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HOW R&D PREMIUM, MARKET POWER, AND STATE OWNERSHIP AFFECTED STOCK RETURNS BEFORE AND DURING THE COVID-19 PANDEMIC: EVIDENCE FROM VIETNAM

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Abstract

This study extends the growing literature on the innovation puzzle by investigating how innovation, market power, and state ownership, influence stock returns in Vietnam. Using Fama–MacBeth regressions and the Carhart four-factor model augmented with R&D intensity, we analyzed a dataset of 31,930 firm-month observations from 2010 to 2021. After controlling for market power and firm characteristics, the results show that a one percent increase in R&D intensity is associated with a 0.577% rise in monthly stock returns. For firms with the most significant market power, the same increase in R&D intensity yields an additional 1.75% return. Among state-owned enterprises (SOEs), the return enhancement is 0.512%. Portfolio-level analysis reveals a robust R&D premium, especially under equal-weighted, though this effect disappears during Covid-19, suggesting sensitivity to market-wide stress. These findings offer empirical support for the competitive advantage and institutional theories, highlighting the strategic value of R&D investment. The study provides practical implications for corporate managers and policymakers aiming to promote innovation-driven performance in emerging markets.

Keywords: Stock returns; R&D premium; market power; state ownership; Covid-19; Vietnam

JEL classification: G20; G21.

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1. INTRODUCTION

R&D investment is generally recognized as a critical approach for increasing business value and driving economic development (Fama & French, 1993). Research in business innovation is a critical and far-reaching field that benefits individual companies and contributes to global economic, social, and environmental advancements. It drives progress, cultivates resilience, and assists in resolving some of the most urgent issues facing the globe. Theoretical and empirical assessments suggest that organizations which invest heavily in R&D generally outperform their counterparts with little or no R&D effort (Chan et al., 2001; Sacomano Neto et al., 2020; Duong et al., 2025). This beneficial relationship results from the value that R&D investment generates, which manifests as competitive advantages by introducing novel products, superior services, and improved overall performance (Gharbi et al., 2014). In contrast, Arif Khan et al. (2023) and current theoretical viewpoints contend that R&D expenditures may reduce firm earnings owing to the lengthy time necessary for development initiatives to acquire operational effectiveness.

Prior literature documents a mixed nexus between market power and firm innovations. According to Gu (2016), organizations in competitive sectors often compete to produce new goods or technology. Completing an R&D project ahead of rivals may cause competing firms to scale down or abandon comparable activities, lowering total company value. This competitive dynamic substantially impacts organizations that engage heavily in R&D, demonstrating a strong association between product market competitiveness and stock returns in R&D-intensive enterprises (Gu, 2016). García-Quevedo et al. (2014) further support that corporations with significant market dominance devote more excellent resources to R&D, leveraging earnings from creative ventures. Therefore, it is worth testing whether market power and R&D affect stock returns in the Vietnamese market. Moreover, the study also aims to investigate whether the impacts of R&D on stock returns vary with different levels of market power.

Various studies report that state ownership significantly impacts the number of R&D investments. The relationship between R&D intensity and company performance is influenced by state ownership for two primary reasons (Yi et al., 2017). Firstly, governments emphasize innovation incentives via national cooperation with international institutions as stakeholders in state-owned enterprises (SOEs). Cao et al. (2020) have further highlighted that SOEs exhibit significantly higher levels of innovativeness and efficiency. Secondly, state ownership provides SOEs with access to digital transformation programs, conferring competitive advantages at an early stage. Wang et al. (2018) proposed that governments can extend exclusive endorsements and preferential treatments to SOEs, enabling them to harness competitive advantages for innovation more effectively. Consequently, this investigation explores the effects of market power and state ownership on the R&D premium in Vietnam, particularly prior to and during the Covid-19 pandemic.

This study contributes to the growing literature on the innovation puzzle by delving into the influence of market power and ownership structure on R&D returns in Vietnam. In order to measure R&D intensity, previous research has used proxies such as the ratio of R&D costs to total assets or revenues (Chan et al., 2001; Al-Horani et al., 2003). However, these approaches have yet to reveal a substantial differential in stock returns between different R&D intensity levels. In contrast, this study employs a distinct method to measure R&D intensity by dividing annual R&D spending by market equity (RDM), which is anticipated to capture higher abnormal returns than other metrics. Additionally, we delve into further research examining the interaction between state ownership, market power, and R&D returns in Vietnam, especially in the context of the Covid-19 pandemic.

This study was conducted in Vietnam due to several factors. Firstly, motivation for the study stems from the uncertain correlation between research and development (R&D) and

corporate performance, as proposed by the Knowledge-based theory and the Competitive Advantage Hypothesis. These ideas suggest that considerable expenditure in research and development (R&D) will stimulate substantial company growth. The perspective is substantiated by Gharbi et al. (2014) and Boeing et al. (2016), who contend that expenditure in research and development provides outcomes that enable organizations to decrease expenses and boost operational effectiveness, eventually bolstering profits. On the other hand, the Innovation Diffusion Hypothesis presents a different viewpoint, indicating some drawbacks linked to research and development (R&D) expenditure that may hinder economic success. This hypothesis highlights the protracted nature of research and development (R&D) endeavors and the subsequent delay in the achievement of any related outcomes, which might lead to escalated expenses and reduced operational effectiveness. Arif Khan et al. (2023) have questioned the widely held assumption that R&D is essential for enhancing firm performance and promoting innovation to achieve greater competitiveness.

Furthermore, our interest in Vietnam is due to its comparatively lower expenditure on innovation than other ASEAN nations, despite a significant rise in research and development expenditures among publicly traded companies from 37.1 billion VND in 2010 to 174.3 billion VND in 2020. The increase in research and development (R&D) costs, especially among State-Owned Enterprises (SOEs), indicates the changing nature of Vietnam's economy. The Vietnamese economy is accessible to international investors due to a continuous shift from a centralized to a market economy. This transition has been characterized by many efforts, such as Decision 99 in 2012, which requires state-owned firms to become public firms via Initial Public Offerings. Nevertheless, this transition has yet to be fully accomplished, leading to various levels of state ownership in listed firms. As of the end of 2022, about 478 firms had 100% state-owned capital, while 198 enterprises had significant state ownership. Significant in size, state-owned enterprises (SOEs) control a considerable portion of total assets, income, and pre-tax earnings at the national level. These SOEs are crucial in critical industries and significantly contribute to the state budget. State-owned enterprises in Vietnam benefit from various unique benefits, such as licenses, administrative privileges, and access to resources such as raw materials, low-cost capital, subsidies, and specialized expertise. The benefits mentioned above have led to a rise in research and development (R&D) spending in the state-owned enterprise (SOE) sector, augmenting market dominance compared to privately owned companies. Our research examines how the decrease in state ownership in publicly traded companies affects the R&D premium in the Vietnam stock market. In addition, we investigate how the combination of state ownership and market power affects the impact of R&D premiums in Vietnam.

The Covid-19 pandemic, a worldwide outbreak of the 2019 coronavirus disease, resulted in the infection and death of millions of individuals across several nations, making it one of the most lethal events in world history. Vietnam is among the five nations, namely Thailand, Japan, the Republic of Korea, and the United States of America, that reported the first instances of Covid-19 outside of China (Huynh & Bui, 2024). Various global studies have indicated that R&D and innovation investments in enterprises exhibit a robust procyclical pattern, as investments in innovation increase during booming economic stages and decrease significantly during a financial crisis. Engaging in research and development (R&D) and innovation is inherently hazardous since it involves unpredictable technical and commercial results. Hence, the primary worry for corporations is whether worldwide investments in R&D during a crisis such as Covid-19 efficiently generate revenues.

The sample includes all non-financial firms listed on the Ho Chi Minh (HSX) and Hanoi (HNX) stock exchanges from July 2010 to March 2021. We follow Duong et al. (2025) in applying Fama and MacBeth's (1973) regression to examine the effects of market power and R&D intensity on stock returns, controlling for ASSET, PAYOUT, and AGE, both before and during the Covid-19 pandemic. We then explore the role of state ownership by dividing firms

into state-owned and private groups and further categorizing them into the top and bottom 20% based on market power, to assess how R&D intensity impacts firms with varying competitive positions. To assess the persistence of the R&D premium, we employ the Carhart four-factor framework. Firms with complete R&D data are allocated into low-, medium-, and high-intensity portfolios, determined by the 30th and 70th percentiles of the RDM distribution. This approach allows us to evaluate differences in returns across R&D intensity groups and confirm the existence of an R&D premium.

This research yields the following key findings. Higher R&D intensity significantly enhances cross-sectional stock returns in the Vietnamese equity market. An increase in R&D intensity increases 0.577% in monthly stock returns, even after controlling for firm characteristics and market power. Firms with the highest levels of R&D intensity generate 0.933% higher returns than those with the lowest levels. These findings suggest that companies engaging in R&D are more exposed to risk but are also expected to deliver superior returns. This evidence aligns with the knowledge-based theory, which emphasizes intangible assets' strategic value, such as innovation.

The effect of R&D on stock performance is more pronounced in firms with substantial market power. Specifically, an increase in R&D spending among firms with the most significant market dominance yields an additional 1.75% monthly stock returns. This result is consistent with the competitive advantage theory. It corroborates the empirical findings of Hou and Robinson (2006), Gu (2016), and Duong et al. (2025), highlighting that firms with strong market positions can more effectively capitalize on innovation investments. Furthermore, the analysis reveals that raising R&D expenditures in state-owned enterprises (SOEs) leads to a 0.512% increase in stock returns. This outcome supports the institutional theory and the findings of Cao et al. (2020).

In addition, this study documents a significant R&D premium in the Vietnamese stock market. Sorting portfolios by R&D intensity indicates that firms with higher R&D investment consistently earn higher returns, particularly under equal-weighting. The return spread between firms of high and low R&D intensity reaches 0.933% monthly. This finding supports Malladi and Fabozzi (2017). After controlling for risk exposures using the Carhart four-factor model, the alpha remains statistically significant at 0.651%. This finding indicates that the R&D premium persists and traditional risk factors do not fully capture the excess return associated with R&D intensity.

Furthermore, analysis of average portfolio returns and Carhart four-factor alphas across R&D intensity groups before and during the Covid-19 period suggests that the R&D premium was predominantly observed before the pandemic. During the crisis, the alpha becomes statistically insignificant, implying that the return premium associated with R&D investment is sensitive to market-wide shocks and tends to weaken under conditions of elevated uncertainty.

This study contributes to the growing body of literature on innovation in emerging markets by being the first to examine the influence of market power and state ownership on R&D premiums in the equity market. Our findings suggest that firms with greater market dominance and state ownership exhibit higher innovation productivity. Moreover, the analysis provides evidence of a significant R&D premium in the full sample and during the pre-pandemic period. However, during the Covid-19 crisis, the R&D premium became statistically insignificant, indicating that its effect diminishes under heightened uncertainty.

The remaider of this study is organized as follows. Section 2 introduces the theoretical framework that guides the analysis. Section 3 describes the data and explains the methodological approach. Section 4 reports and interprets the main findings. Finally, Section 5 concludes the study and offers suggestions for future work.

2. LITERATURE REVIEW

2.1 Theory

Competitive advantage theory posits that R&D efforts enable companies to gain a competitive edge. This advantage may come from new products, innovative production processes, or cutting-edge technologies. Such advantages contribute to increased revenue, cost reduction, and market expansion, ultimately leading to higher profits. Gharbi et al. (2014) argue that the positive relationship between R&D investment and competitive advantages arises from the value generated, which materializes in novel products, superior services, and enhanced overall performance. In industries with intense competition, organizations often strive to innovate. Completing an R&D project ahead of competitors can prompt them to scale down or abandon similar initiatives, influencing the company's overall value.

Knowledge-based theory posits that R&D is crucial for companies to create and accumulate valuable knowledge, which, in turn, enhances operational efficiency, fosters innovation in new products, and facilitates entry into new markets, ultimately leading to increased profitability. Mazzucato and Tancioni (2012) underscore that companies achieve a competitive advantage by focusing on and succeeding in R&D projects. Boeing et al. (2016) further highlight the positive impact of R&D investment on economic advancements, particularly in improving operational efficiency and human resources within China's economy.

Meanwhile, institutional theory suggests that a country's institutional framework is crucial in encouraging investments by offering incentives, creating a stable environment, reducing transaction costs, and minimizing risks and uncertainties. This theory implies that businesses under state ownership have more significant development opportunities and can leverage the resources provided by state institutions more effectively than their counterparts. Findings from studies by Yi et al. (2017) and Arif Khan et al. (2023) support the idea that state-owned companies find it easier to access external resources for investing in and profiting from R&D activities compared to other enterprises.

The innovation diffusion theory posits that there may be a time lag between initiating research and development (R&D) activities and realizing tangible results. This delay is attributed to the challenges in adopting and implementing innovations, often called the "chasm" in Geoffrey Moore's technology adoption life cycle. Contrary to conventional understanding, the statement attributing a negative correlation between R&D and company performance to Arif Khan et al. (2023) contradicts the typical view that R&D is crucial for improving company performance and fostering innovation for enhanced competitiveness.

2.2 R&D Intensity and Stock Returns

Numerous studies have documented the positive link between R&D intensity and stock returns. Mazzucato and Tancioni (2012) established that investors respond positively to companies' innovation efforts. Increased investments in research and development (R&D) and positive signals from the parent company contribute to the development of an optimistic outlook on the business's growth among investors. Yiu et al. (2020) further emphasized that improving management procedures and allocating resources to innovation can result in substantial financial gains for firms. Similarly, Duong et al. (2025) also reported a positive relationship between intangible intensity, including innovation, and stock returns in Vietnam.

In contrast, Arif Khan et al. (2023) argued that higher R&D investment can erode corporate profits. According to their findings, the time-intensive nature of research and development initiatives, from conception to completion, contributes to a delay in realizing positive outcomes. In line with the innovation diffusion theory, once an R&D project is

completed, additional time is required for modifications and operational enhancements, during which the costs associated with research and development investments may weigh on the firm's performance, leading to a decline in earnings. The inverse correlation between research and development (R&D) activities and returns, as suggested by agency theory and the behavioral theory of finance, is attributed to managers' overconfidence in their skills, ultimately diminishing firm performance (Chakraborty, 2023).

Given the varied outcomes of previous research on R&D activities, we suggest the following hypothesis to investigate the effects of R&D intensity on stock returns.

Hypothesis 1: Innovation intensity has a positive nexus with stock returns in Vietnam.

2.3 Market Power and Stock Returns

Previous research has extensively explored the connection between market power and R&D premiums. Dhanora et al. (2021) identified a positive correlation between technological innovation and market power within the Indian market. Technological advancements contribute to the establishment of a favorable reputation in the market, leading to increased operational efficiency and profits. Gu (2016) similarly highlighted that, within industry groups, a company that completes an R&D project ahead of schedule and with greater efficiency than its competitors can assert dominance in the market. This competitive advantage often prompts rival companies to reduce or cease their investments in R&D for similar projects as the potential marginal profits diminish. García-Quevedo et al. (2014) argued that companies wielding substantial market power are inclined to promote higher innovation investments, leveraging their position to profit from R&D activities. The synergy between promoting R&D investment and exercising market control allows companies to generate significant profits.

Kubick et al. (2015) identified a negative association between market power and forthcoming stock returns. They consequently proposed that companies with substantial market power tend to offer stocks perceived as low risk, which in turn leads investors to accept lower returns when holding shares of these companies. Similarly, Maghyereh and Awartani (2014) proposed that significant market power could lead to reduced competitiveness. This decline in competitiveness might dampen the motivation among business managers to innovate, consequently negatively impacting overall business performance.

Given the varied outcomes of previous research on R&D activities, we suggest the following hypothesis:

Hypothesis 2: Market power positively affects stock returns in Vietnam.

2.4 R&D Intensity and Stock Returns in State-Owned Firms

Investors tend to respond positively to companies' innovation efforts, with increased R&D investment and positive signals from a parent company fostering optimism about the firm's growth prospects (Mazzucato & Tancioni, 2012).

Several studies have highlighted the potential advantages of state ownership in innovation outcomes. Yi et al. (2017) identified two crucial ways that state ownership impacts the effect of R&D intensity on innovation performance. Governments place institutional limits on State-Owned Enterprises (SOEs) as stakeholders, possibly influencing their motivation and ability to innovate. Additionally, a company's capacity to capture the rewards of innovation is influenced by its state ownership. SOEs are believed to have a particular edge over non-state-owned equivalents, owing to government subsidies and a greater proclivity to engage in green innovation. Because of their inherent linkages, state-owned enterprises recieve more substantial government assistance and R&D subsidies. Consistent with this, Cao et al. (2020) observed that SOEs create more patents per dollar of R&D investment than non-SOEs.

Similarly, Arif Khan et al. (2023) showed that state ownership moderates the link between R&D activity and firm performance. Their study stressed that government subsidies for the innovation efforts of state-owned firms sometimes alleviate the profit pressure associated with such endeavors. This trend alleviates the urgent necessity for these companies to earn money immediately from their R&D projects. Meanwhile, state ownership allows these firms to access high-quality R&D investments, such as government financing and research funds, thereby improving their overall company performance.

Given these strategic and financial advantages, a positive association is expected between R&D intensity and stock returns in state-owned firms.

Hypothesis 3: R&D intensity is positively associated with stock returns in state-owned firms.

2.5 Covid-19 and Stock Returns

The Covid-19 pandemic profoundly impacted multiple industries, significantly affecting global stocks, as evidenced by earlier studies. Al-Awadhi et al. (2020) reported a substantial negative impact on stock returns for all businesses, with daily increases in Covid-19 cases and fatalities correlating with declines in stock performance. Larger businesses were particularly hard hit, experiencing more severe impacts on their profits than smaller ones. In emerging markets, Topcu and Gulal (2020) and Duong et al. (2025) identified a negative correlation between Covid-19 and stock performance, emphasizing a more pronounced influence of the pandemic on emerging Asian stock markets over European ones. Further documentation of the pandemic's adverse effects on stock markets in specific regions such as China, Taiwan, and Vietnam has been provided by Sun et al. (2021) and Duong et al. (2025).

As most prior studies report inverse impacts of Covid-19 on stock returns, we propose the following hypothesis:

Hypothesis 4: The Covid-19 pandemic reduced the cross-sectional stock returns in Vietnam.

3. DATA AND METHODOLOGY

3.1 Data Collection

We gathered daily pricing for every company listed on the Ho Chi Minh (HSX) and Ha Noi (HNX) stock markets and accounting data from FiinPro. We follow Fama and French (1992) and Duong et al. (2025) by excluding businesses from the banking and utility industries. According to Chan et al. (2001), companies with negative R&D expenditures should not be included in R&D intensity computation. To address the issues caused by outliers, we used the technique of winsorizing variables at the 5^{th} and 95^{th} percentiles, as described by Duong et al. (2025). The final sample consisted of an unbalanced panel with 31,930 firm-month observations from July 2010 to March 2021.

3.2 Variable Definitions

We adhered to the methodology proposed by Fama and French (1992, 1993), including firm size (LNSIZE) and book-to-market ratio (BM). According to Gu (2016), R&D intensity for company i in year t is defined as the ratio of the company's annual R&D expenditure in fiscal year t to its market equity at the end of the same fiscal year. Previous studies have shown that the relationship between research and development (R&D) expenditure and market equity is associated with greater abnormal returns than R&D spending as a percentage of total assets or sales (Chan et al., 2001; Al-Horani et al., 2003; Duong et al., 2024b).

Following Gaspar and Massa (2006) and Duong et al. (2024a), our primary market power proxy is the excess price-cost margin (EPCM). This proxy is calculated by subtracting the industry value-weighted average operating profit margin from the firm's operating profit margin (which is determined by dividing operating profit by sales). This proxy relies on the price-cost margin, sometimes called the Lerner index, which assesses a company's ability to charge prices higher than the marginal cost in industrial organization literature. We chose this proxy due to the possibility of significant differences in profit rates between sectors, which are not influenced by market power. Consequently, the variable is more capable of capturing fluctuations in price influence across industries.

We use the methodology of Duong et al. (2024a) and Lam and Wei (2011) in calculating three indicators of financing constraints, namely total assets, payout ratio, and business age, as measured in months. According to Li and Zhang (2010), older and larger organizations with better payout ratios have fewer financial constraints than younger and smaller firms with lower payout ratios.

Following Cao et al. (2020), we established the state-ownership structure as a binary variable. More precisely, state-owned firms (SOEs) are assigned a numerical value of one, while non-SOEs are assigned a numerical value of zero. The dummy variable assesses the impact of R&D, market power, and budgetary restrictions across various ownership configurations. Appendix A defines each variable used in the model.

3.3 Research Methodology

First, we follow Duong et al. (2024b) in applying Fama and MacBeth's (1973) regression to examine the impact of market power and R&D intensity on stock returns after controlling for variables including ASSET, PAYOUT, and AGE before and during the Covid-19 pandemic.

Next, we examined the influence of state ownership on R&D-intensive firms by using two subgroups categorized by state ownership and private firms. We also categorized all firms into the uppermost 20% and lowermost 20% based on market power to analyze the impact of R&D intensity on publicly traded companies with varying degrees of market power.

Finally, we construct the Carhart four-factor model to examine the persistence of the R&D premium. Following Fama and French (1993), we used the market factor (RMRF), SMB, and HML factors. We created WML using the momentum factor following Carhart (1997). Abnormal returns were estimated using time-series regressions of portfolio excess returns on the Carhart (1997) four-factor model. R&D intensity is the ratio of a firm's R&D expenditure to its market value of equity (RDM). Firms with non-missing R&D data were sorted into three groups using the 30th and 70th percentiles of the RDM distribution, corresponding to low (bottom 30%), medium (middle 40%), and high (top 30%) R&D intensity portfolios. These portfolios were then used to examine whether firms with high R&D intensity earn significantly different risk-adjusted returns compared to those with low R&D intensity, and to test the existence and persistence of an R&D premium.

3.4 Model Construction

Following Duong et al. (2024b) and Chan et al. (2001), Model 1 was constructed to examine the influence of R&D intensity on cross-sectional stock returns. Model 2 was developed to analyze the relationship between market power and stock returns. To achieve these objectives, we created cross-sectional regressions at the monthly level for each organization, in the following manner:

$$R_{i,t} = \beta_0 + \beta_1 RDM_{i,t-1} + \varepsilon_{i,t-1} \quad (1)$$

$$R_{i,t} = \beta_0 + \beta_1 EPCM_{i,t-1} + \varepsilon_{i,t-1} \quad (2)$$

Several studies have demonstrated that small businesses with a high book-to-market (BM) ratio typically have high expected future returns and poor past performance (Fama & French, 1992). Therefore, after controlling for SIZE and BM, we built Model 3 to evaluate the R&D premium, as per Gu (2016):

$$R_{i,t} = \beta_0 + \beta_1 BM_{i,t-1} + \beta_2 lnSIZE_{i,t-1} + \beta_3 RDM_{i,t-1} + \varepsilon_{i,t-1} \quad (3)$$

We also followed Gu (2016) in investigating the combined effect of market power and R&D intensity on cross-sectional stock returns. Gu (2016) pointed out that R&D-intensive firms are riskier but generate more anticipated profits than firms with less R&D intensity, especially in competitive sectors. To test this, we constructed Model 4 as follows:

$$R_{i,t} = \beta_0 + \beta_1 BM_{i,t-1} + \beta_2 lnSIZE_{i,t-1} + \beta_3 RDM_{i,t-1} + \beta_4 EPCM_{i,t-1} + \varepsilon_{i,t-1} \quad (4)$$

Chan et al. (2017) suggested that investment friction enhances stock returns. We followed Lam and Wei (2011) by employing three measures to proxy for investment friction: total asset size, payout ratio, and firm age. After adjusting for investment friction variables before and during the Covid-19 pandemic, we tested the impact of market power and R&D intensity on stock returns using Model 5:

$$R_{i,t} = \beta_0 + \beta_1 BM_{i,t-1} + \beta_2 lnSIZE_{i,t-1} + \beta_3 RDM_{i,t-1} + \beta_4 EPCM_{i,t-1} + \beta_5 ASSET_{i,t-1} + \beta_6 PAYOUT_{i,t-1} + \beta_7 AGE_{i,t-1} + \varepsilon_{i,t-1} \quad (5)$$

where $R_{i,t}$ is the market return at time t, BM is the book-to-market ratio, lnSIZE is the firm's market equity, RDM is R&D intensity, EPCM is market power, ASSET is asset size, PAYOUT is the payout ratio, and AGE is firm age. The sign of "i" indicates a cross-section, while the notation of "t" refers to time, and ε is the error term. All variable definitions are reported in Appendix A.

To evaluate the persistence of the R&D premium, we sorted firms into low, medium, and high R&D intensity portfolios based on the 30th and 70th percentiles of RDM. Portfolio excess returns were then examined using the Carhart (1997) four-factor model to test whether high R&D intensity firms earn significantly different risk-adjusted returns than low R&D firms. We constructed Model 6 as follows:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{RmRf_i} * (Rm - Rf)_t + \beta_{HML_i} * HML_t + \beta_{SMB_i} * SMB_t + \beta_{WML_i} * WML_t + \varepsilon_{it} \quad (6)$$

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Descriptive statistics

Table 1 compiles the descriptive statistics detailing various variables, encompassing observation counts, mean, standard deviation, minimum, median, and maximum values for each variable. The monthly average stock return was approximately 1.12%, accompanied by a standard deviation of 10.48%, indicating substantial variability in returns. The mean market capitalization of firms in the Vietnamese stock market was found to be around 593.21 billion VND. The average R&D intensity (RDM) was 0.27%, with a maximum value recorded at 2.23%. Binh and Tung (2020) reported that the average value of RDM in Vietnam from 2010 to 2018 was 0.20%. Compared to other countries, R&D activity in Vietnam is relatively robust. Duong et al. (2024b) mentioned that RDM has an average value of 0.019 in Taiwan. BM,

LNSIZE, EPCM, ASSET, PAYOUT, and AGE average values were found to be 2.59, 5.25, 0.07, 1.71, 0.44, and 86.72, respectively.

Table 1. Descriptive statistics

Variable	N	Mean	Std Dev	Min	Median	Max
RET (%)	31,930	1.1257	10.4780	-41.0345	0.0000	52.1129
BM	31,930	2.5902	1.8747	0.2781	2.1257	12.4096
LNSIZE	31,930	5.2501	1.5175	1.9766	5.1269	9.2038
RDM	31,930	0.2703	0.3327	0.0000	0.1495	2.2315
MV (VND billions)	31,930	593.2063	1,327.1320	4.6345	150.6588	10,331.730
EPCM	31,930	0.0739	0.0853	-0.0871	0.0504	0.3541
ASSET	31,930	1.7130	2.6031	0.0400	0.7477	17.2000
PAYOUT	31,930	0.4361	0.4435	0.0000	0.3628	2.3534
AGE	31,930	86.7284	42.7524	1.0000	82.0000	248.0000

Notes: This table provides the descriptive statistics of all variables. Appendix A contains variable definitions for all variables. The final data sample comprises 31,930 firm-month observations from 2010 through 2021.

4.2 Pearson Correlation Matrix

Table 2 presents the correlation matrix for RET, BM, LNSIZE, RDM, EPCM, ASSET, PAYOUT, and AGE of individual firms from 2010 to 2020. Table 2 reveals that RET correlates adversely with LNSIZE and EPCM but positively with other factors. RDM and BM have a positive coefficient of 0.595, whereas RDM and LNSIZE have a negative correlation coefficient of -0.287. All of the correlation coefficients in this table are less than 0.8, indicating that multicollinearity is not an issue in our study (Duong et al., 2024b).

4.3 Firm-Level Cross-Sectional Regressions

Table 3 shows the time-series averages of the models' slope coefficients. The Newey-West adjusted t-statistics are given in parentheses. We do not show the regression results for brevity over the entire period as they are similar both before and during the Covid-19 pandemic. In panel A, we first tested the influence of R&D intensity and market power on cross-sectional stock returns through models 1 and 2, respectively. A positive connection was found between RDM and the cross-sectional monthly stock returns in the first model. One percent in R&D intensity was found to raise monthly stock returns by 1.2%, implying the existence of an R&D premium cross-sectionally in Vietnam. This result contradicts Chan et al. (2001) and Duong et al. (2024b). The greater R&D intensity helps to explain anticipated stock returns as R&D-intensive businesses are risky but generate higher expected returns than other peers.

When controlling for firm size and book-to-market ratio through Model 3, the positive nexus between R&D intensity and stock returns persists. Model 4 demonstrates a positive relationship between R&D intensity, market power, and stock returns, indicating that a one percent increase in R&D intensity and market power corresponds to 0.627% and 2.637% increase in stock returns, respectively. In competitive industries, firms, mainly those heavily invested in R&D, often yield higher expected returns. R&D plays a crucial role by driving

Table 2. Pearson Correlation Coefficients

Variable	RET	BM	LNSIZE	RDM	EPCM	ASSET	PAYOUT	AGE
RET	1.0000							
BM	0.0553***	1.0000						
	(<0.0001)							
LNSIZE	-0.0205***	-0.5551***	1.0000					
	(0.0003)	(<0.0001)						
RDM	0.0452***	0.5954***	-0.2870***	1.0000				
	(<0.0001)	(<0.0001)	(<0.0001)					
EPCM	-0.0158***	-0.2418***	0.3236***	-0.0410***	1.0000			
	(0.0049)	(<0.0001)	(<0.0001)	(<0.0001)				
ASSET	0.0093*	-0.1879***	0.6762***	-0.1318***	0.0869***	1.0000		
	(0.0948)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)			
PAYOUT	0.0156***	-0.0216***	-0.0065	0.0473***	-0.0090	-0.0061	1.0000	
	(0.0054)	(<0.0001)	(0.2481)	(<0.0001)	(0.1073)	(0.2747)		
AGE	0.0482***	-0.2158***	0.3509***	-0.0359***	0.0179***	0.2491***	0.0003	1.0000
	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0014)	(<0.0001)	(0.9626)	

Notes: This table provides the Pearson correlation coefficients for all variables. Appendix A contains detailed definitions for all variables. The sample period extended from July 2010 through March 2021. * indicates a significance level of 10%, ** indicates a significance level of 5%, and *** indicates a significance level of 1%. p-values are enclosed in parentheses.

innovation, creating new products or processes, enhancing revenue, reducing expenses, and expanding market opportunities, leading to improved profitability. These results are consistent with Gu (2016) and support Hypothesis 1.

Table 3 reinforces the positive link between R&D intensity and stock returns even after controlling for other variables. An increase in R&D intensity of 0.577% leads to enhanced stock returns. Firms emphasizing R&D also display higher company value and expected stock returns, underscoring the significance of intangible investments in asset pricing. This result is consistent with Eberhart et al. (2004) and aligns with the knowledge-based and competitive advantage theories, contradicting the innovation diffusion theory. This result also supports Hypothesis 1.

Table 3. Fama and Macbeth's (1973) Cross-Sectional Regressions

Panel A: Before Covid-19 (N = 27,733)							
BM	LNSIZE	RDM	EPCM	ASSET	PAYOUT	AGE	ADJR SQ
		1.205***					0.005
		(4.25)					
			1.253				0.009
			(1.02)				
0.170**	-0.020	0.674**					0.024
(1.99)	(-0.21)	(2.00)					
0.178**	-0.069	0.627*	2.637**				0.031
(2.11)	(-0.76)	(1.95)	(2.42)				
0.141*	-0.226**	0.577*	3.087***	0.141**	0.211	0.003*	0.035
(1.66)	(-2.17)	(1.92)	(2.92)	(2.08)	(1.23)	(1.75)	
Panel B: State Ownership (N = 18,286)							
0.168*	-0.244**	0.512*	2.833***	0.095	-0.248	0.002	0.036
(1.76)	(-2.12)	(1.68)	(2.69)	(1.27)	(-1.28)	(0.94)	
Panel C: Non-State Ownership (N = 9,447)							
0.258**	-0.285	-0.191	5.131***	0.327**	1.196***	0.001	0.040
(2.14)	(-1.46)	(-0.34)	(2.87)	(2.10)	(3.07)	(0.27)	
Panel D: Top 20% of market power (N = 6,334)							
0.170	0.065	1.750***	0.506	0.097	0.571	-0.006	0.051
(1.09)	(0.36)	(2.82)	(0.25)	(1.06)	(1.35)	(-1.52)	
Panel E: Bottom 20% of market power (N = 6,436)							
0.339**	-0.149	-0.046	10.499	0.183	0.179	0.009	0.047
(2.06)	(-0.70)	(-0.07)	(1.01)	(1.29)	(0.61)	(1.52)	
Panel F: During Covid-19 (N = 4,197)							
1.144**	0.261	-0.084	0.398	0.032	-0.123	-0.000	0.079
(2.15)	(0.79)	(-0.09)	(0.14)	(0.34)	(-0.31)	(-0.00)	

Notes: We employed a firm-level cross-sectional regression of lagged monthly returns, including RDM, BM, LNSZ, EPCM, ASSET, PAYOUT, and AGE. * indicates a significance level of 10%, ** indicates a significance level of 5%, and *** indicates a significance level of 1%. The T-values are enclosed in parentheses.

Furthermore, the results shown in table 3 also reveal significant relationships for BM, LnSZ, ASSET, and AGE with stock returns. Older or larger firms encounter fewer financial limitations and often witness higher stock returns. This is primarily because larger companies have better access to capital, enhanced competitiveness, and the capability to leverage increased revenues stemming from their R&D initiatives. These advantages enable them to navigate financial constraints more effectively and generate greater shareholder returns. These

findings support Chan et al. (2017), suggesting that investment frictions partly elucidate innovation efficiency.

The analysis examined the differences in innovation efficiency between State-Owned Enterprises (SOEs) and non-SOEs in Panels B and C. SOEs were consequently found to exhibit greater innovation efficiency than private firms, especially within more competitive industries. This finding suggests that SOEs leverage their state ownership benefits, including government connections and subsidies, to embrace innovations more effectively than non-SOEs, enhancing R&D performance. These results support the institutional theory and align with Cao et al. (2020) and Hypothesis 3.

Panels D and E further delve into the top 20% and bottom 20% market power samples, revealing that the R&D premium exists primarily in the top 20% market power sample. Firms with the highest market power and intense R&D efforts generate additional stock returns, indicating that R&D-intensive firms, especially dominant players in competitive industries, achieve higher returns. This result aligns with the notion that winners in innovative competition dominate in terms of market share, supporting Hypothesis 2 and aligning with the competitive advantage theory.

Finally, Panel F investigated the impact of the Covid-19 pandemic on Vietnamese stock market returns. Our findings indicated no statistically significant correlations between factors and stock performance during the pandemic. These results do not support hypothesis 4.

4.4 Empirical Results from the Asset Pricing Models

Table 4A presents portfolio returns sorted by R&D intensity across the sample period. Specifically, stocks with the lowest R&D intensity were allocated to the first tercile (low), while those with the highest R&D intensity were placed into the third tercile (high). Both value-weighted and equal-weighted portfolios were constructed. The analysis employed the Carhart (1997) four-factor model, which adjusts for market (Rm-Rf), size (SMB), value (HML), and momentum (WML) factors.

The table presents the average monthly returns for each R&D intensity tercile. The results reveal statistically significant and positive differences in raw returns between the highest and lowest R&D intensity portfolios, for both value-weighted and equal-weighted strategies. These findings are consistent with Malladi and Fabozzi (2017), who suggested that equal-weighted portfolios outperform value-weighted ones regarding average returns.

Moreover, the results indicate the presence of an R&D premium, particularly in equal-weighted portfolios. Specifically, the raw return between high and low R&D intensity portfolios (H–L) was found to be 0.933% per month, which is significant at the 1% level. After using the Carhart four-factor model, the alpha remained statistically significant at 0.651% (t = 3.51), indicating that traditional risk factors do not fully capture the excess return associated with R&D intensity.

Table 4A: Average Portfolio Returns and Carhart Four-Factor Alphavalues across R&D Intensity Groups in the Full Sample

	Full sample			
	Low R&D	Medium R&D	High R&D	H-L
Panel A: Value-weighted returns				
Raw return	0.512	0.715	1.312***	0.800***
	(0.94)	(1.46)	(2.55)	(3.07)
Carhart four-factor α	0.074	0.114	0.291	0.219
	(0.20)	(0.32)	(0.76)	(0.08)

Panel B: Equal-weighted returns				
Raw return	0.426	0.922**	1.306***	0.933***
	(0.81)	(1.97)	(2.90)	(5.21)
Carhart four-factor α	-0.325	0.124	0.323	0.651***
	(-0.84)	(0.33)	(0.90)	(3.51)

Note: This table displays the results of the four-factor regression (Carhart, 1997) for the full sample from July 2010 to March 2021. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The t-values are enclosed in parentheses.

Table 4B: Average Portfolio Returns and Carhart Four-Factor Alphas across R&D Intensity Groups before and during Covid-19

	Before the Covid-19				**During the Covid-19**			
	Low R&D	Medium R&D	High R&D	H-L	Low R&D	Medium R&D	High R&D	H-L
Panel A: Value-weighted returns								
Raw return	0.181	0.440	0.916**	0.736***	3.030	2.810	4.317	1.287*
	(0.35)	(0.91)	(2.13)	(2.61)	(1.19)	(1.34)	(1.46)	(1.93)
Carhart four-factor α	0.250	0.124	0.346	0.096	-0.416	-0.247	-0.088	0.345
	(0.63)	(0.30)	(0.87)	(0.33)	(-0.37)	(0.34)	(0.07)	(0.61)
Panel B: Equal-weighted returns								
Raw return	0.036	0.580	1.004**	0.968***	3.392	3.521*	4.058*	0.666
	(0.07)	(1.28)	(2.27)	(4.96)	(1.45)	(1.75)	(1.89)	(1.58)
Carhart four-factor α	-0.222	0.204	0.285	0.507**	-0.525	-0.05	0.188	0.730
	(-0.51)	(0.48)	(0.70)	(2.45)	(-0.49)	(-0.06)	(0.23)	(1.57)

Note: This table displays the results of four-factor regression (Carhart, 1997) for data collected before and during Covid-19. t-statistics are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Table 4B displays the average portfolio returns and Carhart four-factor alpha values across R&D intensity groups before and during the Covid-19 period. The raw return spread between high and low R&D intensity firms (H–L) is 0.968% per month, statistically significant at the 1% level. The findings indicate an R&D premium before the Covid-19 pandemic, particularly in equal-weighted portfolios. Even after using the Carhart four risk factors, the alpha remains statistically significant at 0.507%, indicating that traditional asset pricing factors do not fully account for this excess return. These results support the presence of an R&D premium - an abnormal return attributable to firms' innovation investment.

In contrast, during the Covid-19 period, although raw return differentials remain, the alpha estimates become statistically insignificant. Specifically, the alpha is 0.345% (t = 0.61) for value-weighted portfolios and 0.730% (t = 1.57) for equal-weighted portfolios. This result suggests that the R&D premium does not persist under crisis conditions, and its explanatory power weakens during periods of heightened market stress.

5. CONCLUSION

This research is the first to explore how state ownership, market strength, and the Covid-19 pandemic affect R&D premiums in Vietnam, employing various estimation techniques, including Fama and MacBeth's (1973) regression and portfolio sorting methods to analyze the final sample of 31,930 firm-month observations collected from 2010 to 2021.

The findings reveal a robust positive association between R&D intensity and stock returns. Notably, this effect is more pronounced among firms with substantial market power and state-owned enterprises (SOEs), suggesting that the presence of a competitive advantage and institutional structures both play important roles in amplifying returns on innovation. Portfolio-level analyses confirm the existence of a statistically significant R&D premium in the full sample and before the Covid-19 period. However, the premium proves sensitive to macroeconomic conditions. During the Covid-19 crisis, the alpha associated with R&D intensity became statistically insignificant, indicating that the return advantage of innovation investment tends to diminish in times of elevated uncertainty and market stress.

These empirical results carry several important implications. For corporate managers, the positive relationship between R&D intensity and stock returns highlights the strategic importance of innovation investment. Particularly, firms with substantial market power may enhance shareholder value and improve long-term performance through sustained R&D expenditure. This result aligns with the knowledge-based and competitive advantage theories, emphasizing innovation as a key driver of firm success.

From an investment perspective, the emergence of R&D intensity as a meaningful signal of firm quality is of note. Investors seeking excess returns may benefit from allocating capital toward firms with high R&D intensity, especially those operating from dominant competitive positions. However, the observed decline in the R&D premium during market crises underscores the importance of accounting for macroeconomic conditions and uncertainty in portfolio allocation strategies.

For policymakers, the finding that R&D investment in SOEs contributes positively to stock performance suggests that public enterprises, when properly incentivized, can leverage innovation effectively. This result calls for developing institutional frameworks and innovation-supporting policies - such as tax incentives or public–private R&D partnerships - that promote continuous innovation, even within the state sector. Such initiatives may foster the development of a resilient, innovation-led economy in Vietnam and comparable emerging markets.

While this study contributes to the expanding literature on the R&D puzzle in emerging economies, it also has several limitations. First, the analysis is confined to Vietnam, which may limit the generalizability of the findings. Given Vietnam's classification as a frontier market, the results may differ from those observed in more advanced or other emerging economies. Second, the dataset used in this study covers only the period up to 2021 and may not fully reflect post-pandemic recovery or recent shifts in market dynamics. We recommend that future research extend this line of inquiry through cross-country comparisons and incorporation of more recent data to generate broader, more timely, and policy-relevant insights.

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DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest to disclose.

ETHICAL STATEMENT

Ethical approval is not applicable because this article contains no studies with human or animal subjects

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Appendix A. Variable definition

RDM	Following Gu (2016) and Duong et al. (2024b), we measure R&D intensity using the ratio of a firm's research and development (R&D) expenditure in year t to its market value in the same year (RDM)
BM	Following Fama and French (1992) and Duong et al. (2024b), we calculate the book-to-market ratio for each month using the stock market's value from the previous calendar year and the corresponding book value for common stock.
LNSIZE	Following Duong et al. (2024b), we measure firm size using the market equity in June of year t, calculated as the natural logarithm of the firm's market value.
EPCM	Following Gaspar and Massa (2006), we measure market power as a firm's operating profit margin (equal to operating profit over sales) minus the industry value-weighted average operating profit margin.
ASSET	Following Li and Zhang (2010), we measure asset size as the natural logarithm of the book value of total assets recorded at the end of the previous fiscal year.
PAYOUT	We compute total dividends (including repurchases) scaled by earnings following Li and Zhang (2010).
AGE	The number of months the focal stock has appeared in the Fiinpro database at the end of the previous month. Following Hadlock and Pierce (2010), we collect firm age from financial statements.
State-Ownership	Following Cao et al. (2020), we define state ownership as a Dummy variable where SOEs are denoted as 1 and non-SOEs as 0.