has been advancing their industries as they enhance both the quantity and quality of their exports to developed nations[1]. However, as a supper-middle-income developing nation, China has been experiencing a structural slowdown, partly due to sluggish goth in both labor force and productivity[2]. Apart from its own structural problems, China's economy also faces hurdles from the rapid development of Artificial Intelligence (AI). Globally, the World Economic Forum estimates that AI will displace 85 million jobs by 2025 while creating 97 million new ones [3]. This signals a drastic shift in the labor market, introducing substantial uncertainty to global economy.

Faced with the need to find new drives for economic growth and the uncertainty brought by AI, it is crucial for the government to consider how changes in policies can support firms affected by AI, ensuring they adapt and thrive in this evolving landscape.

Previous research focus on the effectiveness of tax policy on firms' performance. Quoc Trung and Van Tan showed the positive effect of tax incentive policy on profitability and operating efficiency empirically with the data from Vietnam[4]. Chen et al. (2019) using Difference-in-Difference method to conduct empirical research on China's 2009 VAT reform, finding the increased investment of experiment group mainly driven by additional investment spikes[5].

Studies on tax policy and innovation performance which is the mainstream of research have different results. Some researchers have found an inverse relationship between tax rate and innovation, which is consistent with the concept of convex tax schedules. Mukherjee et al. (2015) discovered that corporate tax impede innovation at every stage including the spending on R&D and the introduction of new products[6]. This is partly due to a decline in innovator incentives, as evidenced by high turnover rates following tax increases and a drop in innovation productivity among employees. The tax incentive policy also has indirect impact to improve innovation of firms other than ton for tax credits and same competitive advantage as target firms [7]. However, other studies have opposite conclusions. Value-added-tax cuts in China's new energy industries in China leads to not only decrease in profit but also lack of innovation motivation [8]. Also, U.S. R&D tax credit regime (ASC) in 2007 brought its users power innovation performance and its adverse effects depend on firms' innovation diversification and governance [9].

Regarding research data, Mukherjee et al. (2015) emphasize the importance of measuring innovation output instead of investment as R&D expenditure might by relabeled aimed to avoid tax[6]. This is also noticed by Chen et al who found a large proportion

of increase in R&D investment following tax cuts had been relabeled and this leads to misallocation of resources towards less-innovative firms, so mislabeling should be considered when designing incentive policies [10]. The allocative inefficiency can be further explained by the research done by Tang and Liu: regional intellectual property right (IPR) protection determines the effect of incentive policies, so if IPR protection is weak, companies with no intention of innovating might exploit tax incentives to avoid tax paying [11].

In addition to IPR, there are several identified factors that would affect the real effect of incentive policy. Mao et al. found the effect of industrial and R&D policy in China depends on the relative development stage of the industry to the world frontier level: Those policies are more effective to globally emerging high-tech industries [12]. Besides, if Chinese SMEs cannot receive subsidies or competitive advantage from Value-Added-Tax cuts, they would not increase their R&D [7]. In Taiwan, it was found that the positive effect of R&D tax credits only exists in high-tech firms with opportunities for innovation [13].

In terms of policy design, Chen and Gupta highlighted the inefficiency of offering tax credits based on incremental R&D spending over a moving-average baseline, due to the potential loss of tax revenue as firms can strategically time their spending to maximize these credits. A related concern is the impact of lowering income taxes for workers to reduce costs for firms. To address this, Bryce Campodonico et al. recommend that the optimal approach is to lower consumption taxes, which would incentivize both entrepreneurs to save, thereby increasing their net worth, and to invest in their businesses [14].

No previous research has studied the impact of local government incentive policies on technological companies. Given the current dilemma of Chinese economy, well-designed government policies are crucial for stabilizing the economy and promoting growth. This paper aims to fill this gap and provide policy recommendations for the development of high-tech in China.

3 Research Method

3.1 Difference-in-Differences Model

China's policy incentives for technological companies, such as corporate income tax cut, are exogenous policy shocks to the company's operating model and can therefore be considered a natural experiment. Given the timing of the implementation of these incentive policies varies across provinces, to scientifically assess the policy's impact on company stock performance, the following regression model is constructed:

$$\text{Outcome}_{i,t} = \alpha + \beta_1 \text{Policy}_{i,t} + \eta_i + \lambda_t + X_{i,t} + \epsilon_{i,t}$$

$\text{Outcome}_{i,t}$ is the stock performance (closing price, cumulative return rates, transaction volumes), $\text{Policy}_{i,t}$ is the technological policies, η_i is the firm fixed effect, λ_t is

the time fixed effect, $X_{i,t}$ is the set of control variables, and $\epsilon_{i,t}$ is the the random disturbance term. Estimation coefficient β_1 measures the average difference of stock performance before and after policy implementation.

3.2 Variable Construction

Explained variable. Stock performance ($Outcome_{i,t}$) is positively correlated to firms' performance [15][16]. With incentive policies, firms can improve their profitability theoretically which would reflect on the increased stock prices, higher return rates and increased transaction volumes.

Policy Variable $Policy_{i,t}$ equals 1 for different provinces in different date, since the policies are implemented differently in different. We manually collect the relevant policy files of local government to measure the industry policy on technology industry.

3.3 Dataset

This research used A-share Wind dataset that is a leading data provider in China with a strong foundation in financial data.

3.3.1 The "Generality" of Chinese Story.

Since the economic reform, China has been dedicated in technological upgrades through various policies and laws. The "863 Program", enacted in 1986, aimed at promoting research and development in high-tech industries. Over the course of 30 years, the policy helped China acquire cutting-edge technologies in global market, particularly in areas such as automation and advanced resources [17]. A decade after the implementation of the "863 Program," China introduced the Science and Technology Progress Law to further encourage innovation and enhance the productivity of firms in response to increased demand from both domestic and international markets [18]. As of 2024, China, a global leader in science and technology, continues to stimulate further growth in these sectors. From January to August, incentive policies aimed at fostering technological innovation and the development of the manufacturing industry have resulted in tax reductions or refunds totaling over 1.8 trillion yuan at the national level [19].

3.3.2 The "Applicability" to the Research Model.

Company codes provide information on company types, helping to filter technological firms as the control and experimental groups. The dataset also includes companies' addresses, which could be used to identify relevant policies that impact the company and analyze their effects. In this dataset, there is sufficient data to track changes of the stock, including daily prices, return rates and daily volumes of trading, which is align with the identification strategy.

3.3.3 Limitations.

However, the choice of this dataset is also due to practical considerations. Data for companies other than publicly listed ones tends to lack transparency. This may generate sample selection bias in the regression, which brings bias in the estimated parameter.

4 Result

Table 1. Effects of Industical Polices on Closing price, Return rates, and Volume.

	(1)	(2)	(3)
	Closing price	Return	Volume
Policy	9.164***	0.0388**	2124502.2*
	(3.236)	(0.017)	(1107450.533)
Constant	112.8***	0.00798	10116489.6***
	(3.587)	(0.014)	(742793.595)
Firm Fixed Effect	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes
Observations	408974	408974	408974
R^2	0.005	0.174	0.023

Standard error in parentheses; *p<0.10, ** p<0.05, *** p<0.01

Table 1. shows that technological policies boosted closing prices by 9-yuan, daily transactions by over 2 million, and cumulative return rates by 3.8%, reflecting a favorable market response.

The result can be explained by economic theories. Technological policies often aim to improve innovation, which enhances firms' productivity and growth potential. When investors see firms implementing or benefiting from technology progress, they anticipate higher future profitability. As demand for stocks increases, closing prices are driven up. It even creates a positive feedback loop as stock prices increases, more investors perceive these assets as high value, leading to further buying and pushing prices even more. From another perspective, favorable technological policies often signal government support for tech sectors, boosting investor confidence. This can lead to increased transaction volume, as more investors are motivated to buy and hold shares in these companies. Investors' confidence could also be improved as the risk of innovation has been reduced with incentive policies. This makes technological companies more attractive to investors who are more willing to invest at higher prices, raising both closing prices and cumulative returns.

5 Conclusion

This study adopts a macroeconomic perspective to assess the effectiveness of technological policies, rather than focusing on a specific case, therefore it is more referential for future policy-making. Compared to studies on general government fiscal incentives,

this research specifically examines the policies implemented by local governments to support the development of technological policies. The DID model is employed, enabling the exclusion of external factors and proving a precise analysis of how these policies affect firms' stock performance. My empirical specification reduces the possibility of other shocks affecting the experimental groups, as it is highly unlikely for such shocks to occur precisely when technological policies are implemented at different times across various provinces.

This paper presents a framework to exam the effect of industrial policy on technological firms' performance. The daily transition data are employed to get the causal effect. However, the underlying mechanism is still waiting for investigating. That is, how the industrial policy improve the technological firms' performance, from valuation or profit or else. In future studies, researchers could also consider using dynamic specification to capture anticipatory and staggered effects of the policy.

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