อิทธิพลของ "Made in China 2025" ต่อนวัตกรรมพฤติกรรมการผลิตของจีน

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บทคัดย่อ
บทความนี้ถูกรวมเข้ากับแผน "Made in China 2025" ซึ่งเปิดตัวโดยสภาแห่งรัฐของจีนในปี 2558 เพื่อเปลี่ยนการผลิตของจีน บทความนี้นำข้อมูลพาเนลของบริษัทผู้ผลิตสาธารณะ A-share ในปี 2014 และ 2016 มาใช้พร้อมกับการนำรูปแบบความแตกต่างในความแตกต่าง ("DID")

มาใช้เพื่อตรวจสอบอิทธิพลที่แผนกำหนดต่อนวัตกรรมของ
บริษัทเท่าที่บริษัทผู้ผลิตที่เกี่ยวข้องนั้นมีการเปิดเผยผ่าน
การศึกษาเชิงประจักษ์ว่าแผนแทรกแซงความสามารถในการ
สร้างสรรค์นวัตกรรมในระยะต่าง ๆ ของการพัฒนาผลิตภัณฑ์
นอกจากนี้เส้นทางนวัตกรรมยังเชื่อมโยงประสิทธิภาพของ
นวัตกรรมและเงินอุดหนุนทางการเงิน ในท้ายสุด บทความนี้
ได้กำหนดข้อเสนอแนะจากมุมมองขององค์กรและรัฐบาล
ในปี 2019 เป็นปีที่ห้านับตั้งแต่มีการดำเนินการตามแผน
บทความนี้จะเป็นประโยชน์อย่างมากต่ออุตสาหกรรมการ
ผลิตของจีนในการใช้ประโยชน์จากนโยบายเพื่อการปรับปรุง
ประสิทธิภาพในการพัฒนาผลิตภัณฑ์ของบริษัท และการเร่ง
ความเร็วในการพัฒนาอัจฉริยะขององค์กร บทความนี้ยังมี
การตรวจสอบเพิ่มเติมของความสัมพันธ์ระหว่างการดำเนิน
นโยบายของรัฐบาลและประสิทธิภาพของนวัตกรรมของ
องค์กรและให้การอ้างอิงเพิ่มเติมสำหรับผู้ประกอบการจีนที่
จะใช้พฤติกรรมนวัตกรรมอย่างมีประสิทธิภาพ

คำสำคัญ: ตัวแบบที่แตกต่างกัน; ไกล่เกลี่ยผล; ความเข้มข้น
ของ R&D; ประสิทธิภาพการทำงานของนวัตกรรม

Influence of "Made in China 2025" upon Innovation Behavior of China's Manufacturing

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Abstract

This paper is occupied with the "Made in China 2025" plan unveiled by China's State Council in 2015 for transforming China's manufacturing. In this paper, the panel data of A-share public manufacturing companies in 2014 and 2016 are taken, along

with the adoption of the difference-in-differences model ("DID"), to examine influences that the plan imposes upon the innovation of a company. As far as manufacturing companies are concerned, it is disclosed through the empirical study that the plan has variably interfered with its innovation ability at different stages of its product development. Besides that, the innovation path has bridged innovation performance and fiscal subsidies. Finally, the paper has set forth suggestions from the perspectives of the enterprise and the government. In 2019, the fifth year since the plan was initiated, this paper will substantially benefit China's manufacturing industry through ways to avail of policies, for a more efficient improvement in the product development of a company, and an acceleration in intelligent development of corporate innovation. This paper also provides further verification of the relationship between government policy implementation and enterprise innovation performance and provides more references for Chinese enterprises to effectively implement innovation behaviors.

Keywords: Difference-in-differences model; Mediating effect; R&D intensity; Innovation performance

Introduction

Since the 18th National Congress of the CPC (Communist Party of China), the innovative development of China's manufacturing has tremendously magnetized emphasis from the CPC Central Committee with Comrade Xi Jinping as General Secretary of CPC. Meanwhile, all major industrial countries in the world are stimulated by the Age of the Fourth Industrial Revolution to launch their own strategic framework, such as "Industry 4.0" in Germany, "A National Strategic Plan for Advanced Manufacturing" in the USA, "UK Industry 2050" and "Union of Japanese Science and Industry". Facing the disappearing advantage of "Made in China" at a low cost with the diminishing demographic dividend, China has launched the "Made in China 2025" plan to push forward the development of its manufacturing to a higher level. The plan is designed for the balanced planning of China's manufacturing and for a strong country in manufacturing.

As triggered by "Made in China 2025", a series of preferential policies in finance and tax have been released by the Ministry of Finance and State Taxation Administration to boost the high-quality economic development of manufacturing companies. In Measures of Fund Management for Industrial Transformation and Upgrading (Made in China 2025) jointly published and issued by the Ministry of Finance and the Ministry of Industry and Information Technology in 2016, for instance, unveiled that monetary subsidies were to be allocated to transform and upgrade to support such key fields as smart manufac-turing, robust industrial foundations and green manufacturing defined by the "Made in China 2025" plan for the holistic improvement in China's manufacturing. In 2017, the Guidelines of Fund Practice for Industrial Transformation and Upgrading (Made in China 2025) were

jointly published and issued by the Ministry of Finance and the Ministry of Industry and Information Technology. It is expressed in the document that funds will be granted as specific subsidies for the special purpose to dissolve core bottlenecks the ten significant fields suffer. Concerning the No. 70 document issued by the Ministry of Finance in 2018, overpaid value-added tax will be refunded to enterprises in such 10 key fields as defined by the "Made in China 2025" plan, including the new generation of information technology, high-end numerically-controlled machine tools, and robotics. It is elicited from the above-mentioned facts that since the strategy commenced in 2015, all departments under China's government have launched a wide range of incentive policies in three consecutive years to fully carry out the "Made in China 2025" plan, which has stepped up the pace to build a strong country in manufacturing by boosting the innovative development of manufacturing companies and improving their quality and efficiency.

In addition to the development orientation that the plan has defined for the five big projects and the ten key fields like high-end numerically-controlled machine tools and aerospace equipment, the "Made in China 2025" plan covers numerous policies that are benefi-cial to the innovative development of manufacturing companies. Fiscal subsidies, one of the incentive innovation policies released by the government, is a favorable one that benefits companies most directly in their eyes. Furthermore, this policy is so common and highly effective than other countries use it to boost the innovative development of their indigenous companies. As for a company, its enhancement in its innovation capabilities not only derives from its business decisions and governance measures but also lies in such

incentive polices launched by the government, like a governmental subsidy. Apart from government policies that are fully applied, a company will develop innovation paths, like reinforcement in its cooperation and exchanges in and out of the company, to increase its innovation performance. Atkeson and Burstein (2011) hold that the government's promotion of innovation policy plays an important role in the development of enterprises' innovation activities. Meuleman and De Maeseneire (2012) also believe that R&D subsidy policy elements have the most positive impact on enterprise innovation activities. Today, China is forging ahead to upgrade its manufacturing and implement economic transformation. In this special circumstance, it has the practical meaning for China to finalize the mechanism and efficacy of incentive measures taken by the government under the "Made in China 2025" plan to expand the innovation capabilities of China's manufacturing.

The research conclusion is not easily free from the impacts of unrelated factors, for the reason that the comparison before and after the year of policy implementation is only based on sampled manufacturing companies. Consequently, the research conclusion will culminate in deviation. For this sake, the DID regression model is built on the foundation of the model from Ye and Zang (2016), to give in-depth elucidation on the impacts of the "Made in China 2025" strategy upon the innovation behavior of Chinese manufacturing companies.

Concerning the analysis mentioned above and the general introduction to the related literature and following applicable theories, the empirical analysis for the difference-in-differences model is taken in combination with two selected variables (R&D

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intensity and innovation performance - two kinds of corporate innovation behavior at different stages) to undertake a study on the extent to which the incentive policies promulgated by China's government have enhanced the innovation capabilities of companies since the "Made in China 2025" strategy was proposed. Additionally, innovation paths are used as the mediating variable for the study on the mediating effects created by China's incentive innovation policies upon the innovation behavior of companies.

    The limitation of this paper is that it only studies the relationship between policy implementation and one-click check-in and innovation performance of enterprises in the manufacturing industry and does not further study whether this effect occurs in other industries. Therefore, in a next step of such research, the research object can be expanded to other fields, such as gem enterprises.

1. Literature Review and Research Hypothesis
1.1 Literature Review
(1) 2025 Strategy and Corporate Innovation Behavior

    Corporate innovation behavior refers to the behavior through which enterprises obtain excess profits by introducing new products, adopting new production methods, opening up new markets, obtaining new sources of raw materials, and implementing new organizational forms to occupy an advantageous position in the competitive landscape.

    Since the "Made in China 2025" strategy was started in 2015, such research topics as the innovative development of manufacturing, improved competitiveness of manufacturing, and promotion of China's incentive policies have blossomed.

Firstly, Rao and Nirupama (2016) believe that due to the externality of technological innovation, there is a certain spillover effect, and there is a risk that innovation will be imitated and the enterprise will suffer, which will reduce the enterprise's willingness to invest in R&D. Therefore, the government needs to formulate various supporting policies to encourage the enterprise to innovate. Judging from existing research, incentive innovation policies launched by governments can accelerate the research and development of a company. For example, Ernst and Kim (2002) hold that support policies provided by the government could influence corporate innovation. In particular, innovation policies cast bigger influences upon the innovation activity of companies in emerging industrial countries and developing countries. Likewise, Mao and Xu (2015) believe that fiscal subsidies could lend a hand to elevate the innovation performance of a company in a developing country without a well-developed market mechanism. According to Guo, Guo, and Jiang (2016) fiscal subsidies could give company owners more confidence in innovation investment, spurring a company to allocate more in corporate innovation.

Secondly, the main reason why such policies carried out by governments influence the innovation activity of a company is explained as follows: from the perspective of corporate innovation resources, Lazzarini (2015) expounds that due to the agglomeration effect generated by government subsidies within internal R&D investment of a company, the company could acquire more resources for corporate innovation. From the aspect of innovation funds, Bronzini and Piselli (2016) have the viewpoint that tax preferences offered by the government could alleviate the tax

burden of a company, and in turn, a lack of investment in research and development could be mitigated, and the possible risks of innovation could be relieved. By investigating public manufacturing companies in Taiwan from 2001 to 2005, Yang, Huang, and Hou (2012) sum up that preferential tax policies serve as the compensation for the innovation behavior of a company. Chen and Na (2018) propose that with the financial subsidies granted to a company, the management of the company will be endowed with more capabilities and time for innovative R&D and improved innovation effects that are adaptive to the trend of technical changes, though it suffers from complicated technical changes occurring frequently. As Wang (2011) has said, for the sake of R&D characteristics like a long cycle and high uncertainty, some enterprises have cut investments in innovation, but a certain tax preference could abate the prejudice held by company owners and stakeholders toward R&D investments to accelerate the innovation behavior of companies. According to the viewpoint put forth by Montmartin and Herrera (2015), with such preferential policies as granted by governments to companies, companies will continue investing in R&D regardless of fund problems, and their expected risks of R&D projects will be minimized. Finally, in the dimension of innovation performance, Czarnitzki (2011) has found from his research on the effects of Canadian incentive preferential tax policies that those companies which accept preferential tax policies present better innovation performance during subsequent investment in research and development.

(2) Mediating Effect of Innovation Path

With the support of governments, companies will enhance their innovation capabilities by changing or inventing innovation paths that largely refer to an enhancement in the internal and external innovation

cooperation of the company. Firstly, from the perspective of internal effects, Dyer and Singh (1998) contend that innovation paths could lead to the integration of more resources on human and knowledge, the generation of complementary effects, R&D expansion, the acquisition of "relationship rents", and an enhancement in R&D performance. Based on the perspective of Fang (2011), the R&D development of a company will remove its defect—inadequate innovation resources using cooperation out of the company. Secondly, in the facet of the external environment, Zhou and Li (2017) believe that innovation policies lend a hand to boost innovation cooperation between a company and its various partners to obtain better innovation performance by broadening innovation paths. Podolny (2001) says government policies connect companies for cooperation and mutual assistance. Xu, Zhang, and Zhai (2020) believe that innovation input plays a more obvious mediating role. Investment in innovation in the regional innovation system can effectively enhance the promotion effect of financial subsidies on patent output. With acquired support from government policies, a company is deemed to be recognized by the government in the eyes of the market and other companies in the same industry. Such accreditation by the government seems like an advantageous resource for the company to benefit from planned cooperation with other companies. Indeed, the reinforcement in market innovation cooperation, along with policy supports, could ameliorate R&D conditions in companies.

It is concluded from the foregoing literature review that: firstly, most scholars are convinced that incentive innovation policies launched by governments will push forward the innovation activity of

companies in such aspects as innovation resources, innovation funds, and innovation performance. However, secondly, few research literatures focus on the influences and effects of innovation activity at different stages of innovation. Thirdly, the management of a company may undertake innovation cooperation to accelerate R&D outcomes and inspire its innovation.

1.2 Emergence of Hypothesis

Ascribed to the monopoly and incomplete information on external markets, Pareto Optimality could not be materialized by social resources allocated on the mere basis of the pricing mechanism. Eventually, market failure emerges. The maximized efficiency of resource allocation cannot be fulfilled without governmental intervention, which conveys the influences of governmental action upon the development of companies. In the late-comer advantage theory, it is pointed out that emerging countries will take own reality into account to choose both different development paths and modes than developed ones; meanwhile, they may draw upon experience and lessons of developed countries to avoid or lessen the waste of energy and time; about such experi-ence and lesson, they could adopt optimized strategies to catch up with developed ones and enter into a higher stage as soon as possible. As for China, the foreign existing experiences could be absorbed in full combination with the market characteristic of manufacturing enterprises, to accomplish the manufacturing upgrading in a short time.

Peneder (2008) holds that two key factors influence innovation investment decisions; namely, the basic driving force for allocating resources for innovation and the ability to obtain necessary financing

tools. However, China's promotion policies can alleviate the insufficient incentives for enterprises to invest in R&D and the problem of financing constraints. The full-length process from innovation commencement to transfer of innovation achievements will impose such pressure upon a company as human resources and technology. Once big financial supports are given by the government, the company will allocate more funds in the recruitment of innovation talents and R&D technology, and finally, the management will be relieved from the uncertainty of innovation projects. Therefore, it is safe to say such financial supports give companies assistance.

R&D intensity refers to the percentage of the R&D investments of a company in its operating revenues, while R&D investments are undertaken at the initial stage of innovation activity. With the support of government policies, the company will, accordingly, allot more in its R&D to elevate innovation efficiency. Innovation performance equals to the outcomes of the company's innovation activity, namely, patent quantity. In China, the quantity of patents held by a company is typically reckoned as one of the indicators to measure its innovation capabilities. For this sake, R&D intensity and innovation performance are selected as measuring variables for the innovation capabilities of a company. Eventually, Hypothesis 1 has come out from the analysis in previous paragraphs.

Hypothesis 1: Subsidy policies released after the implementation of the 2025 strategy will make impacts upon the innovation activity of a manufacturing company (R&D intensity, innovation performance). With incentive innovation policies, a company will broaden its innovation paths, and strengthen cooperation with other companies,

to improve its innovation performance. Different companies are endowed with distinct aptitude and resources, as well as differentiated advantageous fields, for the reason of which, inter-company cooperation could heighten R&D efficiency of a company. In consideration of this, the innovation paths of a company are measured by cost value of cooperation between this company and other ones. With reference to the practices of Yang, Yang and Liu (2014), the fiscal subsidy is used as a variable to measure incentive innovation policies, for such policies as implemented by governments largely comprise fiscal subsidies provided for companies, the amounts of which are readily available and quantified in financial statements of the company. Finally, Hypothesis 2 is generated from the foregoing analysis.
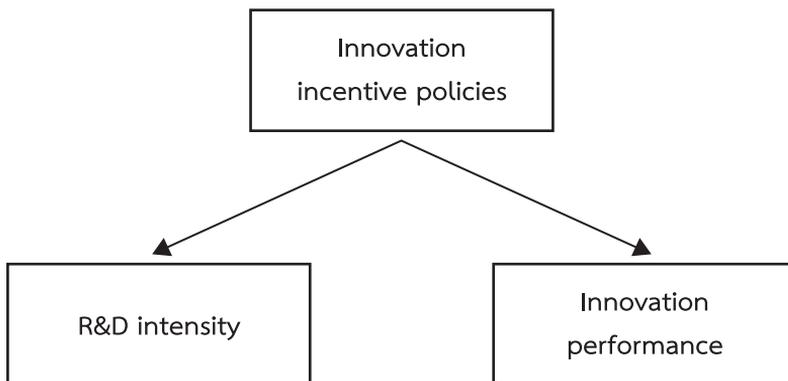
Hypothesis 2: Innovation paths show the mediating effect on relationships between the fiscal subsidy and innovation performance of a company, maximizing the role of the fiscal subsidy in innovation performance

2. Sample Selection and Metrological Model Specification
2.1 Sample Selection and Data Acquisition

No method is found to identify the possibility of direct effects that this Strategy will make in the first year of implementation on innovation behavior of public companies in 2015, so the data of the year 2015 is eliminated. Furthermore, the innovation behavior of a company is inclined to be stricken by other factors, as the implementation duration of 2015 strategy increases. To keep research less disturbed by such impact, one year respectively before and after implementation of this strategy is chosen as the research period. The conceptual framework is shown in figure 1.

Figure 1 Conceptual Framework

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        ┌─────────────────────────┐
        │       Innovation        │
        │    incentive policies   │
        └─────────────────────────┘
             ↙               ↘
┌──────────────────┐    ┌──────────────────┐
│                  │    │    Innovation    │
│  R&D intensity   │    │   performance    │
│                  │    │                  │
└──────────────────┘    └──────────────────┘
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In this paper, research subjects are A-share public companies in 2014 and 2016 that are categorized into manufacturing companies and non-manufacturing ones based on the company category speci-fied in CSMAR (China Stock Market & Accounting Research Database) database. The data indicated in the paper are sourced from CSMAR (China Stock Market & Accounting Research Database) data after elimination of 253 companies engaged in finance and involved in special treatment ("ST"). To remove the impacts of abnormal values from this study, all continuous variables are winsorized at 1%, and finally, totally 4,554 observed values are obtained. In the paper, the preliminary data are collected and processed with software tools: Excel 2013 and Stata 14.0; the subsequent empirical analysis is based on the data analysis with Stata 14.0.

2.2 Model Specification and Variable Definition

Two dependent variables (RD and INNO) are used to stand for two typical indicators: R&D intensity and innovation performance

for innovation behavior of a company. RD equals to R&D investment divided by operating revenues, while INNO is measured at the equation: INNO=ln (applied patent quantity in one year + 1). Both of data are current values. Year and Manufacture are two dummy variables. Year is 0, indicating no incentive innovation policy enjoyed by a company before 2015. If Manufacture is 1, it is the treated group: the group of manufacturing companies; if Manufacture is 0, it is the untreated group of non-manufacturing companies. If β_3 and γ_3 are remarkably positive, H1 is verified successfully. INCO refers to the innovation path of a company and is measured at the equation: INCO=ln (paid cash value related to business operation). Meanings of key model parameters are described in Table 1.

The control variable is defined as follows: (1) cash flow (CF) = net cash flow in current business operation/beginning total assets. This variable shows the capability of a company to acquire resources through own business operation. This capability makes influences upon R&D to interfere with innovation behavior of a company. Therefore, this one is picked out as the control variable. (2) leverage ratio (LEV) = ending total liabilities /ending total assets. Different leverage ratios lead to different financial risks that have effects on the designated innovation policy of a company. Thus, the innovation behavior of the company is under interference. For this sake, this one is also used as the control variable. (3) company size (SIZE) = ln (ending total assets). The different company sizes will affect innovation and R&D investment of a company, which, in turn, impedes the innovation behavior of the company to a certain extent, so it also belongs to the control variable. (4) return on assets (ROA) = total profits in current year/ending total assets. This variable implies the

capability of a company to invest assets in profits. This capability affects the formulation of the corporate innovation policies and interfere with the innovation behavior of the company. In consideration of this, this value is regarded as the control variable. The names and calculation equations of variables are specified in detail as Table 2.

Model 1: $RD_{it} = \alpha + \beta_1 Year_{it} + \beta_2 Manufacture_{it} + \beta_3 Year_{it}*Manufacture_{it}$
$+ \Sigma ind + \Sigma yr + \beta_4 X_{it} + \delta_{it}$

Model 2: $INNO_{it} = \tau + \gamma_1 Year_{it} + \gamma_2 Manufacture_{it} + \gamma_3 Year_{it}*Manufacture_{it}$
$+ \Sigma ind + \Sigma yr + \gamma_4 X_{it} + \zeta_{it}$

Table 1. Meaning of Main DID Model 1 Parameter

	able 1.	After 2015	Difference
Experience Group	$\alpha + \beta_2$	$\alpha + \beta_1 + \beta_2 + \beta_3$	$\Delta y_1 = \beta_1 + \beta_3$
Un	α	$\alpha + \beta_1$	$\Delta y_0 = \beta_1$
DID			$\Delta\Delta y = \beta_3$

Meaning of Main DID Model 2 Parameter

	able 1.	After 2015	Difference
Experience Group	$\tau + \gamma_2$	$\tau + \gamma_1 + \gamma_2 + \gamma_3$	$\Delta y_1 = \gamma_1 + \gamma_3$
Un	τ	$\tau + \gamma_1$	$\Delta y_0 = \gamma_1$
DID			$\Delta\Delta y = \gamma_3$

In the model, the subscript i stands for the company, t for the year. $\sum$ind is adopted to measure the fixed effect of the industry, and $\sum$yr is used to measure the fixed effect of time. δ and ζ are random disturbances. X is the control variable of the model.

Table 2. Name and Calculation Equation of Variable

Symbol	Name	Calculation Equation
RD	R&D Intensity	RD=R&D investment/operating revenue
INNO	Innovation Performance	INNO=ln (patent quantity in one year +1)
SUB	Fiscal Subsidy	SUB=ln (fiscal subsidy acquired by the company)
CF	Cash Flow	CF=cash flow in business operation /beginning total assets
LEV	Leverage Ratio	LEV=total liabilities/total assets
SIZE	Company Size	SIZE=ln (total assets)
ROA	Return on Assets	ROA=total profits/total assets
INCO	Innovation Path	INCO=ln (paid cash value related to business operation)

3. Regression Result and Analysis

3.1 Descriptive Statistics

For manufacturing and non-manufacturing companies, the description statistics are undertaken to grasp different variables between these two kinds of companies in more direct ways.

Table 3. Descriptive Statistics on Manufacturing Company Samples

Variable	Min.	Median	Max.	p75	Mean	Standard Deviation
Year	0	1	1	1	0.54	0.49
Manufacture	0	0	1	1	0.15	0.36
YM	0	0	1	1	0.07	0.26
RD	0.07	3.76	27.58	5.23	4.32	3.11
INNO	1.39	5.18	8.72	5.97	5.14	1.29
SUB	10.45	16.38	20.52	17.11	17.50	18.52
INCO	16.38	18.60	22.11	19.49	19.38	19.88
CF	-0.22	0.05	0.35	0.10	0.06	0.07
LEV	0.03	0.37	0.80	0.52	0.38	0.19
SIZE	19.20	21.19	26.05	22.29	21.86	1.04
ROA	-0.37	0.04	0.32	0.08	0.05	0.06

YM: interaction item of YEAR and MANUFACTURE

Table 4. Descriptive Statistics on Non-Manufacturing Company Samples

Variable	Min.	Median	Max.	Mean	Standard Deviation
Year	0	1	1	0.54	0.65
Manufacture	0	0	1	0.23	0.47
YM	0	0	1	0.12	0.45
RD	0.14	4.27	30.91	5.93	4.91
INNO	0.69	4.71	10.07	4.80	1.56
SUB	0.00	16.12	20.82	17.75	18.76
INCO	16.21	18.76	24.57	20.82	22.25
CF	-0.39	0.05	4.54	0.08	0.37
LEV	0.06	0.35	5.46	0.42	0.46
SIZE	19.86	21.73	27.36	22.01	1.47
ROA	-0.27	0.05	0.21	0.05	0.05

YM: interaction item of YEAR and MANUFACTURE

As indicated in Table 3, 75% of companies in the treated group own the R&D intensity below 5.23, while the maximum is up to 27.58, which implies that those investments in innovation allocated by some manufacturing companies are far beyond the average in this industry, but a big gap of such investments occurs among companies. The average innovation performance reaches 5.14, with the minimum and maximum respectively at 1.39 and 8.72, which unveils that capabilities of R&D achievement transfer are varying with companies, in addition to different incentive innovation policies bestowed upon companies. The fiscal subsidy has its minimum at 0, disclosing no incentive innovation policy bestowed upon some companies.

Regarding the innovation path, its minimum is 16.38, a maximum 22.11, and a standard deviation of 19.88. From the perspective of the innovation path, data are greatly differentiated by different attitudes of all sampled companies toward innovation cooperation. As for control variables, all companies are, by and large, at the same level. The comparison between Table 3 and Table 4 shows slight differences between the experiment and the untreated groups. From the aspect of the corporate innovation behavior, the untreated group has the higher R&D intensity than the experiment one, while the latter one owns the more satisfactory innovation performance than the untreated one. The following metrological analysis is required to identify the extent that such differences are generated by the implementation of the "Made in China 2025" policy, to determine their statistical significance, and to judge whether or not manufacturing companies have strengthened their innovation behavior since 2015 with the implementation of incentive innovation policies.

3.2 Relational Analysis

For more direct observations about the relationship between each variable and two kinds of innovation behavior, the relational analysis is carried out in the dimension of two dependent variables, with results as described in Table 5 and Table 6.

Table 5. Correlation coefficient

Dependent Variable: y=RD							
	RD	YM	SUB	CF	LEV	SIZE	ROA
RD	1						
YM	-0.061**	1					
SUB	-0.058***	0.019**	1				
CF	0.073	-0.041**	-0.016**	1			
LEV	-0.190***	-0.037	0.204***	-0.013	1		
SIZE	-0.229***	0.077*	0.649***	-0.029	0.449*	1	
ROA	0.352**	-0.091**	-0.057	0.367***	-0.254***	-0.086*	1

Note: ***、**、* respectively stand for the significance level at 1%, 5% and 10%.
YM is the interaction item of YEAR and MANUFACTURE

Table 6. Correlation Coefficient

Dependent Variable: y=INNO							
	INNO	YM	SUB	CF	LEV	SIZE	ROA
INNO	1						
YM	0.341***	1					
SUB	0.403***	0.211*	1				
CF	-0.115***	-0.041	-0.016	1			
LEV	0.206**	-0.037	0.204***	-0.013	1		
SIZE	0.457***	0.077*	0.649***	-0.029	0.449***	1	
ROA	0.084*	-0.091**	-0.057	0.167***	-0.254***	-0.086*	1

Note: ***、**、* respectively stand for the significance level at 1%, 5% and 10%.
YYM is the interaction item of YEAR and MANUFACTURE

After relational analysis results are compared between Table 5 and 6, it is elicited that RD is significantly and negatively correlated to the interaction item of YEAR and MANUFACTURE at 5%, while INNO is significantly and positively correlated to the interaction item of YEAR and MANUFACTURE at 1%. It is concluded that the implemented "Made in China 2025" strategy has imposed varying effects upon the innovation behavior of companies. Also, the fiscal subsidy (SUB) granted by the government has affected differently the influences on the innovation behavior of companies. In particular, R&D is negatively correlated to the fiscal subsidy at 1%; and the fiscal subsidy at 1% has positively pushed forward the innovation performance of companies. This shows that the financial subsidy policy implemented by the government can promote the implementation of enterprise innovation

In the facet of control variables, ROA is positively correlated to the innovation behavior of companies. In other words, the enhanced profitability could boost R&D activity to drive the increase in R&D investments and improvement in innovation performance. As for CF, LEV, and SIZE, all of them are negatively correlated to R&D invest-ment and innovation performance respectively, which is closely related to the nature of corporate R&D activities and difficulties in the transfer of technical achievements.

3.3 Analysis of DID Regression Model

As reported in Table 7, the regression results of the foregoing DID model indicate the respective p-value under F verification of Model 1 and Model 2 are 0.01 and 0.02, showing largely significant statistics of these two models. In two models, the interaction items

of YEAR and MANUFACTURE have coefficients respectively at -0.381 and 0.463, both of which are significant at 10% and in line with both the above-mentioned correlation analysis and conclusion from verification of single variable. It's safe to say the 2025 Strategy doesn't act as an impetus to innovation achievements of companies, but a spur to remarkably stimulating their innovation performance. Both Model 1 and 2 show positive coefficients of CF and ROA that play significant roles respectively at 10% and 1%. Therefore, those companies with sufficient funds will allocate more investments in R&D. However, the LEV coefficients in the two models are negative. In Model 2, particularly, p-value shows significantly negative correlated at 1%, which implies that the capital leverage of a company will stand in the way to the development of corporate innovation behavior.

Table 7. Regression Result of DID Model

Variable	Model 1	Model 2
YM	-0.381*	0.463*
	(-1.13)	(1.06)
CF	0.594*	0.793***
	(1.11)	(4.95)
LEV	-0.112	-0.604***
	(-0.23)	(-4.20)
SIZE	-0.953***	0.616***
	(-3.02)	(6.59)
ROA	6.749***	0.521

Variable	Model 1	Model 2
	(2.44)	(0.64)
Industry	Yes	Yes
Year	Yes	Yes
F	4.19	26.76
P-value	0.01	0.02
R2	0.06	0.22
Constant	25.602***	-8.283***
	(3.80)	(-4.14)

Note: ***、**、* respectively stand for the significance level at 1%, 5% and 10%.
YM is the interaction item of YEAR and MANUFACTURE

By reporting DID verification results of single variables (RD and INNO) after the strategy is implemented, Table 8 reveals differences between the control and the treated groups in terms of changes in innovation behavior. Just as specified in the following table, both two groups enhance innovation behavior after the implementation of the strategy. For RD, the untreated group has raised by 0.427, while the experiment one by 0.348. The verification result of single variables is -0.079 with significance at 1%, implying no obvious effects of this strategy upon the R&D intensity of a company. Regarding the innovation performance, the untreated group has increased by 0.324, while the experiment one by 0.609. With the comprehensive analysis of horizontal fixed effects among companies, the innovation performance has risen by 0.285 after the strategy is implemented, significant at 10%. From the economic perspective, the treated group

has elevated its innovation performance more than the control one by 46.8%, which makes it clear that the implementation of this strategy has substantially accelerated the improvement in innovation performance of manufacturing companies. This proved hypothesis 1.

Table 8. DID Verification of Single Variable

	Untreated Group		Treated Group		Difference		DID
	Before strategy	After strategy	Before strategy	After strategy	Untreated group		Treated group
RD	5.704	6.131	4.143	4.491	0.427	0.348	-0.079***
t-value							3.21
INNO	4.979	5.303	4.495	5.104	0.324	0.609	0.285*
t-value							1.08

Note: ***、 **、* respectively stand for the significance level at 1%, 5% and 10%.

3.4 Testing of Mediating Effect

To verify Hypothesis 2 indicated in previous paragraphs, the causal steps proposed by Wen et al. (2004) are taken to verify the mediating effect of operational risks. The verification procedures are described as follows:

Step One: Build Model 3 for fiscal subsidy and innovation behavior. The corporate innovation paths largely refer to innovation cooperation whose effects upon corporate R&D investments are lower than upon innovation performance. For this sake, the corporate innovation performance is analyzed as the dependent variable of the model. In the model, X is the control variable.

Model 3: INNO = $\eta_0 + \eta_1 SUB + \eta_2 X + \rho$

As indicated in Table 9: regression verification results of Model 3, η_1 in this model is 2.050e-09, significant at 1%. Therefore, the second step is required.

Step Two: first, build Model 4 based on the innovation path as the dependent variable, and fiscal subsidy as the independent variable. Then, endow Model 4 with the mediating variable—innovation path, and build Model 5 for the mediating effect of innovation behavior, fiscal subsidy, and innovation path. In the model, X is the control variable.

Model 4: INCO = $V_0 + V_1 SUB + V_2 X + O$
Model 5: INNO = $\tau_0 + \tau_1 SUB + \tau_2 INCO + \tau_3 X + \psi$

Judging from the regression results in Table 9, V_1 is 5.163, significant at 1%; τ_2 is 2.00e-11, significant at 10%. Consequently, it is roughly proved that innovation paths make part of mediating effects upon innovation performance and fiscal subsidy. Next, the third step is followed.

Step 3: verify the significance of $\tau 1$ in Model 5. As inferred from Table 9, $\tau 1$ is significant at 1%, which proves that innovation paths make mediating effects upon innovation performance and fiscal subsidy. As a result, the accuracy of Hypothesis 2 is justified.

Table 9. Regression Result of Mediating Effect Verification

Variable	Model 3	Model 4	Model 5
INCO			$2.00*10-13*$
			(0.86)
SUB	$2.05*10-11***$	$5.163***$	$1.95*10-11***$
	(3.40)	(4.46)	(3.17)
CF	$-0.801***$	$3.48*10-9$	$-0.802***$
	(-3.18)	(0.07)	(-3.18)
LEV	$-0.331*$	$7.12*10-9$	$-0.329*$
	(-1.59)	(-0.18)	(-1.58)
SIZE	$0.448***$	$6.22*10-10***$	$0.435***$
	(6.88)	(4.97)	(6.53)
ROA	$3.092***$	$1.99*10-11*$	$3.053***$
	(3.21)	(1.08)	(3.16)
Constant	$-4.837***$	$-1.34*10-12***$	$-4.569***$
	(-3.51)	(-5.07)	(-3.24)
R2	0.25	0.22	0.26
P	0.01	0.02	0.01
F	35.7	27.97	29.86

3.5 Testing of Robustness

PSM-DID method is further applied to the verification of robustness that safeguards the accuracy of research findings, to protect analysis results against systematic errors in the tendency of influences that 2015 strategy supports innovation behavior of

manufacturing and non-manufacturing companies, and to lessen biases of the DID model. In consideration of the limited paper structure, the method of nearest neighbor matching is adopted for a one-to-one match. The results are as follows.

As described in Table 10, of 506 observed values, 2 values of the treated group are off support; 12 values of the untreated group are off support. The other 492 are on support.

Table 10. PSM-DID Match Result

psmatch2:	psmatch2: Common		
Treatment	support		
assignment	Off support	On support	Total
Untreated	12	241	253
Treated	2	251	253
Total	14	492	506

The equilibrium hypothesis is verified afterward to identify whether match results are in line with the equilibrium hypothesis. About practices of Lu Dong, et.al, the equilibrium verification is carried out in two dimensions for variables: student's test and standard bias for mean differences between matched groups. As specified in Table 11, the standard bias is limited to 20% after the match, and the mean difference between matched groups is not significant at 10%. Therefore, it is believed that the equilibrium hypothesis is successfully verified.

Table 11. PSM-DID Equilibrium Test Result

Variable Mean Value of Treated Group Mean Value of Untreated Group t-value p Standard Bias (%)					
CF	0.053	0.054	-0erag.12	0.91	-0.4
LEV	0.38	0.36	0.89	0.38	5.0
SIZE	22.06	21.92	1.47	0.14	12.3
ROA	0.04	0.04	1.40	0.16	14.1

Table 12. Regression Result of PSM-DID Mode
(Testing of Robustness)

Variable	Model 1	Model 2
YM	-0.308*	0.652*
	(-0.3)	(0.97)
CF	1.291***	2.515**
	(2.16)	(1.69)
LEV	-2.508*	-0.063
	(-0.80)	(-0.06)
SIZE	-0.029*	0.211*
	(-0.81)	(0.86)
ROA	4.733	2.454*
	(-0.10)	(1.12)
Industry	Yes	Yes
Year	Yes	Yes
F	1.54	1.22

Variable	Model 1	Model 2
P-Value	0.01	0.01
R^2	0.03	0.12
Constant	6.332	0.381
	(0.38)	(0.07)

Note: ***、**、* respectively stand for the significance level at 1%, 5% and 10%.
YM is the interaction item of YEAR and MANUFACTURE

As indicated in Table 12, the findings are largely consistent with previous paragraphs after Both Model 1 and 2 are verified through matching by PSM. It is further evidence that justifies the hypotheses mentioned in foregoing paragraphs.

4. Conclusion and Recommendation

By analyzing the data about A-share public companies in 2014 and 2016, this paper adopts the DID model to verify the influences of the "Made in China 2025" plan upon corporate innovation. Empirical results show that despite the influences of the "Made in China 2025" plan upon the innovation behavior of China's manufacturing companies, such influences vary within the different stages of corporate innovation. Firstly, in the following aspects, this plan is negatively related to R&D intensity.

1. In consideration of R&D features like long investment periods and the slow return of assets, company owners are likely to make R&D plans based on existing strategies, even though the preferential innovation policies are released by the government.

2. The years 2014 and 2016 were selected and observed for

this paper, but a wide variety of incentive innovation policies launched after implementation of the 2025 strategy could not benefit companies in the short time to 2016. Consequently, no signs are discovered about the positive influences of the strategy on the enhancement of corporate R&D intensity. However, this strategy shows a significant and positive relation to innovation performance, for the reason that only by quick transformation into intellectual property rights can the R&D investments offset assets expended during research and development. As the strategy is implemented, those innovation supports provided by the government for manufacturing companies will, to a certain extent, accelerate the transformation of R&D achievements. It is reasonably anticipated that a manufacturing company will witness better development of their innovation performance than non-manufacturing ones. Finally, it is found that innovation paths play a mediating role as the fiscal subsidy drives the innovation activities of companies.

The analysis mentioned in previous paragraphs elicits recommendations as follows. Firstly, in addition to reliance on government resources, companies are required to proactively seek other innovation resources and broaden innovation paths, to gain more benefits for the innovative R&D of the companies. Furthermore, companies, within the big picture of the "Made in China 2025" strategy, are advised to not only focus on product innovation but to place more emphasis upon technical innovation and optimized human resources.

In addition, by providing policy supports, the government ought to offer manufacturing companies more fund channels to prevent such companies from R&D shutdown caused by fund shortage during their innovative research and development. The government is

advised to release diverse policy supports. For instance, rewards could be granted to those companies with excellent innovation achievements to increase the innovation benefits of the company indirectly.

Furthermore, while boosting the innovation R&D of manufacturing companies, the government is obliged to launch a more rigid system for the transformation and protection of achievements and to safeguard the proprietary innovation achievements of companies. In turn, a well-regulated fair innovation market could be created to further expedite the innovative development of manufacturing companies, and to play a deeper role as a booster and locomotive for the "Made in China 2025" strategy.

In conclusion, the results from the empirical analysis unveil the tendency of changes in the innovation activities of manufacturing companies since the "Made in China 2025" strategy was implemented. In 2019, the fifth year since the 2025 strategy was inaugurated, it is realized that the implementation of the "Made in China 2025" strategy will bring expected effects in the coming five years.

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