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The Impact of the US-China Trade War on Firm Innovation

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Abstract. Innovation is a vital factor driving the development of core competitiveness and the upgrade of economic structure., and its dynamic evolution mechanism has always been the research focus in the field of industrial economics and international trade. As complex international dynamics emerge in a globalized world, negative economic shocks can leave long-lasting impacts on firms' innovation capabilities. This study utilizes the 2018 US-China trade war as a quasi-natural experiment, and a multi-dimensional econometric analysis framework are constructed to examine how trade frictions influence firm-level innovation in China. Constructing a difference-in-differences model, analysis of 2013-2023 firm data indicate that the US-China trade conflict causes a significant decline in innovation activity, but high industry competition and government subsidies mitigate its impact. This study further clarifies the effects of trade friction on firm innovation by contributing to the existing literature and providing empirical evidence as well as policy implications for fostering innovation capacity and resilience.

Keywords: US-China trade war, firm innovation, industry competition, government subsidy

1. Introduction

With the advancement in productivity and trade, globalization has long become an irreversible trend for the international economy. Firms participating in Global Value Chains (GVCs) can achieve substantial leaps in production efficiency by expanding technological exchange. However, since the 2008 financial crisis, multiple political and economic events have profoundly disrupted global supply and value chains, resulting in prominent shifts toward regionalization and de-globalization. In 2018, the United States government launched investigations under Section 301 of its Trade Act, claiming the existence of "unfair trade practices" by China, imposing high tariffs on imported Chinese goods. The additional tariffs affected over 6,000 product categories and $250 billion in monetary worth, causing major impacts on economic stability, supply chain security and the global development outlook. As China is currently undergoing a crucial stage of transforming high-speed growth into high-quality growth, it is important to explore how to strengthen innovation, promote new quality productive forces, and maintain sustainable, globalized economic growth under turbulent international conditions.

Innovation is a core driving force behind development, interacting with globalization in a reciprocally beneficial manner. Applications of innovative technology elevate firms' GVC participation and position, allowing them to upgrade via cooperation, cost reduction and efficiency

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enhancement, while globalization can in turn boost innovation through spillover effects and economies of scale [1]. However, as international cooperation deepens, the impact of negative shocks has also become far-reaching. The effects of trade friction on innovation are multi-faceted, involving both positive and negative channels: it can force firms to focus on research and development, but the high-cost, high-risk nature of such activities would inhibit innovation in times of economic recession. Therefore, it is uncertain how the bilateral trade conflict in 2018 would influence the innovation activity of Chinese firms, with potential moderating mechanisms that warrant further study.

This paper examines how firm innovation is affected under trade frictions and specific factors involved in the process, focusing on the 2018 US-China trade war. Analysis shows that the trade war suppresses firm innovation, but high market competition and government subsidies alleviate this negative effect. Building on existing literature, this study further considers the extent to which different industries were impacted by using the number of increased tariffs as the explanatory variable, rather than distinguishing only between affected and non-affected categories. Moreover, it covers data extensively from 2013-2023 and provides empirical evidence as well as policy insights on fostering innovation capabilities and resilience from firm, region and country perspectives.

2. Literature review

As research has shown, with economic globalization comes advancements in firm innovation in a more liberalized environment [2]. For developing countries especially, firms can become deeply embedded in GVCs, quickly gaining knowledge from spillovers in outsourced manufacturing, thus enabling themselves to make significant progress in innovation [1]. On one hand, innovation growth can in turn strengthen firms, regions and industries against international volatility in trade [3]. On the other hand, high technology growth in developing countries may threaten to overtake developed countries, which may respond by implementing protectionist policies such as anti-dumping measures. This outcome could raise international trade costs, hinder GVC development, and ultimately impede firms in innovative activities.

From the aspect of trade friction impacts, most research concerning innovation in China has focused on US action against China, including anti-dumping investigations, technology lockdowns, and trade wars. Therefore, quasi-natural experiments are a typical model for analysis, with various events being explored. Some studies use a single year to represent the start of trade frictions, for example, 2016 or 2017 [4,5]. The year 2018 is also commonly used as the benchmark [6-8]. Other studies utilize multiple periods of anti-dumping sanctions or tariff shocks, adopting a more extensive overview [9,10]. Apart from discrete variables, there is also research incorporating continuous explanatory variables when analyzing tariff increases [11]. There is no general agreement as to whether trade frictions positively or negatively impact innovation, according to relevant literature. A number of studies conclude that trade frictions force Chinese firms to increase innovation activities [7,9,11]. This is also reflected in the green innovation efficiency of regions [9]. Similarly, scholars find it to have raised Total Factor Productivity (TFP) [5]. Yet, other research arrives at the result that trade frictions hamper innovation and TFP [4, 12]. Specific studies on the ICT industry and exporting firms discover a negative effect as well [8,10]. On the topic of US-China trade frictions, researchers also examine innovation in developed countries, finding that levels of cooperative innovation between the US and China suffered a significant decrease after the trade war [6]. This means responsive measures from China can have positive effects on protecting Chinese firms' innovation: research shows that technology sanctions on supply chains initiated by China are beneficial to firm innovation [12].

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In summary, in the context of globalization, events of trade friction encompass various time points of shock, have a wide-ranged impact, and involve various channels and mechanisms. Although protectionism can force Chinese firms to enhance core technologies and continue industry upgrading, it also impedes GVC development, stopping firms from learning through spillovers while threatening profitability and even survival, all of which are detrimental to innovation because of its long cycles and high risks. Hence, there is room for further research on how the US-China trade war in 2018 affects firm innovation, its moderating facts, and subsequently how firms can be supported to maintain stable, efficient innovation activities.

3. Methodology

3.1. Hypotheses

As is shown by the above literature review, trade war has potential effects in opposite directions on firm innovation. While firms may increase innovation out of escape-competition motives, they may also cut down on innovation because of restrictions on firm performance and resource accessibility. Therefore, the following hypotheses are proposed:

H1a. The US-China trade war positively impacts firm innovation.

H1b. The US-China trade war negatively impacts firm innovation.

Firm innovation is substantially influenced by the industry competition they face. Firms in industries with higher competition levels tend to face more challenges during economic recessions, as they have a more urgent need to maintain market share and survival through building a competitive edge. Thus, the following hypothesis is posited:

H2. Industry competition positively moderates firm innovation.

Innovation is a high-cost, high-uncertainty type of activity that can incur large risks and opportunity costs during the trade war. Government subsidies can substantially mitigate financial constraints, lower opportunity costs of R&D resources, and help firms in sustain innovation. Hence the following hypothesis is set:

H3. Government subsidies positively moderate firm innovation.

3.2. Estimation model

This paper utilizes the Difference-In-Differences (DID) model to test the hypotheses, designed as follows:

$$Innovation_{i,t} = \beta_0 + \beta_1 Treat*Post + \sum Controls_{i,\ t-1} + FE_{t-1} + FE_i + \varepsilon \qquad (1)$$

$Innovation_{i,t}$ denotes the innovation output of firm t in year i, Treat measures the extent to which a firm is exposed to the 2018 trade dispute, Post is a dummy variable indicating time with 2018 as the threshold year corresponding to the US tariff imposition waves, and FE signifies year and firm fixed effects. Considering innovative activities typically require long time cycles, and the timespan for the relevant factors to impact innovation, the explained variable is lagged by one period. Furthermore, this study conducts heterogeneity analysis on industry competition and government subsidy variables, using the following model:

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$$Innovation_{i,t} = \beta_0 + \beta_1 Treat * Post + \beta_2 Treat * Post * z_{i,t-1} + \beta_3 z_{i,t-1} + \sum Controls_{i,t-1} + FE_{t-1} + FE_i + \varepsilon \quad (2)$$

$z_{i,t-1}$ represents industry competition and government subsidies, and an interaction term of z $z_{i,t-1}$ and $Treat*Post$ is added to the model.

3.3. Data

3.3.1. Variable definition

The explained variable is firm innovation, which is typically measured by patent applications or grants. This study uses the log number of patent grants, given that it represents relatively high-level innovation. The explanatory variable is a DID term obtained from Post*Treat, in which Post is a dummy indicator set to 1 for years 2018 or beyond, and 0 otherwise, to capture the imposition of US tariffs in 2018 as the exogenous shock; Treat measures the extent to which a firm is affected by trade frictions. To identify industries targeted by tariff increases, this study uses 6-digit HS codes specified by official US documents of the 3 waves of additional tariffs, matched to GB/T 4754-2017 industry codes. Firm-level effects of the trade war are determined based on whether the firm's industry was affected by the shock. Current literature typically uses a dummy variable to mark these firms but considering heavily targeted industries have been subjected to multiple rounds of tariff increases, this study uses the actual percentage change as the Treat variable. Control variables take into account firm characteristics including size (assets and number of employees), listing age, Return On Assets (ROA), leverage, board size, ownership concentration, and Tobin's Q. The log number of continuous control variables are used due to heteroskedasticity concerns.

3.3.2. Descriptive statistics

The following data are obtained on Chinese A-share listed firms from 2013-2023 based on methodology design and variable definition, as displayed in Table 1. Among them, tariff data come from official US documents, patent data are collected using the China National Research Data Service (CNRDS) database, while the rest are from the China Stock Market & Accounting Research Database (CSMAR) database. The data are then winsorized on the 99% level, entries with missing values are omitted, and the log transformation of certain variables are calculated to replace their original values.

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Table 1. Descriptive statistics

	(1)	(2)	(3)	(4)	(5)
Variable	N	Mean	SD	Min	Max
Pat	29,685	32.43	199.6	0	11,592
Size	29,685	1.825×10^{10}	9.091×10^{10}	8.703×10^{6}	2.733×10^{12}
Age	29,685	10.01	7.962	0	32
ROA	29,685	0.0423	0.637	-3.994	108.4
Lev	29,685	0.408	0.201	-0.195	0.994
Board	29,685	8.440	1.660	0	18
Labor	29,685	5,972	20,077	12	570,060
Conc	29,685	59.18	15.27	1.310	101.2
TobinQ	29,685	2.148	4.916	0.625	729.6

4. Methodology

4.1. Base regression

The outcomes of the base regression are presented in Table 2. According to these results, the DID term negatively affects firms' patent grants in the next year, with significance at the 99% level. The coefficient remains significant and negative after controls are added; specifically, trade friction causes a 16.2% reduction in firm innovation, proving hypothesis H1b.

Table 2. Base regressions

	(1)	(2)
VARIABLES	Pat	Pat
DID	-0.173***	-0.162***
	(-3.65)	(-3.38)
Size		-0.046
		(-1.38)
Age		-0.139***
		(-4.91)
ROA		0.693***
		(5.90)
Lev		-0.085
		(-1.04)
Board		-0.011
		(-1.24)
Conc		-0.001
		(-0.73)
TobinQ		0.027***
		(3.63)
Labor		0.121***
		(4.77)

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CF		-0.148*
		(-1.87)
Constant	1.725***	2.215***
	(179.34)	(3.48)
Observations	29,685	29,685
R-squared	0.818	0.820
FE	Yes	Yes
Cluster	Yes	Yes
Adj. R-squared	0.788	0.790
F-value	13.32	12.08

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.2. Heterogeneity analysis

4.2.1. Industry competition

Table 3 summarizes the results of the heterogeneity analysis. The Herfindahl index on the industry level is computed to proxy industry competition levels. According to column (1), the interaction term has a significantly positive coefficient, illustrating that industry competition negatively impacts the effects of trade friction. For industries with a higher competition level, the restrictive impact on firm innovation becomes smaller, proving hypothesis H2.

4.2.2. Government subsidies

Government subsidies are measured by a binary variable equal to 1 when the amount received by a firm exceeds that of the industry median, and 0 otherwise; relevant data are collected from the CSMAR database. According to column (2) of Table 3, the effect is significantly negative as represented by the interaction term. This implies government subsidies negatively affect the inhibition process of the trade war on firm innovation, supporting hypothesis H3.

Table 3. Heterogeneity analysis

	(1)	(2)
VARIABLES	Pat	Pat
DID	-0.312***	-0.213***
	(-4.50)	(-4.13)
DID_HHI	0.855***	
	(3.12)	
HHI	-0.031	
	(-0.30)	
DID_HighGS		0.093*
		(1.85)
HighGS		-0.007
		(-0.41)
Size	-0.035	-0.049

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	(-1.05)	(-1.49)
Age	-0.135***	-0.134***
	(-4.76)	(-4.73)
ROA	0.695***	0.697***
	(5.90)	(5.93)
Lev	-0.061	-0.083
	(-0.75)	(-1.01)
Board	-0.010	-0.011
	(-1.07)	(-1.24)
Conc	-0.001	-0.001
	(-0.70)	(-0.72)
TobinQ	0.029***	0.026***
	(3.89)	(3.50)
Labor	0.123***	0.120***
	(4.83)	(4.71)
CF		-0.150*
		(-1.91)
Constant	1.911***	2.298***
	(3.02)	(3.63)
Observations	29,386	29,685
R-squared	0.821	0.820
FE	Yes	Yes
Cluster	Yes	Yes
Adj. R-squared	0.791	0.790
F-value	11.59	10.45

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

Focusing on the 2018 trade war between the US and China, this study constructs a DID model to examine how trade friction affects firm innovation in China. Analysis results illustrate the following. First, the trade war reduces firm innovation significantly, which is in agreement with part of the relevant research, but contradicts the opinion that trade friction forces firms to enhance innovation efforts. Because this study utilizes relatively recent data of up to 2023, results suggest a prolonged impact of the trade war, potentially affecting long-term innovation prospects. Heterogeneity analyses show that both industry competition and government subsidies alleviate the negative impact, indicating that these factors aid firms in advancing innovation. The empirical evidence of this study has policy implications: under trade friction circumstances, the government should not only improve funding and support in resources to help firms maintain a sufficient level of innovation investment but also ensure fair competition in the market and enhance innovation dynamism, in order to strengthen resilience in innovation during periods of friction and cultivate long-term innovation capacity.

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References

[1] Melitz, M.J., Redding, S.J. (2022) Trade and innovation. National Bureau of Economic Research Working Paper
[2] Liu, Q., Ma, H. (2020) Trade policy uncertainty and innovation: Firm level evidence from China's WTO accession. Journal of International Economics 127, 103387.
[3] Zhang, D., Zheng, W., Ning, L. (2018) Does innovation facilitate firm survival? Evidence from Chinese high-tech firms. Economic Modelling 75, 458-468.
[4] Kong, D., Liu, C., Narayan, P.K., Sharma, S.S. (2024) The US–China trade war and corporate innovation: Evidence from China. Financial Management 53(3), 501-541.
[5] Ding, Z., Qian, D., Wang, X. (2025) Research on the impact of trade friction on the green innovation efficiency of cities: A study from the perspective of profit-quality analysis. Science Research Management 46(3), 160-169
[6] Yoon, C., Park, J. (2022) The US-China Trade War and Firm Innovation. Working Paper.
[7] Xu, Z., Zhong, X., Zhang, Z. (2022) Does the Sino–US trade friction promote firm innovation? The role of the export grab effect. Sustainability 14(5), 2709.
[8] Chen, Y., Zhang, S., Miao, J. (2023) The negative effects of the US-China trade war on innovation: Evidence from the Chinese ICT industry. Technovation 123(5), 102734.
[9] Xie, L., Liu, X., Tan, Y. (2025) Reverse push effect or suppression effect? International trade friction and corporate innovation. Journal of Management Sciences in China 28(4), 17-31.
[10] Xu, P., Jin, Z., Li, J. (2025) Trade Friction, Talent Policy and Export Enterprise Innovation. Review of Industrial Economics (3), 187-206.
[11] Benguria, F., Choi, J., Swenson, D.L., Xu, M.J. (2022) Anxiety or pain? The impact of tariffs and uncertainty on Chinese firms in the trade war. Journal of International Economics 137, 103608.
[12] Wang, Y., Zhao, J., Kong, D. (2025) Research on the Impact of Trade Friction on the Transformation and Upgrading of Manufacturing Enterprises: A Quasi-natural Experiment Based on Listed Companies in China. Modern Finance and Economics-Journal of Tianjin University of Finance and Economics 45(2), 110-129.