Will China's Indigenous Innovation Strategy be Successful as a Response to the Decoupling Risk?

1. Introduction

The world of international business is undergoing a fundamental shift, having tremendous implications for corporate strategies. The world's two largest economies, China and the US, previously highly interlinked and closely coupled, are now faced with a significant risk of decoupling. At the moment, this risk in many ways has already become a reality. A process of decoupling was initiated by the harsh anti-China rhetoric and policies of former US President Donald Trump; and now, President Joe Biden's administration has mostly continued following the same course in its own policy approach. If continued, this move towards the decoupling of the US and Chinese economies will likely reverse the trend of globalization that characterized the past few decades.

Arguably, the most important strategy adopted by Chinese corporations is indigenous innovation (zi zhu chuang xin) in order to deal with the risk of decoupling. In essence, indigenous innovation calls for a corporation to advance its own technologies by relying on domestic engineers and technologies, as well as the resources of domestic universities, research institutions, and other domestic corporations (Chen, 1994; Fu, 1998). The strategy of indigenous innovation is based on two rationales. First, without continued innovation, Chinese corporations will not be able to outcompete their Western counterparts once decoupling occurs. Second, the US and other Western corporations may suddenly cut off access to the supply of critical new technologies, which means that the Chinese side should attempt to achieve complete control over its own technologies and its capacity for continued technological progress.

The Chinese corporate strategy of indigenous innovation is likely to change the landscape for the global business environment and therefore is an area that is deserving of very careful research and analysis. Moreover, corporations in other countries may emulate the Chinese strategy of indigenous innovation and this will therefore further transform the structure of many business sectors. At the same time, the strategy of indigenous innovation is sometimes perceived to be anti-free market in its principles and hence will require careful consideration moving forward.

Given the rising importance of indigenous innovation, the existing body of literature on the topic is at present inadequate and inconclusive. Even so, past research has nonetheless long identified the importance of indigenous innovation (Chen, 1994; Fu, 1998). Following this trend, some researchers proposed theories to explain the rise and uniqueness of indigenous innovation (Chen, 2017; Chen, Yin, & Li, 2020; Xu et al., 2007). Recently, Lv and Liu (2019) and Zhang, Yang and Liu (2022) further analyzed the features of indigenous innovation in practice. Zhang et al. (2022) found that indigenous innovation has played a positive role primarily in non-economic and non-business aspects, such as patriotism, elitism and endurance of hardship. As for the overall impact from the strategy of indigenous innovation, there is no consensus in the literature (Chand, Qian, Wang, & Yin, 2018).

In this paper, we focus on two critical issues arising from the strategy of indigenous innovation: First, which enterprises are more likely to adopt the strategy of indigenous innovation? Second, is the strategy of

indigenous innovation able to mitigate the risk of decoupling? In order to answer the first question, we conduct a text analysis of corporate annual reports for all the listed companies on Chinese stock markets for the period between 2017 and 2019 and identify those enterprises adopting an indigenous innovation strategy. In order to analyze whether indigenous innovation is an effective strategy to respond to China-US economic decoupling, we construct a so-called Trump Index, which is a measure of then-US President Trump's anti-China tweets. We then analyze whether and how Chinese enterprises adopting indigenous innovation have been affected relatively less by the Trump Index in terms of their share prices between 2017 and 2019.

This paper offers several findings that are not found or supported by the existing research literature. As for which enterprises are more likely to adopt the strategy of indigenous innovation, we discover the following results: 1) enterprises under the ownership of the central government are less likely to adopt this strategy, contrary to theoretical analysis; 2) top executives with strong R&D experience are more inclined to adopt indigenous innovation as their strategy; 3) enterprises with a good track record in R&D are more likely to engage in indigenous innovation; and, 4) enterprises with high PE ratios are more likely to adopt the strategy of indigenous innovation. As for the outcomes of adopting indigenous innovation as a corporate strategy, we discover the following results: 1) those enterprises adopting indigenous innovation are overall less impacted by the risk of decoupling; 2) state-owned enterprises (SOE) are less effective in adopting indigenous innovation to mitigate the risk of decoupling; 3) firms with top executives who have research backgrounds perform better; and, 4) firms actively adopting corporate social responsibility (CSR) are less effective in using the indigenous innovation strategy than other firms. A general implication of the findings is that indigenous innovation is likely to achieve partial rather than universal success in dealing the US-China decoupling risk, since good firms may adopt the strategy and only they can achieve success by implementing the strategy. Meanwhile, other firms either do not adopt the strategy or fail to implement the strategy.

2. Theory and Hypotheses

In the following, we first conduct a theoretical analysis of which type of enterprises are more likely to implement indigenous innovation. We first analyze whether State-Owned Enterprises (SOEs), in particular, central government owned SOEs, may be more interested in pursuing indigenous innovation for non-economic reasons than other enterprises. This argument is based on the research of many economics and management scholars who have long pointed out that due to the lack of incentives, SOEs have more interest in pursuing national and government objectives than market success (Xu & Zhang, 2008, Megginson & Netter, 2001). In China, indigenous innovation is often times a top-down instruction for SOEs by the government. Therefore, we posit that central government SOEs and their managers are often obligated to pursue indigenous innovation like CSR projects (Córdoba-Pachón et al., 2014).

Next, we study the relationship between the background of senior executives and the firms' adoption of indigenous innovation. There is a large literature of the upper echelon theory, which argue that firm executives have power on firms' performance (Hambrick & Mason, 1984). Therefore, the background and experience board directors have received would have considerably huge influence on important decisions driven by their inclinations (Golden & Zajac, 2001). Guided by Hambrick's logic (1981), executives may dictate the firm' destiny through their decisions in every critical timepoint. Furthermore, executives' background and experience (Carpenter, Geletkanycz, & Sanders, 2004), board structure (Baysinger &

Hoskisson, 1990) and social ties (Geletkanycz & Hambrick, 1997) are further studied by researchers. Moreover, the upper echelons theory has explanation power in firm's innovation activities (Damanpour & Schneider, 2006). Based on this we theorize that firms having senior executives with R&D background are more likely to engage in indigenous innovation.

We also theorize that firms which are very experienced in innovation and have made good progress in innovation in the past are more likely to conduct indigenous innovation. The reason is that a lot of research has shown that when a firm is successful in the past relying on a strategy, the firm is likely to continue the same strategy (Steiber & Alänge, 2013). In other words, there is an inertia in corporate strategy (Hannan, & Freeman, 1984). Indigenous innovation is after all a kind of innovation and therefore firms with good success in innovation in the past will like pursue indigenous innovation.

Finally, we explore the market valuation and the likelihood of adopting indigenous innovation. When a firm is highly valued by the stock market, its price-to-earnings ratio (PE) is high and the firm tend to have easier time raising capital than others (Nagji & Tuff, 2012). Due to this reason, such kind of firms are more likely to conduct indigenous innovation than other firms (Tidd, 2001).

Based on the above theoretical arguments, we believe that factors such as state ownership, the number of valid inventions a firm holds, the background of senior executive and the firm's PE contribute to the firms' performance. We form the following hypotheses:

> Hypothesis 1: Central government SOEs are more likely than other enterprises to adopt the strategy of indigenous innovation.
> Hypothesis 2: Firms that have senior executives with research background are more willing to conduct indigenous innovation than others.
> Hypothesis 3: Firms which have achieved more technological inventions are more willing to conduct indigenous innovation than others.
> Hypothesis 4: Firms with a higher PE ratio are more likely to conduct indigenous innovation than others.

Next, we analyze the effectiveness of strategy of indigenous innovation in tackling the risk of US-China decoupling. To begin with, we theorize that, overall, the strategy of indigenous innovation helps a firm to mitigate the negative impact of the decoupling risk. The reason is that when China is decoupled from the US, a Chinese firm may lose the opportunity to obtain technology from the US. Indigenous innovation aims to enhance a Chinese firm's own capacity to innovate and therefore make up the loss of technology from foreign sources. This line of reasoning is based on the innovation literature, which provides insights on how firms utilize their resources to conduct R&D and innovation to prevent technology crises from harming firms' interests (Amit & Zott, 2001; Roberts, 1999). Therefore, the strategic management of innovation represents a crucial component of a firm's strategy (Hamel, 2000; Keupp, Palmié, & Gassmann, 2012).

We further posit that an SOE is less effective in implementing indigenous innovation in comparison with other types of enterprises. This is based on existing literature about the behavior of SOE (Hart, Shleifer, & Vishny, 1997; Zhou, Gao, & Zhao, 2017). The literature has shown that relative to a POE, an SOE is more attuned to top-down instructions from the government and is less efficient in carrying out a bottom-up

business strategy such as innovation (Shleifer, 1998). Therefore, after announcing a strategy of indigenous innovation, an SOE is less effective in fending off the decoupling risk than a POE.

Next, we analyze the relationship between background of the senior executive and effectiveness of indigenous innovation. We argue that an experienced senior executive in R&D should be more effective in carrying out the strategy of indigenous innovation than an inexperienced senior executive. This argument follows the aforementioned upper echelon literature, which emphasizes that the senior executive is most effective in implementing corporate strategies in areas of his expertise (Hambrick, 2007).

Finally, we study whether a firm active in pursuing projects of corporate social responsibility (CSR) is more effective in implementing the strategy of indigenous innovation. Normally, firms active in CSR are better managed and efficient in operation. However, in the Chinese context, a firm active in CSR is often very interested in its political and social image, rather than its profitability or efficiency (Lau, Lu, & Liang, 2016). Therefore, such a firm may adopt indigenous innovation as a CSR project and is actually unable to fully implement the strategy (Gallego-Álvarez, Prado-Lorenzo, & García-Sánchez, 2011). That is, we argue that firms with active CSR project are less effective in carrying out indigenous innovation than other firms.

Based on the above theoretical analyses, we form four hypotheses. All these hypotheses relate the firm's characteristics to the effectiveness of the corporate strategy of indigenous innovation in mitigating the risk of US-China decoupling. They are as follows.

> *Hypothesis 5: Firms that adopt the strategy of indigenous innovation are less affected by the risk of US-China economic decoupling than other firms.*
> *Hypothesis 6: SOEs are less effective in implementing indigenous innovation as a strategy to mitigate the decoupling risk than POEs.*
> *Hypothesis 7: Firms led by senior executives with research experience are more effective in indigenous innovation as a strategy to mitigate the decoupling risk than others.*
> *Hypothesis 8: Firms active in CSR projects are less effective in indigenous innovation as a strategy to mitigate the decoupling risk than others.*

3. Method

3.1 Index Construction

The Trump Index. In this paper, we construct a Trump Index using former US President Donald Trump's twitter data (Trump Twitter Archive: http://www.trumptwitterarchive.com) to capture the risk of US-China decoupling. We define the Trump Index as the accumulated trade-related tweets against China by Trump. The reason we choose trade-related tweets against China is that China is the largest trade partner of the US, and the extensive trade between China and the US has been highly symbolic of the two countries economic ties. Besides, the former president would often announce protectionist policies after his tweets (Lang & Li, 2021). Our approach is similar to Baker, Bloom, & Davis (2016).

The Stock Performance Index (SPI). To quantify how different firms respond to the risk of US-China economic decoupling, we construct a Stock Performance Index (SPI) for each company annually. The stock market provides us a unique perspective to evaluate the performance of enterprises (Fama, 1970). We construct the SPI by adopting a two-stage regression. In the first stage regression, we calculate the cumulative abnormal return (CAR). In the second stage regression, we explore the correlation between the CAR and the

Trump Index for each firm. The coefficient estimator is the Stock Performance Index (SPI), which reflects the impact of the risk of decoupling on a particular firm.

The Indigenous Innovation Strategy (IIS). We conduct text analysis of the company's annual report and construct a dummy variable Indigenous Innovation Strategy (IIS) for each company annually. Based on the existing literature using the Management's Discussion and Analysis (MD&A) section of a public company's annual report as an indicator of a company's future strategy (Cole & Jones, 2005; Muslu, Radhakrishnan, Subramanyam, & Lim, 2015), we use the text of the MD&A section in the annual and semi-annual reports of Chinese A-share non-financial listed companies, and use text analysis methods to identify whether the company has adopted an indigenous innovation strategy.

3.2 Variables, Measures, and Data Sources

We use the data of Chinese non-financial listed companies from 2017 to 2019 to empirically test whether the indigenous innovation strategy (IIS) can help firm respond better to the risk of US-China economic decoupling. The samples of newly listed companies and de-listed companies are deleted to ensure the generality of the results. The data covers the SPI, IIS, ownership, market value, R&D investment, number of valid invention patents, the existence of a CSR project, PE ratio, Tobin's Q, ROA, and leverage ratio of each firm, as well as the age, gender, and work experience of senior executives. We also include the trade volume, R&D intensity of the province, that may affect the effectiveness of the indigenous innovation strategy. The data sources are from the CSMAR database and self-constructed index. To rule out the influence of outliers, we discard values smaller than 0.5th percentile or greater than 99.5th percentile for all variables.

3.3 Identification Strategy

To test what kinds of firms are more likely to adopt the indigenous innovation strategy, we adopt the following Probit regression specification, for firm i in year t,

$$P(IIS_{i,t} = 1) = F[\alpha + \beta_1 SOE_{i,t-1} + \beta_2 ResearchBack_{i,t-1} + \beta_3 ValidInvention_{i,t-1} + \beta_4 R\&DInvest_{i,t-1} + \beta_5 CSR_{i,t-1} + \beta_n Controls_{i,t-1} + FixedEffects + \varepsilon_{it}] \qquad (1)$$

The dependent variable $IIS_{i,t}$ is a dummy variable which equals to 1 if the firm adopts the indigenous innovation strategy. The key independent variables include $SOE_{i,t-1}$, dummy variable equals to 1 if the firm is state-owned enterprise; $ResearchBack_{i,t-1}$, dummy variable equals to 1 if senior executives have research work experience; $ValidInvention_{i,t-1}$, the logarithm of the number of total valid inventions of the firm; $R\&DInvest_{i,t-1}$, the firm's R&D investment as a percentage of total assets; $CSR_{i,t-1}$, dummy variable equals to 1 if the firm adopts the company social responsibility (CSR) projects. The control variables include the market value, PE ratio, Tobin's Q, ROA, and leverage ratio of each firm. We also control the year fixed effect and industry fixed effect. To avoid the reversal causality, we use the one year lagged value for all independent and control variables, and the t-statistics are cluster at the industry level.

To test whether the indigenous innovation strategy can help the firm better cope with the risk of US-China economic decoupling, we use the following regression specification, for firm i in year t,

$$SPI_{it} = \alpha + \beta_1 IIS_{i,t} + \beta_2 SOE_{i,t} * IIS_{i,t} + \beta_3 ReschBaearck_{i,t} * IIS_{i,t} + \beta_4 CSR_{i,t} * IIS_{i,t} + \beta_n Controls_{i,t} + FixedEffects + \varepsilon_{i,t} \qquad (2)$$

where the dependent variable SPI_{it} denotes the performance of the firm's response to the risk of US-China decoupling. The key independent variable is $IIS_{i,t}$, a dummy variable denotes whether the firm adopts

the indigenous innovation strategy. To test the moderating effect of other factors, we also include $SOE_{i,t} *$ $IIS_{i,t}$, interaction variable tests whether the state ownership can affect the effectiveness of indigenous innovation strategy; $ResearchBack_{i,t} * IIS_{i,t}$, interaction variable tests whether the executive's research background can effectively affect the indigenous innovation strategy; $CSR_{i,t} * IIS_{i,t}$, interaction variable tests whether the firm having CSR projects can affect the effectiveness of indigenous innovation strategy. The control variables, fixed effect and clustered statistics approaches are done the same as equation (1).

4. Preliminary Results and Contributions

The regression results for equation (1) are based on the annual data from 2017 to 2019. We find that the coefficients of *Central SOE* are significantly negative (p=0.074), which shows that central government SOEs are less likely to propose the indigenous innovation strategy. Thus, H1 is not supported. The results also show that the coefficients of *ResearchBack*, *log(ValidInvention)*, and *R&D* are significantly positive (p=0.065, 0.010, 0.000). This indicates that firms whose senior executives have research background, with more valid invention patents, and higher R&D investment are more likely to adopt the indigenous innovation strategy. Thus, H2 and H3 are supported by the empirical results. We also find that the coefficient of *PE Ratio* is significantly positive (p=0.007), which show that firms with higher market valuations are more likely to adopt indigenous innovation strategies, which support H4.

The estimation results for equation (2) are based on the annual data from 2017 to 2019. We find that indigenous innovation strategy works better when facing the risk of decoupling, which support H5. We then test the moderating effects of other factors. The results show that the coefficients of *IIS * SOE* and *IIS * Central SOE* are significantly negative (p=0.064, 0.015). This indicates that the state ownership, especially central state ownership would weaken the effect of indigenous innovation strategy in mitigating the decoupling risk, which support H6. We also find that the coefficient of *IIS * ResearchBack* is not significant (p=0.419). Thus, H7 is not supported. The coefficient of *IIS * CSR* is significantly negative (p=0.059), which indicates that the CSR strategy actually would weaken the effectiveness of the indigenous innovation strategy. Thus, H8 is supported by the empirical results.

This paper makes three theoretical contributions to the literature. First, we conduct a two-step analysis of indigenous innovation using a large dataset by asking which firms adopted the strategy and the resulting impacts after adopting the strategy. This approach has not been utilized in the existing literature. Second, we link indigenous innovation to the issue of China-US decoupling, quantifying the risk through the text analysis of tweets made by former US President Trump. In this way, we convert high-frequency stock price responses to the daily Trump Index into a low frequency annualized firm-specific set of statistics, which matches average share price volatility to the Trump Index. Third, we utilize a text analysis of corporate annual reports to identify firms which adopt the strategy of indigenous innovation and we use stock share prices as a harbinger of the future impact arising from the strategy of indigenous innovation. Besides, a practical implication of the paper is that China's indigenous innovation is likely to achieve partial rather universal success in dealing with the US-China decoupling risk, since despite campaigns by the government, only around a quarter of firms adopt the strategy and among these firms, only some of them can achieve success in implementing the strategy. In particular, successful firms are likely to be private firms with senior executives experienced in R&D.

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