Financial Experts on the Top Management Team: Do They Reduce Investment Inefficiency?

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ACKNOWLEDGEMENT

We are grateful to Andrew Stark (the Editor) and an anonymous referee for very helpful comments and suggestions. All remaining errors are ours.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are publicly available from the sources noted in the text.

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/jbfa.12575.

CONFLICT OF INTEREST STATEMENT

There is no conflict of interest to declare.

FUNDING INFORMATION

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Abstract

We examine the effect of Top Management Team (TMT) professional finance experience on firm investment efficiency. Top managers with a career background in finance help reduce deviations of investment from the level warranted by firm fundamentals. Reductions in investment inefficiencies are achieved by financial expert managers using project-specific, rather than company-wide, discount rates for project evaluation and facilitating debt and equity issuance at lower costs. Greater investment efficiency due to financial expertise of TMT improves firm performance. We demonstrate that these improvements are driven by the collective expertise of the TMT, rather than solely by chief executive officers.

Keywords: Investment Efficiency, Top Management Team, Demographic Characteristic, Financial Expert, Experience, Firm Performance

JEL Classification: G30; G32; G34; J24; M12

1 INTRODUCTION

Economists have accumulated ample evidence indicating that past experiences of top management team (TMT) members have a profound impact on corporate behaviors and policies. For example, recent research shows that TMT's individual life and career experiences have implications for financial disclosure (Bamber, Jiang, & Wang, 2010), corporate philanthropy (Luo, Xiang, & Zhu, 2017), and the quality and transparency of financial reporting (Ma, Novoselov, Zhou, & Zhou, 2019; Zhang, 2019). Yet, relatively little empirical evidence speaks to the role that TMT's functional background, and in particular, their financial experience, plays in influencing a firm's investment policy. This study fills this void by providing evidence on the impact of TMT members' financial expertise on firm investment efficiency.

Efficient allocation of capital has high priority in corporate management and is vital to corporate profitability (Cook, Romi, Sánchez, & Sánchez, 2019; Lara, Osma, & Penalva, 2016). *A priori*, managers should undertake all positive net present value (NPV) projects to enhance firm value in a perfect market. In reality, managers often face various forms of constraints when making investment decisions, such as inaccurate project appraisal or insufficient resources. Consequently, managerial inability to attenuate the constraints in investment gives rise to investment inefficiency (García-Sánchez & García-Meca, 2018). As such, financial expertise may play a crucial role in corporate policies. Notably, managers with a functional background in finance (hereafter a 'financial expert') have a deeper understanding of financial practices and tend to get easier access to finance because they can negotiate and communicate with capital market participants more effectively by 'speaking the same technical language'. As a result, their knowledge can help facilitate effective resource utilisation and capital allocation (Custódio & Metzger, 2014; Güner, Malmendier, & Tate, 2008). Drawing on the financial skills-based view by Güner et al. (2008) and Custódio and Metzger (2014), we hypothesize that top managers' financial expertise promotes more capital-efficient investments.

To test our central hypothesis, we begin with defining a financial expert as someone who had work experience in the finance industry or held a finance-related position in previous employment. Our data show that, on average, 21.2% of TMT members from U.S. public firms are financial experts during the sample period from 2003 to 2018. Notably, the proportion of financial experts on corporate TMT gradually increased from 18.3% in 2003 to 23.8% in 2018, underscoring the practical implications of our study.

Next, we empirically test the impact of financial expert managers on firms' overall investment inefficiency as well as separately on overinvestment and underinvestment inefficiencies. We find that the proportion of financial experts on the TMT is negatively associated with overall investment inefficiency, after controlling for observable determinants of investment inefficiency as well as for year and industry or firm fixed effects. Further examination reveals that the reduction in investment inefficiency driven by financial expert top managers is greater for underinvestment, relative to overinvestment, decisions both in terms of statistical and economic significance. Specifically, a one-standard-deviation increase in the proportion of financial experts on the TMT

leads to a 10% decrease in underinvestment inefficiency versus a 6% decrease in overinvestment inefficiency.

We next examine the cross-sectional variation in the effect of financial experts on investment inefficiency. We show a stronger effect of financial expert TMT members on reducing investment inefficiency in financially constrained and high-growth firms, and those in highly competitive industries, consistent with the view that managerial skills are more important in these firms (Chemmanur, Kong, Krishnan, & Yu, 2020; Chemmanur & Paeglis, 2005; White, Woidtke, Black, & Schweitzer, 2014).

We further explore the channels through which financial expert top managers reduce investment inefficiency. First, firms may fall into the trap of 'WACC fallacy' and overinvest (underinvest) in risky (safe) divisions if they adopt the company-wide discount rate - the weighted average cost of capital (WACC), in capital budgeting (Krüger, Landier, & Thesmar, 2015). We find that the 'WACC fallacy' only exists in firms with a low fraction of financial expert top managers, implying that top managers with financial experience adhere to the financial theory more closely and use project-specific discount rates to evaluate investment opportunities. Second, we find that firms with a high financial expert ratio are able to raise debt and equity at lower costs than others, and these firms' investments are less affected by external market conditions. These results confirm that financial experts facilitate efficient investments through more accurate project evaluation and less costly financing.

Crucially, using the mediation analysis by Baron and Kenny (1986) and Cook et al. (2019), we show that investment inefficiency mediates the link between financial expert top managers and firm performance. Specifically, by reducing investment inefficiency, financial expert top managers significantly improve firm performance.

To alleviate potential endogeneity concerns, we perform several additional tests. One reason for endogeneity is the reverse causality as financial expert TMT members could be more likely to join firms with already greater investment inefficiencies. We address this possibility by lagging the financial expert ratio and by using firm fixed effects in additional tests to control for time-invariant firm heterogeneity. Alternatively, firms may be hiring financial experts to accommodate changes in their opportunity sets or when they seek expertise in investment financing. We deal with this 'firm-matching' concern in several ways. First, we adopt the instrumental variable (IV) approach, using financial experts hired more than three years ago and the industry median financial expert ratio as instruments for financial expert ratio. Our main results remain unchanged using this approach. Second, using difference-in-differences (DiD) tests, we examine the impact of the turnover of financial expert managers on investment inefficiency. We show that the addition of a financial expert to the TMT reduces investment inefficiency. On the other hand, departures of financial experts do not lead to greater investment inefficiencies, suggesting that financial experts can facilitate knowledge exchange and influence the rest of the team to invest efficiently. The main results are also robust to using the Generalized Method of Moments (GMM) and the Weighted Least Squares (WLS) model, and to controlling for TMT characteristics, skills, and talent.

Importantly, we find no evidence that our results can be attributed solely to specific members of the TMT, such as a CEO with financial expertise or executives in finance-focused positions, which may be more frequent in certain types of firms. We also examine how holding a director seat at a focal firm by a TMT member affects our results. We find that financial expert executives who do not hold a director seat at a focal firm drive the reduction in investment inefficiencies, consistent with the idea that they are less busy and can spend more time making decisions. Moreover, we show that the financial expertise of TMT helps reduce investment inefficiencies beyond the effect of a powerful CEO who is also a financial expert. At the same time, the positive impact of the TMT's financial expertise is stronger when the CEO is less powerful and not a financial expert, consistent with the notion that CEO delegates financial decision-making to the TMT when they are less knowledgeable (Graham, Harvey, & Puri, 2015).

We contribute to the literature in three ways. First, although the role of TMT characteristics has been widely studied in the management literature, the business finance and accounting literature typically focuses on the association between the attributes of an individual corporate top manager (i.e., CEO, CFO) and firm policies. For instance, prior literature has studied the impact of CEO's financial experience on corporate financial policies (Custódio & Metzger, 2014), audit pricing (Kalelkar & Khan, 2016), earnings management (Gounopoulos & Pham, 2018), as well as the influence of CFO's financial expertise on accounting restatements (Aier, Comprix, Gunlock, & Lee, 2005). Several studies investigate the impact of financial experts in the boardroom on firm strategies. Güner et al. (2008) explore the effect of the financial expert directors on firm financing and investment policies, and Apergis (2019) reviews how financial experts on the board affect bank profitability and risks. Our paper contributes to this strand of literature by examining financial expertise of the entire TMT and showing that financial expert top managers work together to reduce investment inefficiency.

Second, our findings complement the literature on the determinants of investment efficiency. Prior research has established that free cash flow (Richardson, 2006), financial reporting quality (Biddle, Hilary, & Verdi, 2009), and corporate social responsibility (Benlemlih & Bitar, 2018) among other firm-specific factors, influence investment efficiency. We look beyond these firm-level characteristics and explore the role of top managers' functional background in finance. Thus, our study advances the understanding of investment efficiency determinants by highlighting the importance of TMT's past experiences.

Third, our study relates to the growing literature examining the impact of managerial experience on various corporate policies (Dittmar & Duchin, 2016; Malmendier & Tate, 2005a, 2005b; Malmendier, Tate, & Yan, 2011). By studying the importance of previous work experience in finance, even when working in roles that are not directly related to investments, we uncover an important factor in promoting efficient investment allocation.

The remainder of this study is organised as follows. Section 2 illustrates the theoretical background and develops hypotheses. Section 3 describes the data and variable construction. Section 4 presents the main empirical results. Section 5 addresses the endogeneity and robustness of the results. Section 6 provides additional analyses, and the last section concludes.

2 THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Theoretical Framework

Our study grounds its theoretical framework in the upper echelons theory, which contends that TMT members' functional backgrounds, experiences, and cognitive-oriented values exert significant influence on business decisions (Hambrick, 2007; Hambrick & Mason, 1984). This theory posits that corporate outcomes are affected by executives' interactions, which promote information and knowledge sharing in the workplace, thus producing positive spillover effects throughout the organization (Ridge & Ingram, 2017). Specifically, knowledge transfer and integration within the TMT influences middle managers and ultimately shapes project implementation and operations within the entire organization (Ou et al., 2014).

We also draw on the concept of the dominant coalition (Cyert & March, 1963) that shifts focus in leadership development from the CEO towards the entire top executive suite. It asserts that the entire management team is vested with the responsibility to manage firm operations (Finkelstein & Hambrick, 1990; Hambrick, Cho, & Chen, 1996; Hambrick & Mason, 1984; Murray, 1989; Ridge & Ingram, 2017). Moreover, top executives have the ear of the CEO, who often uses other managers' views to explain her own decisions (Carpenter & Weikel, 2011). Hence, TMT is considered a unique and powerful player in the corporate decision-making process, establishing our focus on the entire team, rather than only on the CEO.

Literature in psychology, management, and business finance demonstrates that experiences and skills acquired during past employment have a long-lasting impact on an individual's behaviour, in turn affecting the behaviour of their peers (Law & Mills, 2017; Ma et al., 2019). Specifically, prior research argues that CEOs with functional backgrounds are more effective in handling problems within their expertise. CEOs with career experience in business operations are better at addressing supply chain issues (Koyuncu, Firfiray, Claes, & Hamori, 2010). Managers with research backgrounds often invest heavily in R&D (Barker & Mueller, 2002), while CEOs with marketing expertise are more successful in managing marketing policies (Boyd, Chandy, & Cunha Jr, 2010). As a result, past experiences and expertise that spill over throughout the TMT across the members with diverse skillset may ultimately influence the functioning of the entire team (Hambrick, 2007; Hambrick & Mason, 1984). Given that professional experience is a crucial factor that determines the outcomes of the decisions at the upper echelon, we focus on one of its aspects, namely, financial experience.

2.2 Financial Experience and Investment Efficiency

Similar to the various types of professional employment documented in extant studies, such as academia (Ma et al., 2019; White et al., 2014), marketing, sales, operations, and research and development function (Chemmanur & Paeglis, 2005), engineering and legal function (Barker & Mueller, 2002), and military service (Benmelech & Frydman, 2015; Law & Mills, 2017), financial experts have unique characteristics that may shape corporate strategies and practices. A number of empirical studies note that firms with a greater level of financial expertise possess higher investment and management capacity and can implement organizational strategies more effectively, thus improving corporate policies. For example, Hellmann and Puri (2002) find that start-up firms may

benefit from the financial expertise of venture capitalists because these financially sophisticated experts significantly contribute to the professionalization of these firms by introducing stock option plans, establishing human resource policies, and appointing a vice president (VP) of sales and marketing. Jelic, Zhou, and Wright (2019) demonstrate that executive directors with previous work experience in finance perform better in financial monitoring and cost-cutting, thereby enhancing a firm's profitability. Custódio and Metzger (2014) provide evidence that CEOs with professional finance experience are more financially sophisticated and manage investments more actively.

Accounting failures of the last two decades and the 2008 financial crisis further underscored the importance of financial expertise in corporate decision-making (Cao & Narayanamoorthy, 2014; Kalelkar & Khan, 2016).[1] Unsurprisingly, recent studies report an upward trend in the appointments of CEOs with financial experience (Custódio & Metzger, 2014; Kalelkar & Khan, 2016). However, CEOs delegate financial decisions and share decision-making with the rest of the TMT (Graham et al., 2015). Hence, financial expertise of all top managers, and not that of the CEO only, should matter for corporate policies. Motivated by this strand of literature, we argue that financial experts help the management team perform accurate investment appraisals, provide financial knowledge and practical skills, offer new perspectives, and contribute to top management strategy development, thereby making corporate investment more efficient. Thus, our main hypothesis is:

H1: Financial expert TMT members reduce firm investment inefficiency.

Firms may invest inefficiently because of a mismatch between financial resources and investment opportunities. For example, firms may forego positive NPV projects due to insufficient financing resources. Hence, the beneficial effect of financial expert managers is expected to be more pronounced in firms with poor access to finance, which leads us to our next hypothesis:

H2A*:* The reduction in investment inefficiency facilitated by financial expert TMT members is stronger in financially constrained firms.

Prior research demonstrates that management quality and skills are more important for growing firms and firms in highly competitive industries (Chemmanur et al., 2020; Chemmanur, Kong, Krishnan, & Yu, 2019; Chemmanur & Paeglis, 2005; White et al., 2014). As demands for more efficient capital allocation increase in the market's expectations of growth and competitive pressures, the skills of financial expert managers may be more valuable in such firms. Hence our next hypotheses are:

H2B: The reduction in investment inefficiency facilitated by financial expert TMT members is stronger in high growth firms.

H2C*:* The reduction in investment inefficiency facilitated by financial expert TMT members is stronger in firms operating in competitive industries.

[1] An article from the New York Times (see https://www.nytimes.com/2006/01/30/opinion/enron-happens.html for details) notes that some of the notorious accounting scandals could have been prevented if financial expert CEOs were hired.

3 DATA AND VARIABLE CONSTRUCTION

3.1 Sample Selection

Our initial sample consists of all U.S. firms in COMPUSTAT during 2003–2018. We focus on this period to avoid the potential shareholder's change of attitude towards financial experts after the passage of Sarbanes–Oxley Act (SOX) in 2002. Although SOX only mandatorily requires listed firms to appoint at least one financial expert on their audit committees, it may also increase shareholder's demand for financial experts on the TMT.

We obtain financial, accounting, and stock market variables from the *COMPUSTAT* and *CRSP*. We identify TMT member's professional financial experience from their employment history in BoardEx. After excluding firms in the financial industry (SIC 6000–6900) and utilities (SIC 4900–4999), our final sample consists of 30,142 firm-year observations, corresponding to 4,412 unique U.S. firms.

3.2 Investment Inefficiency

We estimate investment inefficiency following Richardson (2006). We begin with computing firm total investment (I_total) as the sum of research and development expenditure (R&D), capital expenditure (CAPEX), and acquisition expenditure (Acquisition) minus sale of property, plant, and equipment (SPPE), all scaled by the book value of total assets (Firm Size) in the prior year:

$$I\_total_{i,t} = \frac{R\&D_{i,t} + CAPEX_{i,t} + Acquisition_{i,t} - SPPE_{i,t}}{Firm\ Size_{i,t-1}} \quad (1)$$

We then obtain the value of the investment after meeting maintenance needs (I_new) by subtracting maintenance investment (I_maintence), proxied by the depreciation and amortization scaled by the previous period book value of total assets, from the total investment:

$$I\_new_{i,t} = I\_total_{i,t} - I\_maintence_{i,t} \quad (2)$$

Next, we estimate an overall firm investment inefficiency (*Inefficiency*) as the absolute value of the residual ($\varepsilon_{i,t}$) from the following model:

$$\begin{aligned} I\_New_{i,t} = {} & \beta_0 + \beta_1 Tobin\ Q_{i,t-1} + \beta_2 Leverage_{i,t-1} + \beta_3 Cash\ Holding_{i,t-1} \\ & + \beta_4 Firm\ Age_{i,t-1} + \beta_5 Firm\ Size_{i,t-1} + \beta_6 Stock\ Return_{i,t-1} \\ & + \beta_7 I\_New_{i,t-1} + Year\ Dummy_t + Industry\ Dummy_j + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where Tobin Q is the ratio of the market value of assets divided by the book value of total assets. Leverage is the sum of the book value of short- and long-term debt scaled by the book value of total assets. Cash Holding is the ratio of cash and short-term investment to book value of total assets. Firm Age is the natural logarithm of one plus the number of years since the firm was listed in *CRSP*. Firm Size is the natural logarithm of total assets. Stock Return is the annual stock return. We define industry using the first two digits of the SIC code.

Additionally, we define the positive residuals as a measure of overinvestment inefficiency (*Overinvestment*), and the absolute value of negative residuals as a measure of underinvestment inefficiency (*Underinvestment*). Higher values of *Inefficiency* indicate more severe investment

inefficiencies. Likewise, higher values of *Overinvestment* (*Underinvestment*) correspond to more severe overinvestment (underinvestment) problems.

3.3 Top Management Team (TMT)

We collect executives' biographical information and employment history from *BoardEx* and use them to construct two common proxies for TMT. Our first proxy for the TMT is broader and includes executives with the titles of VP or higher, such as Chairman, CEO and other Chief Officers, President and VP (Beckman, 2006; Ridge & Ingram, 2017; Tihanyi, Ellstrand, Daily, & Dalton, 2000).[2] Our second proxy for TMT is narrower and only includes Chairman, CEO, President, Chief Operating Officer, and Chief Financial Officer (Geletkanycz & Hambrick, 1997; Murray, 1989; Sanders & Carpenter, 1998; Tihanyi et al., 2000).

3.4 Financial Experts

Our definition of a financial expert follows Custódio and Metzger (2014) and Kalelkar and Khan (2016) and is based on executives' employment history rather than on their educational background. This choice is motivated by the recent research showing that experience can lead individuals to stray from the expected utility theory and base their decisions on the realized past outcomes, rather than on the entire distribution of possible outcomes (Hertwig, 2012; Hertwig, Barron, Weber, & Erev, 2004; Hertwig & Erev, 2009). Specifically, we define financial experts as those who have experience in the finance industry (SIC 60, 61, and 62), as well as those who served in broadly defined finance-related roles, including accountant, auditor, broker, CFO, treasurer, financial controller, and VP of finance, to name a few.[3]

3.5 Firm-Level Controls

In our regression analysis, we control for a wide range of factors known to affect investment inefficiency (Benlemlih & Bitar, 2018; Chen, Hope, Li, & Wang, 2011; Chen, Li, & Zou, 2016; Liu & Mauer, 2011; Richardson, 2006). Specifically, we control for firm size (*Firm Size*), investment opportunities (Tobin Q), leverage (Leverage), cash holdings (Cash Holding), firm age (*Firm Age*), stock returns (*Stock Return*), asset tangibility (Tangibility), the standard deviation of ROA (ROA Volatility) and that of cash holdings (Cash Holding Volatility), and a loss indicator (Loss). In the investment inefficiency regressions, we expect a positive sign of the coefficient on Tobin Q, Cash Holding Volatility, ROA Volatility, and Cash Holding, while we do not form a prediction on the sign of the

[2] The role name of chief officers varies by firms, including Chief Business Officer, Chief Compliance Officer, Chief Marketing Officer, Chief Technical Officer, and among others. Hence, we run a keyword search and include the role name with 'Chief … Officer' in our broader classification of TMT.

[3] Custódio and Metzger (2014) define finance-related roles as Accountant, CFO, Treasurer, VP of Finance or employee from top-tier auditing firms. However, finance-related roles may also include Director of Finance, Financial Controller, Credit Officer, Tax Officer, Investment Officer, etc. In order to capture a more comprehensive definition of the finance-related role, we run a keyword search in director role name and full-text description from *BoardEx* to identify financial experts. These keywords include 'Accountant', 'Accounting', 'Auditing', 'Auditor', 'Bank', 'Banker', 'Banking', 'Broker', 'Brokerage', 'CFO', 'Chief Financial Officer', 'Credit', 'Controller', 'Finance', 'Financial', 'Financing', 'Investment', 'Loan', 'Securities', 'Tax', 'Treasurer', and 'Treasury'.

coefficient on Leverage, *Firm Size*, *Firm Age*, *and Stock Return.* Additionally, we expect Tangibility to be positively (negatively) related to Overinvestment (Underinvestment), and Loss to be positively (negatively) related to Underinvestment (Overinvestment). In the robustness analyses, we additionally control for governance characteristics, such as the percentage of independent directors, board size, CEO duality, and E-Index. Table A.1 provides detailed definitions of all analysis variables.

4 EMPIRICAL RESULTS

4.1 Descriptive Statistics

Panel A of Table 1 presents descriptive statistics. We winsorize all continuous variables at the 1st and 99th percentiles of their respective distribution. The mean value of the overall investment inefficiency (*Inefficiency*) is 0.074, while the mean *Overinvestment* and *Underinvestment* are 0.087 and 0.065, respectively. Interpreted for an average-sized firm, these statistics imply that approximately 279 (208) million dollars are overspent (underspent) annually, that is, invested inefficiently.[4] Based on mean *FinExp Ratio* and *FinExp Ratio ExCEO*, 21.2% of the TMT members are financial experts or 19.5% if the CEO is excluded from the TMT. When both the CEO and managers holding finance-related positions are excluded from the TMT, 7.9% of the remaining TMT members are finance experts, on average.[5] Statistics for other analysis variables are largely comparable to prior research (Benlemlih & Bitar, 2018; Chen, Sun, Tang, & Wu, 2011; Richardson, 2006).

[Insert Table 1 around here]

Panel B of Table 1 presents the annual distribution of financial expert ratio during the sample period and shows that the proportion of financial experts on the TMT increased from 18.3% in 2003 to 23.8% in 2018, consistent with Kalelkar and Khan (2016).[6]

4.2 Do Financial Expert TMT Members Affect Investment Efficiency?

We use the following model to test our central hypothesis that TMT members with financial experience reduce investment inefficiency:

[4] The average book value of total assets in our sample is $3,207 million. Thus, approximately $279 (=$3,207 × 0.087) million is overinvested and $208 (=$3,207 × 0.065) million is underinvested.

[5] Most financial expert top managers that are not a CEO or do not hold finance-related position have titles of 'Vice President' or 'Senior Vice President'. According to the description of these titles in BoardEx, these VPs act as 'Advisor', 'General Manager', or have responsibilities in areas such as 'Business Development', 'Marketing', 'Operation', which are not directly related to finance. Other non-finance positions frequently occupied by managers with financial experience are COO, (Vice) Chairman, HR, and CIO.

[6] From unreported cross-industry statistics, we find that financial expert top managers are not concentrated in particular industries. We also check the correlation between the key analysis variables in Table IA.1 in the Internet Appendix and show a significantly negative, albeit small in magnitude, correlation between investment inefficiency proxies and the fraction of financial experts on the TMT.

$$Inefficiencies_{i,t} = \beta_0 + \beta_1 FinExp\ Ratio_{i,t-1} + \theta X_{i,t-1} + Year\ Dummy_t + Industry\ Dummy_j + \varepsilon_{i,t} \quad (4)$$

where Inefficiencies is one of the investment inefficiency proxies (*Inefficiency*, *Overinvestment*, and *Underinvestment*); FinExp Ratio is the ratio of financial experts on the firm's TMT; X represents a set of control variables described in Section 3.5; i, *j*, and t, are firm, industry, and year subscripts, respectively. In all regressions, the standard errors are clustered at the firm level to account for possible within-firm serial correlation.[7] Our first hypothesis predicts a negative and statistically significant coefficient on *FinExp Ratio* ($\beta_1 < 0$).

Table 2 presents the main results. For each investment inefficiency proxy, we perform regressions controlling for key firm characteristics as in Richardson (2006) (columns (1), (3), and (5)) as well as for an extended set of firm characteristics (columns (2), (4), and (6)).[8] *FinExp Ratio* attracts a significantly negative coefficient in all regressions, supporting our hypothesis of a negative relationship between TMT members' financial experience and firm investment inefficiency. The results are also economically meaningful. For example, a coefficient of -0.046 in column (1) suggests that, all else being equal, a one-standard-deviation increase in the ratio of financial expert TMT members (*FinExp Ratio*) translates into approximately 0.65-percentage point decrease in inefficient investment (*Inefficiency*). Given an average value of 0.074 for *Inefficiency*, this change represents an 8.76% reduction in the overall investment inefficiency, representing a reduction of $21 million in inefficient spending for an average-sized firm.[9]

Splitting investment inefficiency into over- and underinvestment shows that financial experts on the TMT are instrumental in reducing both types of inefficiency. Specifically, coefficients of -0.037 and -0.05 in columns (3) and (5) indicate that a one-standard-deviation increase in *FinExp Ratio* decreases overinvestment and underinvestment by 0.5 and 0.7 percentage points, respectively, corresponding to a drop in overspending by $17 million and in underinvestment by $23 million.

[Insert Table 2 around here]

[7] Results are qualitatively similar when industry fixed effects are replaced with firm fixed effects as shown in Table IA.2 in the Internet Appendix. Results are also unchanged when using a contemporaneous financial expert ratio instead of a lagged one (untabulated).

[8] We later extend a set of controls to include firm governance characteristics constructed using BoardEx and RiskMetrics databases and show that our main conclusions remain the same. We relegate these tests to the Internet Appendix (Table IA.3) as the inclusion of these additional controls significantly reduces the sample size.

[9] This number is calculated as −0.046×0.141=−0.006486 or −0.65%, based on the standard deviation of 0.141 for *FinExp Ratio* reported in Panel A of Table 1. The percentage change in investment inefficiency is calculated as -0.006486/0.074 = 8.76%. For firms with an average book value of total assets ($3,207 million) in our sample, the amount inefficiently invested is $3,207×0.074=$237.318 million. Thus, a 8.76% reduction represents approximately $21 (= $237.318×8.76%) million.

The coefficients on control variables are in line with prior studies. Investment inefficiencies are greater in smaller firms and those with higher growth opportunities, leverage, cash holdings, tangibility, and volatility of ROA and cash holdings. Firms experiencing losses tend to underinvest in the following year, but are less likely to overinvestment.

Overall, the findings in Table 2 underscore the importance of the financial expertise on the entire TMT in reducing investment inefficiencies, both in over- and underinvestment, and thus, are broadly consistent with Custódio and Metzger (2014), who focus only on the CEOs' career backgrounds. Perhaps unsurprisingly, they differ from the findings by Güner et al. (2008) who show that directors with banking experience use their financial expertise and connections to promote investment opportunities that may not be in the shareholders' interests. Unlike outside directors with links to lenders, top managers are insiders, and hence are more likely to act in the interests of their current employer.

4.3 Cross-Sectional Effects of TMT's Financial Expertise on Investment Inefficiency

To test hypotheses 2A-2C that financial expertise of TMT members is more significant in firms with greater financial constraints, growth opportunities, and competitive pressures, we perform the following model:

$$Inefficiency_{i,t} = \beta_0 + \beta_1 FinExp\ Ratio_{i,t-1} + \beta_2 FinExp\ Ratio_{i,t-1} \times Heterogeneity_{i,t-1} + \beta_3 Heterogeneity_{i,t-1} + \theta X_{i,t-1} + Year\ Dummy_t + Industry\ Dummy_j + \varepsilon_{i,t} \quad (5)$$

where *Heterogeneity* is an indicator variable for financially constrained firms, or high growth firms, or firms operating in competitive industries. Specifically, we define *High Growth* equal to one if the firm's Tobin's Q lies in the top tercile of the sample distribution, and zero otherwise; *Constrained* equals one if the firm's Kaplan-Zingales (KZ) index lies in the top tercile of the sample distribution, and zero otherwise; *High Compete* equals one if a firm operates in an industry that belongs to the bottom tercile of Herfindahl-Hirschman index (HHI), and zero otherwise. Table A.1 in the Appendix provides further details on the construction of these variables. H2A-2C predict a negative and significant coefficient on all *Heterogeneity* proxies ($\beta_2 < 0$).

Table 3 reports the results. The coefficient estimates on the interaction of *FinExp Ratio* and *Constrained* in columns (1) – (3) are negative, although significant only in the overall inefficiency and underinvestment regressions. Thus, more financially constrained firms reap greater benefits from the presence of financial expert managers who facilitate further reductions in underinvestment. Specifically, a one-standard deviation increase in financial expert ratio reduces underinvestment in financially constrained firms by additional 4.3% from the average underinvestment level (0.02×0.141/0.065).

[Insert Table 3 around here]

Similarly, in columns (4)-(6) and (7)-(9), the interaction terms of *FinExp Ratio* with *High Growth* and *High Compete*, respectively, attract significantly negative coefficients in the total

investment inefficiency and underinvestment regressions. A one-standard deviation increase in financial expert ratio reduces underinvestment in high-growth firms and in those operating in a more competitive environment by additional 6% from the average underinvestment level (0.027×0.141/0.065), hence approximately doubling the effect of TMT's financial expertise. It is perhaps unsurprising that we do not find a more significant impact of financial expert managers on overinvestment in high-growth, financially constrained and more competitive firms, as it is underinvestment, rather than overinvestment, that poses a serious problem in these firms (Abdoh & Liu, 2021; Gay & Nam, 1998; Myers, 1977). Overall, this evidence supports hypotheses 2A-2C that having more financial experts on TMT is especially valuable for firms who suffer from greater investment inefficiencies.

4.4 How Do Financial Expert TMT Members Facilitate Efficient Investments?

In this section, we explore possible channels through which financial expert managers reduce investment inefficiency by studying their role in the choice of a discount rate adopted in investment appraisal and their influence on investments under tight market conditions.

4.4.1 Do Financial Expert TMT Members Enable More Accurate Project Appraisal?

Graham et al. (2015) show that the NPV method is the primary choice in firm's capital allocation decision. The textbook theory on capital budgeting instructs to use the project-specific discount rate rather than the company-wide discount rate (i.e., WACC). Otherwise, firms may fall into the trap of the 'WACC fallacy' by overinvesting (underinvesting) in divisions with a higher (lower) market beta and, correspondingly, higher (lower) required rate of return relative to the firm's core division (Krüger et al., 2015). In reality, firms' investment appraisal practices are not always consistent with financial theory, and many firms incorrectly use the company-wide discount rate to evaluate investment opportunities (Graham & Harvey, 2001). Custódio and Metzger (2014) show that because financial experts adhere to financial theory more closely, the 'WACC fallacy' only exists when the CEO is not a financial expert. However, most CEOs share investment decisions with the rest of the TMT or delegate decision-making entirely (Graham et al., 2015). Hence, more financially sophisticated top managers, who are likely to be key decision-makers on financial and investment policies, may guide the firm towards using more appropriate discount rates in investment appraisals, thus promoting more efficient investments.

To test this conjecture, we follow Custódio and Metzger (2014) and Krüger et al. (2015) and examine the capital expenditure of firms' non-core divisions. Table 4 reports the results. The dependent variable is the non-core division-level capital expenditure scaled by division-level total assets (*Non-Core Division CAPEX*) obtained from COMPUSTAT *Business Segment* Database.[10] Column (1) replicates the results from Krüger et al. (2015) and shows that the capital expenditure of non-core divisions is positively associated with the spread between the non-core division's beta and core

[10] We combine a firm's segments operating in the same Fama-French 48 industry into a division. A division with the largest sales is defined as the core one, and all other divisions are non-core.

division's beta (*Delta Beta*), thereby confirming that firms tend to overinvest into high-risk divisions likely because they use a lower company-wide, rather than division-specific, discount rate for investment selection.[11]

Next, we assign firms with *FinExp Ratio* in the top quartile of the sample distribution to *High FinExp Subsample*, and the remaining firms are assigned to *Other Firms Subsample*. Consistent with expectations, the coefficient on Delta Beta is statistically insignificant for *High FinExp Subsample* in column (2), indicating that the 'WACC fallacy' is not an issue for firms with a high level of financial expertise on the executive team. However, it is a concern for firms with a lower fraction of financial expert managers, as suggested by a significantly positive coefficient on Delta Beta in column (3). These results reveal one way in which financial expert managers reduce investment inefficiency, namely by adhering more closely to basic financial knowledge and using correct discount rates in capital budgeting.

[Insert Table 4 around here]

4.4.2 Do Financial Expert TMT Members Facilitate Raising External Capital?

We next examine whether financial expertise on the TMT facilitates raising external financing in tight market conditions. To this end, we regress firms' debt and equity issuance as well as the costs of debt and equity on the proxies of overall market conditions and a set of controls, separately for firms with a high and low financial expert ratio. We measure *Debt Issuance* as long-term debt issued less long-term debt retired during the fiscal year plus changes in the current debt, scaled by sales in the previous year. *Equity Issuance* is defined as the difference between the sale and the purchase of common and preferred stock, scaled by sales in the previous year. We proxy the cost of debt (*Cost of Debt*) by interest expenses divided by the sum of the book values of short-term and long-term debt. We estimate the cost of firm's equity (*Cost of Equity*) from the CAPM model using CRSP value-weighted index and 1-month T-bill rate as proxies for market portfolio and the risk-free rate, respectively.[12] The beta is estimated from the regression of daily stock returns on the market proxy over the fiscal year. As a shock to credit conditions, we use the default spread (Default Spread) between the average yield on Moody's corporate bond ratings Aaa and Baa. As a shock to equity markets, we use the average of individual stock illiquidity across all stocks in a given year (Illiquidity), where individual stock illiquidity is calculated following Karolyi, Lee, and Van Dijk (2012) as the natural logarithm of absolute price change per dollar of the trading volume plus one. Table A.1 in the Appendix provides more details on the construction of these variables.

[11] Industry-level asset beta are taken from Table IA.II of Krüger et al. (2015). They compute industry-level asset betas as the coefficient in the 60-month rolling regression of monthly returns of value-weighted Fama-French 48 industry portfolios on the CRSP value-weighted index.

[12] The risk-free rates are from Kenneth R. French Data Library

(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Panel A of Table 5 reports the results. For brevity, we only report the coefficient estimates on the proxies for external market conditions.[13] The coefficient on *Default Spread* in *Debt Issuance* regressions (row 1) is insignificantly different from zero for firms with high financial expert ratio, while it is significantly negative for other firms, suggesting that the latter group tends to reduce debt issuance in the unfavourable credit conditions. However, the difference in the coefficients between the two groups is statistically insignificant. More importantly, *Default Spread* in the *Cost of Debt* regressions (row 2) attracts an insignificant coefficient in the subsample of firms with a high financial expert ratio, but a significantly positive coefficient in the subsample of other firms. The difference between the two groups is statistically significant ($p<0.1$). These findings indicate that, even though financial expert managers do not necessarily facilitate raising more debt when external credit conditions are tight, they ensure no significant increases in the cost of debt. In contrast, firms with a lower financial expert ratio experience significant increases in the cost of debt during unfavourable market conditions, which also explains the observed cuts in their debt issuance.

[Insert Table 5 around here]

Rows 3 and 4 of Panel A show that all firms experience significant reductions in equity issuance and increases in the cost of equity in tight equity markets. However, the cost of equity for firms with a high financial expert ratio increases significantly less relative to the rest of the firms, as suggested by a significantly lower coefficient for the high financial expert group in row 4 ($p<0.000$). Taken together, these results suggest that when external market conditions deteriorate, financial expert managers are instrumental in facilitating debt and equity issuance at lower costs.

The previous analysis raises the question of whether lower costs of equity and debt in firms with a high financial expert ratio, relative to other firms following the shocks to external capital markets, translate into positive effects on capital investment. We examine this question in Panel B of Table 5, which shows the results of the regressions of capital expenditures (*CAPEX*), research and development expenses (*R&D*), and acquisition expense (*Acquisition*) on shocks to debt and equity markets (*Default Spread* and *Illiquidity*) separately for firms with and without a high financial expert ratio.

We find that during tight market conditions firms with a high financial expert ratio do not cut their capital expenditures, while the other firms significantly decrease them, as suggested by the coefficients on *Default Spread* and *Illiquidity* in rows 1 and 2 of Panel B, even though the differences are not statistically significant across the two groups. At the same time, both groups of firms significantly reduce their investment in R&D following the market shocks; however, for firms with a high fraction of financial experts on TMT this reduction is only half the size of that for the remaining firms ($p<0.05$ and $p<0.1$ in rows 3 and 4). Finally, firms with a high financial expert ratio do not change their acquisition spending during the tight market conditions, while the remaining firms significantly reduce this type of investment ($p<0.001$ and $p <0.05$ in rows 5 and 6).

[13] Full regression results corresponding to Table 5 are presented in Tables IA.4 and IA.5 in the Internet Appendix.

Overall, the evidence in Table 5 suggests that financial expert managers facilitate access to finance in difficult market conditions, thus ensuring that their firms' investments are less likely to be affected by market uncertainty.

4.5 Does Efficient Investment Due to Financial Experts on TMT Improve Firm Performance?

Prior studies document that higher investment efficiency improves firm performance (Lara et al., 2016). Our evidence that top managers with a functional background in finance facilitates efficient investment suggests that firms with more financial experts on TMT should also perform better. We test this conjecture by examining the mediating effect of investment inefficiency on the relationship between financial expert top managers and firm performance. Specifically, we expect financial expert TMT members to reduce investment inefficiency, which, in turn, should boost firm performance.

Figure 1 illustrates the intuition behind the mediation analysis. The ratio of financial expert top managers is the treatment variable, while investment inefficiency is the mediator, and firm performance is the examined outcome variable. Path A corresponds to the effect of the treatment (financial expert top managers) on the mediator (investment inefficiency) while Paths B and C demonstrate the effect of, respectively, the mediator and the treatment on firm performance. Finally, path ABC represents the total effect of financial expert top managers on firm performance, thus incorporating both direct and indirect effects.

[Insert Figure 1 around here]

We follow Baron and Kenny (1986) and Cook et al. (2019) in performing the mediation analysis and present the results in Table 6. We use two forward-looking industry-adjusted firm performance proxies, *ROA* (return on assets) and *Total Factor Productivity,* computed as the average of three-year ahead performance proxies. Return on assets is earnings before interest, taxes, depreciation, and amortization, scaled by the book value of total assets. A firm's total factor productivity (TFP) is estimated following Field and Mkrtchyan (2017) as the residual in the regression of sales on the number of employees, fixed assets, cost of materials, industry and year effects. The industry adjustment is performed by subtracting the industry median in a given fiscal year from a firm-specific variable.

[Insert Table 6 around here]

Panel A of Table 6 presents the mediation analysis using *ROA* as a performance proxy. Column (1) examines Path A relationship and shows that the treatment (*FinExp Ratio*) is significantly and negatively related to the mediator (*Inefficiency*), consistent with our main results. Column (2) examines Paths B and C by regressing *ROA* on both the treatment and the mediator. The coefficient estimates on *FinExp Ratio* and *Inefficiency* capture their direct effects on *ROA*. After taking the direct effect of *Inefficiency* on firm performance into account, *FinExp Ratio* is positively and significantly related to the average three-year forward industry-adjusted ROA, confirming that a higher proportion of financial experts on the TMT is associated with better firm performance. Using

Baron and Kenny (1986) approach to evaluate the mediation effect, we estimate that the total effect of financial expert top managers on ROA is 0.137 and their mediating effect (i.e., indirect effect that operates through investment inefficiency) is a statistically significant 0.107 (p-value<0.000), thus accounting for a large part (78%) of the overall improvement in *ROA*.

The results in Panel B of Table 6 use *Total Factor Productivity* as a performance proxy and are consistent with Panel A. 92.21% of the total effect of financial expert managers on TFP operates indirectly, through the impact on investment inefficiency. The remaining direct effect of financial expert managers on TFP is small in magnitude and insignificant (0.006). Panels A and B of Figure 2 illustrate the results of the mediation analysis using, respectively, *ROA* and *Total Factor Productivity* as performance proxies. Overall, this evidence confirms that an increase in investment efficiency driven by financially sophisticated top managers leads to sizable improvements in future firm performance.

[Insert Figure 2 around here]

5 ROBUSTNESS TESTS

5.1 TMT-Firm Matching

A potential concern in our analysis is that the proportion of financial experts on the TMT may be endogenously determined because financial expert top managers are not randomly assigned into a TMT but are carefully selected by the firm. Alternatively, financial experts may self-select into specific types of firms. Hence, TMT-firm matching could be taking place.

This concern may not be serious given that, even if a manager is appointed for the purpose of implementing a specific investment, they will undoubtedly get involved in managing other corporate investments and policies (Güner et al., 2008). For instance, managers hired for their expertise in managing treasury may also be involved in capital expenditure projects, for which they were not specifically selected. Hence, although there could be some matching between recently appointed TMTs and the firm with respect to some of the firm's policies, it is unlikely to impact all firm's policies. Nonetheless, we address this issue using two different approaches: instrumental variables (IV) approach and difference-in-difference tests exploiting exogenous managers' turnover events.

5.1.1 Instrumental Variable (IV) Approach

We begin our IV approach with identifying valid instruments, which should be highly associated with the financial expert ratio but unrelated to firm-level investment inefficiency. Our first instrument is the ratio of financial experts on the TMT appointed more than three years ago (*FinExp_Over3years*). The rationale for this instrument is suggested by Custódio and Metzger (2013) and Harford and Schonlau (2013) who argue that skills and experiences of recently hired managers obtained from previous employment matter more for the current firm's policies. Thus, managers who were hired a long time ago cannot be endogenously selected to match the firm's new investment opportunities.

Our second instrument is the industry median financial expert ratio (*FinExp Ind*), where industry is defined as 2-digit SIC codes. Given a similar structure of the TMT within an industry, this industry-level ratio is likely to be directly related to the firm-level financial expert ratio. However, it is unlikely that the industry-level financial expert ratio will directly affect a given firm's investment inefficiency.

Table 7 reports the results of IV regressions. In the first stage of the IV approach, we regress a firm's financial expert ratio on the two instrumental variables and the same set of controls as in equation (4). Panel A presents the results for the full-sample regression using overall investment inefficiency as a dependent variable, while Panels B and C report the results of the regressions performed on the subsamples used in overinvestment and underinvestment regressions, respectively. The two instrumental variables (*FinExp Tenure* and *FinExp Ind*) attract significantly positive coefficients in all first-stage regressions (first column of each panel), and importantly, appear to be relevant and exogenous (Cragan and Donald weak identification test p-value<0.000 and Sargan-overidentification test=0.325).

[Insert Table 7 around here]

In the second-stage regressions (second column of each panel), we regress one of the proxies for investment inefficiency (*Inefficiency*, *Overinvestment*, and *Underinvestment*) on the fitted value of *FinExp Ratio* from the first stage,. The coefficient estimates on *FinExp Ratio* are significantly negative and are similar in magnitude to our baseline results from Table 2. This evidence is reassuring as it suggests that our results are not biased due to potential TMT-firm matching.

5.1.2 Turnover of Financial Expert Top Managers

To further address the potential concern of the endogenous TMT-Firm matching, we examine the effect of the change in the number of financial expert managers on investment inefficiencies. In Panel A of Table 8, we compare investment inefficiencies for firm-years that have new appointments of financial expert top managers with firm-years that have no change in the number of financial experts on TMT. We define *Increase* as an indicator variable equal to one if the number of financial experts on the TMT this year is greater than that in the previous year, and zero otherwise. Significantly negative coefficient estimates on *Increase* in columns (1) and (3) of Table 8 indicate that the increase in the number of financial experts on TMT leads to significant reductions in firm's overall investment inefficiency, in particular by lowering underinvestment, but it has an insignificant impact on overinvestment (column (2)).

[Insert Table 8 around here]

In Panel B, we investigate the impact of departures of financial expert top managers on investment inefficiencies using a sample that consists of firm-years with a decrease in the number of financial expert managers and firm-years with no change in the number of financial expert managers. *Decrease* is an indicator variable set to one if at least one financial expert manager left the TMT, and zero otherwise. Consistent with Panel A, these results suggest that departures of

financial experts from the TMT increase overall investment inefficiency and underinvestment, lending further support to our main findings.

However, the tests in Table 8 do not consider how many new appointments or departures of financial expert managers a company experiences in a given year. We expect that the effect on investment inefficiency will be increasing in the number of financial expert managers joining or leaving the firm. To verify this conjecture, we repeat the analysis from Panel A (B) of Table 7 by comparing firm-years with no change in the number of financial expert managers to one of the six subsamples, defined as firm-years with new appointments (departures) of one, no more than two, no more than three and so on, and up to six financial expert managers.[14] Panel A (B) of Figure 3 plots the coefficient estimates on *Increase* (*Decrease*) for each of the six subsamples. The absolute value of the coefficient estimates increases almost monotonously with the number of changes in financial experts on TMT, suggesting that the reduction (increase) in investment inefficiency is greater when more financial experts join (leave) the TMT, consistent with our expectations.

[Insert Figure 3 around here]

The limitation of the above analysis is that it focuses only on the change in the number of financial expert managers in the current year and ignores any changes that could have been taking place around this year, therefore potentially distorting the results. To address this concern, we perform DiD tests that provide a cleaner setting to test the impact of the changes in the number of financial expert managers on investment inefficiency. We define the pre-period as three years prior to the measurement of the change in the number of financial expert managers, and post-period (*Post*) is the following three years, starting with the year in which we measure the change (year *t*). We use three different definitions of treated firms. First, we define treated firms as those that appoint at least one additional financial expert manager in the current year, but do not experience any change in the number of financial expert managers over the previous three years.[15] Second, we further narrow down the definition of treated firms by purging firms that experience any decrease in the number of financial expert managers over the two years following an increase in year *t*. Third, we use a definition analogous to the first one, but where treated firms have at least one departure, instead of a hire, of a financial expert manager in year *t*.[16]

Table 9 reports the results of regressing investment inefficiency proxies on the *Treated×Post*, *Treated* indicator, a set of controls, and industry and year fixed effects. We expect the DiD

[14] The maximum number of financial experts that join or leave the TMT in a given fiscal year is 6.

[15] This restriction yields 1,401 unique treated firms corresponding to 6,112 firm-year treated observations and 651 unique control firms corresponding to 4,184 firm-year control observations.

[16] For the third definition of treated firms, we are able to identify 1,376 treated firm-year observations. However, the sample size becomes too small to perform a meaningful DiD analysis when we impose further restrictions on the DiD setting, such as no increase in the number of financial expert top managers in the two-year period following their decrease in year *t*. That is why, unlike for the increase in the number of financial experts, we are unable to adopt a more stringent definition of *Treated* based on the decrease in the number of financial experts.

coefficient on *Treated×Post* to be significantly negative when the definition of *Treated* is based on the increase in the number of financial experts on TMT (first two definitions), and to be significantly positive when it is based on the decrease in the number of financial experts (third definition). Regressions in Panel A are based on the first definition of *Treated* and show a negative and statistically significant coefficient on the DiD term in the overall investment inefficiency and underinvestment regressions (columns (1) and (3)), but an insignificant one in overinvestment regression (column (2)). Panel B uses the second and a more stringent definition of *Treated* and shows significantly negative coefficients on DiD terms in all regressions, which also are noticeably larger in magnitude compared to the coefficients in Panel A. Thus, the findings in Panels A and B reinforce our main results that adding financial experts to TMT leads to a reduction in investment inefficiency.

[Insert Table 9 around here]

In Panel C of Table 9, we use the third definition of *Treated* to test the impact of a decrease in financial expert top managers on investment inefficiency. The coefficients on the DiD term are insignificant in all models, suggesting that the decrease in the number of financial expert top managers does not necessarily increase investment inefficiency.

The implications of the results in Table 9 are twofold. First, they reaffirm our main finding that more financial experts on the TMT facilitate more efficient investments. Secondly, significant estimates on DiD terms for the increase in financial expert managers in Panels A and B, but insignificant estimates on DiD terms for the decrease in financial expert managers in Panel C suggest that departures of financial experts from the TMT may have a weaker effect on investment inefficiency than their appointment to the TMT. This evidence supports the argument that financial experts on the TMT facilitate knowledge exchange and create positive spillovers to other team members that help mitigate investment inefficiencies. For example, a financial manager who left the firm may have influenced other TMT members to adhere to the financial theory in choosing project-specific, rather than company-wide, discount rates. Hence, other TMT members, who are not financial experts may continue the previously shared and adopted practices even after the financial expert left the TMT.

5.2 Variations in the Measurement of Financial Expert Ratio

In this section, we explore several variations of *FinExp Ratio* to better understand how certain positions within TMT affect our results. Prior evidence shows that CEO is a key decision-maker on a range of firm policies (Custódio & Metzger, 2013, 2014; Dittmar & Duchin, 2016; Hertwig et al., 2004; Hertwig & Erev, 2009; Kalelkar & Khan, 2016). To address a concern that our results could be unduly driven by the sole impact of the financial expert CEO on firm investment policy, our first variation of the financial expert ratio excludes CEO from the TMT (FinExp Ratio ExCEO). Hence, using this variation allows us to check whether our findings are due to the efforts of the entire TMT, rather than driven exclusively by the CEO.

The second variation, in addition to the CEO, excludes all finance-related positions from the TMT (*FinExp Ratio ExCEO&Non-FinRoles*). The rationale for this variation is that top managers in

financial roles, such as Chief Financial Officer or VP of finance are more likely to have previous work experience in finance than top managers working in non-financial roles (i.e., COO, CIO). Since some firms may be setting up more finance-related positions due to the nature and multitude of their investment projects, our current results may be distorted by a large presence of such positions. By excluding all finance-related roles from the TMT, we can examine whether any manager with prior finance experience, even if not currently serving in finance roles, can affect investment efficiency.[17]

Our third variation investigates whether our results are driven by financial expert directors who are TMT members following on the evidence in Güner et al. (2008) that financial experts in the boardroom exert significant influence over firm policies. Although this conjecture is unlikely to be valid in our setting as only 3.4% of top managers who are financial experts also sit on the board of a focal firm in our sample, we nonetheless decompose *FinExp Ratio* into the ratio of financial expert managers who do not hold any board positions (*FinExp Ratio Non-Board Members*) and the ratio of financial expert managers who also sit on the board of the focal firm (*FinExp Ratio Board Members*).

We repeat our main tests using the three variations of the financial expert ratio and present the results in Panels A-C of Table 10. Panel A that uses the first variation of the ratio shows that coefficient estimates on FinExp Ratio ExCEO remains negative and highly significant at the 1% level across all investment efficiency regressions. This result confirms that the negative association between manager's financial expertise and investment inefficiency cannot be attributed solely to financial expert CEOs. Non-CEO top managers with financial expertise also play a crucial role in alleviating investment inefficiencies.

[Insert Table 10 around here]

Panel B of Table 10 that uses the second variation of the ratio shows that *FinExp Ratio ExCEO&Non-FinRoles* attracts negative and significant coefficients in overall investment inefficiency and underinvestment regressions, albeit smaller in magnitudes compared to those in the baseline regressions in Table 2. This result suggests that prior professional experience in finance has a profound influence on managerial decisions throughout their careers, regardless of the new roles taken. Even though TMT members in non-CEO or non-finance-related roles are less directly responsible for investment activities, skills from previous finance-related employment help them work together with other top managers and implement more efficient investments.

Finally, in Panel C of Table 10 we find that both financial experts with and without seats on the focal firm's board reduce investment inefficiency. Both coefficient estimates on *FinExp Ratio*

[17] By way of illustration, Jose Bayardo had previous financial experience (CFO of Complete Production Services Inc from 2008 to 2010) and was a non-finance executive (Senior VP of resources and business development) at Continental Resources Inc from 2012 to 2015. On the other hand, John Hart had financial experience and served as a finance executive (Senior VP/CFO/Treasurer) at Continental Resources Inc from 2009 until present. Although both Jose Bayardo and John Hart are considered financial experts, the alternative measure of the ratio of financial experts on the TMT excludes John Hart from the TMT and only includes Jose Bayardo, while the main and broader measure includes both Jose Bayardo and John Hart in the computation of financial expert ratio.

Non-Board Members and on *FinExp Ratio Board Members* are negative and statistically significant. The differences between the two coefficients are not statistically significant in the overall investment inefficiency and overinvestment regressions. However, in underinvestment regressions, the coefficient on *FinExp Ratio Non-Board Members* is significantly more negative than that on *FinExp Ratio Board Members* (-0.053 vs -0.032; p-value=0.004). This result suggests that financial experts who are on the TMT but are not members of the focal firm's board, may exert greater influence in reducing underinvestment, possibly because they are less busy than top managers who are also members of the board.

Taken together, the results in Table 10 demonstrate that financial expert managers, irrespective of their roles within and outside of TMT, facilitate more efficient investments.

5.3 Other Robustness Checks

We run several additional robustness checks. First, we test the sensitivity of our results to the definition of TMT by narrowing it down to the positions of Chairman, Chief Executive Officer, Chief Operating Officer, Chief Financial Officer and President (Geletkanycz & Hambrick, 1997; Murray, 1989; Sanders & Carpenter, 1998; Tihanyi et al., 2000). Second, we repeat our main tests in Table 2 and cross-sectional tests in Table 3 using an alternative model to estimate investment efficiency as in Biddle et al. (2009). Third, we adopt the Weighted Least Squares (WLS) model to address potential sample issues due to uneven distribution of observations across the sample period and the Generalized Method of Moments (GMM) to attenuate the common endogeneity concerns. Finally, we control for other managers' skills and characteristics that may be correlated with their financial experience, such as manager's tenure, MBA degree, gender, and whether a manager is an Ivy league alumni and graduated during a recession (Custódio & Metzger, 2013; Faccio, Marchica, & Mura, 2016; Falato, Milbourn, & Li, 2012; Huang & Kisgen, 2013). Our results are robust to all these checks and are presented in Tables IA.6-IA.9 in the Internet Appendix.

6 ADDITIONAL ANALYSIS

6.1 How Does CEO Power and Financial Experience Impact the Relationship Between Financial Expert TMT Members and Investment Inefficiency?

In Section 5.2, we demonstrated that the financial expertise of TMT members other than that of the CEO significantly improves investment efficiency, thus confirming that operational and financial business outcomes can be attributed to the collective efforts of the TMT. However, participatory work within the TMT could be disrupted if the CEO is more powerful and experienced given the evidence in the literature that such CEOs maintain the 'final say' in the decision-making process and are less likely to delegate financial decisions to other top executives (Graham et al., 2015). Hence, a relevant question that we explore next is how the presence or absence of a powerful and financially sophisticated CEO affects the relationship between financial expert TMT members and investment inefficiency.

To answer this question, we examine how both CEO power and financial expertise impact the relationship between financial expert non-CEO managers and investment inefficiency. We expect

this relationship to weaken or even disappear when the CEO has high power and is also a financial expert as she will be less likely to engage in a participatory group process and draw on financial expertise of other TMT members. On the other hand, we expect this relationship to become more pronounced when CEO has low power and is not a financial expert as she will be more likely to engage in a participatory process and rely on advice from other TMT members with relevant financial experience.

To test these conjectures, we construct several proxies for CEO power. We define *High (Low) Compensation CEO* and *Long (Short) Tenure CEO* as indicator variables equal to one if, respectively, the CEO pay slice and tenure lie in the top (bottom) quintile of all CEOs. CEO pay slice is computed as the CEO's compensation divided by the total compensation of the five highest paid executives. We define *Duality (No-Duality)* as an indicator variable equal to one if a CEO is (is not) the Chairman of the board. We then repeat our main tests by adding interactions of *FinExp Ratio ExCEO* with one of the proxies for the CEO power, separately for the subsamples of firms with and without financial expert CEO.

Results are presented in Table 11. The dependent variable in all regressions is the overall investment inefficiency (*Inefficiency*). Panel A examines how the link between financial expert top managers and investment efficiency is affected by the presence of a highly powerful CEO. Columns (1)-(3) and (4)-(6) report results for the subsamples with and without financial expert CEOs, respectively. In all regressions, the coefficient estimates on *FinExp Ratio ExCEO* are negative and highly significant and not statistically different across the financial and non-financial CEO subsamples. Importantly, insignificant coefficients on interaction terms in all regressions suggest that the presence of a powerful CEO does not diminish the relationship between TMT's financial expertise and investment inefficiency. These findings are consistent with our main results and confirm that the financial expertise of TMT members other than the CEO promotes investment efficiency, even in the presence of a highly powerful CEO and regardless of her own financial expertise.

[Insert Table 11 around here]

Panel B re-examines the above relationship in the presence of a low-power CEO. All coefficients on *FinExp Ratio ExCEO* are negative and highly significant and are close in magnitude to those in Panel A. The coefficients on the interaction terms in columns (1)-(3) are statistically insignificant, indicating that low-power CEOs, who are financial experts do not change the negative relationship between TMT's financial expertise and investment inefficiency. This result is important because, together with the corresponding result in columns (1)-(3) of Panel A, it confirms that the financial expertise of the CEO, regardless of their power, does not dominate that of the other members of the TMT, whose collective experience appears to be of primary importance for alleviating investment inefficiencies. In contrast, the coefficients on the interaction of *FinExp Ratio ExCEO* with *Low Compensation CEO* and *Short Tenure CEO* in columns (4) and (5), respectively, are significantly negative, suggesting that financial knowledge of other TMT members may matter even more for facilitating investment efficiency when CEO has low power and is not a financial expert. However, there is no difference between the effect of financial expert TMT members on investment

inefficiency across firms with and without CEO/Chairman duality given the insignificant coefficient on the interaction term in column (6), *FinExp Ratio ExCEO×No-Duality*.

Overall, the results in Table 11 indicate that, while CEO power does not diminish the role of other TMT members' financial expertise in reducing investment inefficiency, there is some evidence that TMT's role is more salient in the presence of a low-power non-financial expert CEO.

6.2 Which Investment Components Does TMT's Financial Expertise Influence?

Our main results examine the inefficiency of the total investment, defined as the sum of CAPEX, R&D, and acquisition expense. A natural question from this analysis is whether financial expertise influences investment inefficiency in a particular area. Compared to routine capital spending, acquisition investments tend to be relatively high-profile and more complex to implement, while R&D investments are more opaque and difficult to evaluate (Aboody & Lev, 2000; Lara et al., 2016). Therefore, the financial expertise of top managers may be more valuable and hence, have a stronger impact on reducing investment inefficiencies for certain investment types.

To test this conjecture, we decompose our investment inefficiency measure into three components - CAPEX, R&D, and acquisition investment inefficiency, and repeat the main tests using each of these inefficiency measures as a dependent variable.[18] Panels A, B, and C of Table 12 present the results, where the inefficiency dependent variable is based on, respectively, CAPEX, R&D, and Acquisition investments. The coefficient on FinExp Ratio in column (1) is negative and highly significant for each investment component in Panels A-C, suggesting that managerial financial expertise promotes overall investment efficiency in all three areas. Columns (2) and (3) of each panel examine, respectively, over- and underinvestment into each component. The results in Panel A show that financial expert top managers significantly reduce overinvestment, but not underinvestment, in CAPEX, while the results in Panels B and C suggest that financial expertise can help reduce both over- and underinvestment in R&D and acquisition investment. In terms of economic magnitudes, a one-standard deviation increase in the ratio of financial experts on the TMT increases capital expenditure, R&D, and acquisition inefficiencies by, respectively 1.9%, 9.3% and 4.4%.

[Insert Table 12 around here]

Taken together, these findings demonstrate that the financial expertise of top managers is instrumental for mitigating inefficiencies in all three main investment types, although it appears to influence the inefficiency of R&D investment most.

[18] In line with Richardson (2006), the investment measure used in our study subtracts maintenance investment, which is the amount of amortization and depreciation (A&D). However, as we are unable to exactly identify the amount of A&D allocated to each type of investment, we regress the raw amount of CAPEX, R&D, and Acquisition on the same factors as in the investment model (3) to obtain the residuals.

7 CONCLUSIONS

Existing literature mainly focuses on how the experiences of the CEO explain corporate outcomes. Studies on the association between TMT member's professional experience and corporate policies are scarce. This paper fills the gap by examining how early employment in finance affects top managers' investment decisions. Our findings indicate that financial expertise on the TMT reduces investment inefficiency, and is crucial regardless of the power and financial expertise of the CEO. Further, our results demonstrate that TMTs with financial experts follow financial theory more closely and are able to issue additional debt and equity at lower costs during unfavourable markets. Importantly, we show that greater investment efficiency due to financial experts on the TMT significantly improves firm value. Overall, the evidence from this study supports the view that financial experts possess valuable skills and work in teams to promote more efficient investment.

This study provides valuable implications for company stakeholders. Specifically, it underscores the importance of the skills and experience acquired from past finance employment for improving firm investment efficiency as financial expert TMT help ensure efficient allocation of corporate resources. However, similarly to Güner et al. (2008) with respect to directors, we do not suggest that firms should appoint only financial experts to the TMT as they must consider multiple dimensions in the recruitment process. Financial expertise is only one of many aspects that the firm should seek to balance when recruiting managers.

ACKNOWLEDGEMENT

We are grateful to Andrew Stark (the Editor) and an anonymous referee for very helpful comments and suggestions. All remaining errors are ours.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are publicly available from the sources noted in the text.

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APPENDICES

Table A.1

Variable Definitions

Variable	Definition and COMPUSTAT Items
Inefficiency	Absolute value of the residual estimates from investment model (3).
Overinvestment	Positive residual estimates (including zero) from investment model (3).
Underinvestment	Absolute value of the negative residual estimates from investment model (3).
FinExp Ratio	The ratio of the number of TMT members with previous finance experience to the total number of TMT members.
FinExp Ratio ExCEO	The ratio of the number of TMT members with previous finance experience to the total number of TMT members, where the CEO is excluded from the TMT.
FinExp Ratio ExCEO&Non-FinRoles	The ratio of the number of TMT members with previous finance experience to the total number of TMT members, where the CEO and managers working in finance-related positions are excluded from the TMT.
FinExp Ratio Non-Board Members	The ratio of the number of TMT members with previous finance experience who do not hold any board positions in the focal firm to the total number of TMT members.
FinExp Ratio Board Members	The ratio of the number of TMT members with previous finance experience who hold board positions in the focal firm to the total number of TMT members.
Narrow FinExp Ratio	The ratio of the number of TMT members with previous finance experience to the total number of TMT members, where the TMT only includes Chairman, Chief Executive Officer, Chief Operating Officer, Chief Financial Officer and President.
ROA	The average over the three future annual industry-median-adjusted return on assets (ROA). The industry adjustment is performed by subtracting the industry median in a given fiscal year from a firm-specific variable. Firm's ROA is earnings before interest, taxes, depreciation and amortization (ebitda), scaled by the book value of total assets (at).
Total Factor Productivity	The average over the three future annual industry-median-adjusted total factor productivity. The industry adjustment is performed by subtracting the industry median in a given fiscal year from a firm-specific variable. Firm's total factor productivity is measured as the residual in the regression of sales on the number of employees, fixed assets, cost of materials, industry and year effects, following the approach in Field and Mkrtchyan (2017).
ACQ	Acquisitions (acq), scaled by the book value of total assets (at).
Asset Growth	Book value of the total assets (at) over the book value of total assets in the previous year, minus one.
Average TMT Tenure	Average tenure of all TMT members.

Board Size	Natural logarithm of the number of board directors.
Cash Flow	Earnings before interest, taxes, depreciation and amortization (ebitda) less interest (xint) and taxes (txt), scaled by the book value of total assets (at).
Cash Holding	Cash and short-term investments (che), scaled by the book value of total assets (at).

(continues)

Table A.1 (continued)

Variable	Definition and COMPUSTAT Items
CEO Duality	Dummy variable equal to one if the CEO is also the Chairman, and zero otherwise.
CAPEX	Capital expenditures (capx), scaled by the book value of total assets (at).
Debt Issuance	Long-term debt issuance (dltis) less long-term debt reduction (dltr) plus current debt changes (dlcch), scaled by sales in the previous period.
E-Index	The entrenchment index based on six provisions: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendment as in Bebchuk, Cohen, and Ferrell (2009).
Equity Issuance	Sale of common and preferred stock (sstk) less purchase of common and preferred stock (prstkc), scaled by sales in the previous period.
Constrained	Dummy variable equal to one if the firm's Kaplan and Zingales (1997) (KZ) Index lies in the highest tertile of sample firms, and zero otherwise. The KZ index is calculated as -1.001909× (Cash Flow/Capital) - 0.2826389×Tobin Q + 3.139193×Leverage - 39.3678×(Dividends/Capital) - 1.314759× (Cash Holding/Capital). Capital is property, plant and equipment (ppent). Dividends are the dividend to common stock (dvc).
Core Q	Tobin's Q of a firm's core division, computed as the weighted-average Tobin's Q of firms in the same Fama-French 48 industry. The core division is the one with the largest sales.
Cost of Debt	Interest and related expense (xint) divided by the book value of short-term and long-term debt (dlc + dltt).
Cost of Equity	Expected annualized return from the CAPM model. The parameters are estimated using daily stock returns over a year and the CRSP value-weighted index return.
Decrease	An indicator variable set to one if at least one financial expert manager left the TMT in a given year, and zero otherwise.
Default Spread	The difference between the average yield on Moody's corporate bond ratings Baa and Aaa expressed in percentage points.
Delta Beta	The difference between the industry-level non-core division's beta and industry-level core division's beta. The core division is the one with the largest sales, while all others are defined as non-core. Industry-level beta is obtained from Krüger et al. (2015).
Dividend Dummy	An indicator variable equal to one if the firm pays cash dividends in a given year, and zero otherwise.
Division Q	Divisional Tobin's Q, computed as the weighted-average Tobin's Q of firms in the same

	Fama-French 48 industry.
Division Size	Natural logarithm of the book value of total assets (at) of the division.
Duality	An indicator variable equal to one if the CEO holds a position of a Chairman, and zero otherwise.
Female TMT Ratio	The ratio of the number of female TMT members to the total number of TMT members.
FinExp Ind	Industry median *FinExp Ratio* measured for each industry in a given year.
FinExp_Over3years	The ratio of financial experts on the TMT appointed more than three years ago to the total number of TMT members.
Firm Age	Natural logarithm of the number of years since the firm was listed in CRSP plus one.
Firm Size	Natural logarithm of sales (sale) of the firm.
HHI Index	Sum of the squares of the market shares (sales scaled by the total sales of the industry) of all firms in the same industry for a given year.
High Compete	An indicator variable equal to one if a firm operates in an industry in the bottom tercile of HHI index, and zero otherwise.

(continues)

Table A.1 (continued)

Variable	Definition and COMPUSTAT Items
High Growth	An indicator variable equal to one if a firm's Tobin Q lies in the highest tercile of sample distribution, and zero otherwise.
Illiquidity	the average of individual stock illiquidity across all stocks in a given year. Individual stock illiquidity is calculated as the natural logarithm of absolute price change per dollar of the trading volume plus one.
Increase	Dummy variable equal to one if the number of TMT members with professional finance experience of a firm increases in the current period when compared to that in the prior year, and zero otherwise.
Independent Director	The number of independent directors to the total number of board directors.
Ivy League TMT Ratio	The ratio of the number of TMT members graduated from an Ivy League university (Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, Princeton University, University of Pennsylvania, and Yale University) to the total number of TMT members.
Leverage	Sum of the book value of short-term and long-term debt (dlc + dltt) scaled by the book value of total assets (at).
Loss	An indicaotr variable equal to one if a firm has negative net income (ni), and zero otherwise.
Low (High)	An indicator variable equal to one if the proportion of the CEO's total compensation over the total compensation of top five highest-paid executives lies in the bottom (top)

Compensation CEO	quintile of the sample distribution, and zero otherwise.
MBA TMT Ratio	The number of TMT members with MBA degree to the total number of TMT members.
Net Working Capital	Net current assets (act) less current liabilities (lct) and cash (che), scaled by the book value of total assets (at) less cash (che).
Recession TMT Ratio	The ratio of the number of TMT members who obtained her first degree in a recession year to the total number of TMT members. Recession years are those identified as such by National Bureau of Economic Research**.**
R&D	Research and development expenditures (xrd), scaled by the book value of total assets (at).
Retained Earning	Retained earnings (re), scaled by common equity (ceq).
Short (Long) Tenure CEO	An indicator variable equal to one if a CEO's tenure lies in the bottom (top) quantile of sample distribution, and zero otherwise.
Stock Return	Annual stock return from CRSP.
Tangibility	Net property, plant, and equipment (ppent), scaled by the book value of total assets (at).
Tobin Q	Market value of assets (at + csho × prcc_f - ceq), scaled by the book value of total assets (at).
Vol Cash Flow	Standard deviation of *Cash Flow* over the previous three-year period.
Vol Cash Holding	Standard deviation of *Cash Holding* over the previous three-year period.
Vol ROA	Standard deviation of *ROA* over the previous three-year period.

Notes: The table offers details about the analysis variables. The first column shows their names, and the second column explains their calculation. We also note the COMPUSTAT mnemonics of the data items used to calculate the variables.

TABLES

Table 1

Summary Statistics

Panel A: Full Sample Summary Statistics

	Obs.	Mean	Std. Dev.	p25	Median	p75
Inefficiency	30,142	0.074	0.095	0.020	0.044	0.090
Overinvestment	12,409	0.087	0.126	0.017	0.043	0.105
Underinvestment	17,733	0.065	0.072	0.021	0.045	0.083

FinExp Ratio	30,142	0.212	0.141	0.100	0.200	0.333
FinExp Ratio ExCEO	30,142	0.195	0.136	0.091	0.182	0.321
FinExp Ratio ExCEO&Non-FinRoles	29,608	0.079	0.129	0.000	0.000	0.121
FinExp Ratio Non-Board Members	30,142	0.178	0.132	0.074	0.167	0.297
FinExp Ratio Board Members	30,142	0.034	0.079	0.000	0.000	0.018
ROA	29,980	-0.019	0.409	-0.046	0.021	0.091
Total Factor Productivity	29,547	-0.012	0.626	-0.206	0.031	0.285
Debt Issuance	26,682	0.123	1.028	-0.020	0.000	0.020
Cost of Debt	21,102	0.150	0.471	0.042	0.063	0.094
Equity Issuance	26,682	0.225	0.855	-0.006	0.001	0.017
Cost of Equity	26,117	0.111	0.204	-0.003	0.107	0.224
Default Spread (%)	26,682	1.095	0.357	0.829	1.026	1.262
Illiquidity (%)	26,682	1.763	0.914	1.155	1.453	2.582
Delta Beta	6,255	-0.037	0.335	-0.290	-0.040	0.180
Firm Size	30,142	5.468	2.356	4.049	5.606	7.034
Tobin Q	30,142	2.301	2.614	1.189	1.644	2.578
Leverage	30,142	0.293	0.504	0.001	0.186	0.443
Frim Age	30,142	2.571	0.894	1.946	2.708	3.219
Cash Holding	30,142	0.249	0.244	0.053	0.164	0.378
Vol Cash Holding	30,142	0.067	0.063	0.023	0.048	0.091
Tangibility	30,142	0.221	0.219	0.059	0.140	0.308
Vol ROA	30,142	0.104	0.405	0.020	0.040	0.086
Loss	30,142	0.374	0.484	0.000	0.000	1.000

Pane B: Time Series Distribution of Main Variables

Year	*FinExp Ratio*	*Inefficiency*	Obs.	*Overinvestment*	Obs.	*Underinvestment*	Obs.
2003	0.183	0.066	2,074	0.065	799	0.067	1,275
2004	0.195	0.070	2,122	0.086	800	0.061	1,322
2005	0.199	0.075	2,144	0.090	889	0.065	1,255
2006	0.199	0.076	2,136	0.090	953	0.066	1,183
2007	0.202	0.080	2,073	0.098	873	0.068	1,200

2008	0.202	0.086	2,042	0.108	902	0.070	1,140
2009	0.205	0.071	2,031	0.073	600	0.070	1,431
2010	0.219	0.064	1,915	0.072	718	0.060	1,197
2011	0.223	0.070	1,841	0.085	855	0.059	986
2012	0.219	0.070	1,739	0.082	754	0.061	985
2013	0.219	0.066	1,690	0.076	646	0.061	1,044
2014	0.230	0.072	1,695	0.087	732	0.061	963
2015	0.227	0.076	1,674	0.085	726	0.070	948
2016	0.227	0.080	1,700	0.099	739	0.067	961
2017	0.234	0.082	1,666	0.098	702	0.072	964
2018	0.238	0.080	1,600	0.098	721	0.067	879

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables (see Table A.1 in the Appendix). Panel A presents the number of observations (Obs), the mean (Mean), the standard deviation (Std. Dev.), 25th (p25), 50th (Median), and 75th (p75) percentiles for all variables. Panel B reports the annual distribution of the main explained and explanatory variables. All continuous variables are winsorized at the top and bottom 1%.

Table 2

The Effect of TMT's Financial Expertise on Investment Inefficiency

Dep. Var.	*Inefficiency*		*Overinvestment*		*Underinvestment*	
	(1)	(2)	(3)	(4)	(5)	(6)
FinExp Ratio	-0.046***	-0.045***	-0.037***	-0.037***	-0.050***	-0.046***
	(0.004)	(0.004)	(0.008)	(0.008)	(0.004)	(0.004)
Firm Size	-0.008***	-0.007***	-0.010***	-0.010***	-0.008***	-0.006***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Tobin Q	0.003***	0.003***	0.006***	0.005***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.003*	0.003*	-0.003	-0.001	0.006***	0.006***
	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)
Stock Return	-0.001	-0.000	-0.001	-0.001	-0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)

Ln (Firm Age)	-0.001	0.001	0.001	0.001	-0.000	0.002***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Cash Holding	0.040***	0.039***	0.080***	0.085***	0.023***	0.021***
	(0.004)	(0.005)	(0.009)	(0.010)	(0.004)	(0.004)
Vol Cash Holding		0.075***		-0.001		0.121***
		(0.015)		(0.030)		(0.013)
Tangibility		0.008*		0.004		0.013***
		(0.004)		(0.006)		(0.005)
Vol ROA		0.011***		0.020**		0.006**
		(0.003)		(0.009)		(0.002)
Loss		0.001		-0.011***		0.007***
		(0.001)		(0.003)		(0.001)
Constant	0.093***	0.076***	0.105***	0.108***	0.074***	0.041***
	(0.018)	(0.018)	(0.017)	(0.018)	(0.014)	(0.014)
Observations	30,142	30,142	12,409	12,409	17,733	17,733
Adj./Within R^2	0.154	0.159	0.176	0.181	0.163	0.177

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table reports ordinary least squares (OLS) estimated coefficients from the regression of investment inefficiency proxies on the ratio of financial expert managers (*FinExp Ratio*). The dependent variable is indicated at the top of columns. *Inefficiency* (*Overinvestment*) (*Underinvestment*) is the absolute value of the residual estimates (positive residual estimates, including zero) (negative residual estimates) from investment model (3). All independent variables are lagged by one year. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include year and 2-digit SIC industry indicator variables and use standard errors clustered at the firm level (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 3

Cross-Sectional Tests of the Effect of TMT's Financial Expertise on Investment Inefficiency

	Financial Constraints			Growth Opportunities			Industry Competitiveness		
Dep. Var.	*Inefficiency*	*Overinvestment*	*Underinvestment*	*Inefficiency*	*Overinvestment*	*Underinvestment*	*Inefficiency*	*Overinvestment*	*Underinvestment*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FinExp	-	-	-0.041***	-	-0.033***	-	-	-0.024**	-

Ratio	0.040***	0.035***		0.038***		0.039***	0.022***		0.023***
	(0.005)	(0.010)	(0.004)	(0.004)	(0.009)	(0.004)	(0.006)	(0.010)	(0.006)
× Constrained	-0.017**	-0.006	-0.020**						
	(0.009)	(0.016)	(0.008)						
× High Growth				-0.027***	-0.027	-0.027***			
				(0.010)	(0.021)	(0.009)			
× High Compete							-0.029***	-0.014	-0.027***
							(0.009)	(0.018)	(0.008)
Constrained	0.004	0.006	-0.001						
	(0.003)	(0.005)	(0.003)						
High Growth				0.012***	0.007	0.014***			
				(0.003)	(0.006)	(0.003)			
High Compete							0.001	-0.002	-0.001
							(0.003)	(0.006)	(0.002)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	30,142	12,409	17,733	30,142	12,409	17,733	30,142	12,409	17,733
Adjusted R-squared	0.160	0.181	0.185	0.157	0.176	0.183	0.160	0.181	0.186

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table presents OLS estimates from the regression of investment inefficiency proxies on the fraction of financial experts on the TMT (*FinExp Ratio*) and its interaction with the proxies for financially constrained firms (*Constrained*), firms with greater growth opportunities (*High Growth*), and those operating in highly competitive industries (*High Compete*). The dependent variable is indicated at the top of columns. *Inefficiency* (*Overinvestment*) (*Underinvestment*) is the absolute value of the residual estimates (positive residual estimates, including zero) (negative residual estimates) from investment model (3). All independent variables are lagged by one year. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 4

"WACC Fallacy" in Firms with and without High Fraction of Financial Experts on TMT

Dep. Var.	*Non-Core Division CAPEX*		
	Full Sample	High FinExp Subsample	Other Firms Subsample
	(1)	(2)	(3)
Delta Beta	0.009***	0.009	0.008***
	(0.003)	(0.008)	(0.003)
Division Q	-0.003***	-0.005***	-0.002***
	(0.001)	(0.001)	(0.001)
Core Q	-0.003***	-0.003*	-0.003***
	(0.001)	(0.001)	(0.001)
Firm Size	0.003***	0.004	0.002**
	(0.001)	(0.003)	(0.001)
Division Size	-0.003***	-0.006**	-0.002**
	(0.001)	(0.003)	(0.001)
Cash Flow	0.013	0.019	0.013
	(0.010)	(0.037)	(0.010)
Ln (Firm Age)	-0.000	-0.004	0.001
	(0.001)	(0.004)	(0.002)
Asset Growth	0.003	0.027*	0.001
	(0.003)	(0.015)	(0.003)
Retained Earnings	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Constant	0.091***	0.119***	0.081***
	(0.012)	(0.027)	(0.014)
Observations	6,255	1,333	4,922
Adjusted R-squared	0.055	0.110	0.057

Notes: The table presents OLS estimates from the regression of non-core division-level CAPEX (*Non-Core Division CAPEX*) on the spread between the non-core division's beta and core division's beta (*Delta Beta*). A division is defined as a group of

the firm's business segments operating in the same Fama-French 48 industry. Divisions that do not have the highest sales are classified as non-core. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of controls as in Krüger et al. (2015), year and industry indicator variables, and use standard errors clustered by firm (in parentheses). The sample period is 2003-2008. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 5

The Effect of TMT's Financial Experience on Debt and Equity Issuance and Investment in Tight Markets

	Dependent Variable	Key Explanatory Variable	High FinExp Subsample	Other Firms Subsample	P-value (Diff)
	(1)	(2)	(3)	(4)	(5)
Panel A: Debt and Equity Issuance and the Associated Costs					
(1)	*Debt Issuance*	*Default Spread*	-0.155	-0.238***	0.520
			(0.098)	(0.084)	
(2)	*Cost of Debt*	*Default Spread*	-0.017	0.071**	0.084
			(0.041)	(0.032)	
(3)	*Equity Issuance*	*Illiquidity*	-0.482***	-0.497***	0.921
			(0.107)	(0.106)	
(4)	*Cost of Equity*	*Illiquidity*	0.080***	0.099***	0.000
			(0.004)	(0.001)	
Panel B: Firm Investment					
(1)	*CAPEX*	*Default Spread*	-0.001	-0.008***	0.317
			(0.007)	(0.003)	
(2)	*CAPEX*	*Illiquidity*	-0.000	-0.001***	0.480
			(0.001)	(0.001)	
(3)	*R&D*	*Default Spread*	-0.034***	-0.061***	0.042
			(0.009)	(0.010)	
(4)	*R&D*	*Illiquidity*	-0.006***	-0.011***	0.077
			(0.002)	(0.002)	
(5)	*Acquisition*	*Default Spread*	-0.003	-0.023***	0.001

			(0.004)	(0.004)	
(6)	*Acquisition*	*Illiquidity*	-0.001	-0.004***	0.034
			(0.001)	(0.001)	

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table reports results from the OLS regression of debt and equity issuance and the associated costs (Panel A) and firm investment (Panel B) on the proxies of overall market conditions and a set of controls, separately for firms with a high and low financial expert ratio (High FinExp Subsample and Other Firms Subsample, respectively). Firms with *FinExp Ratio* in the top quartile of the sample distribution are assigned to High FinExp Subsample, and the remaining firms are assigned to Other Firms Subsample. The dependent variable and the key explanatory variable (a proxy for market condition) are indicated in the first and second columns, respectively. *Debt Issuance* is a long-term debt issued less long-term debt retired during the fiscal year plus changes in the current debt, scaled by sales in the previous year. *Equity Issuance* is the difference between the sale and the purchase of common and preferred stock, scaled by sales in the previous year. *Cost of Equity* is estimated from the CAPM model. *Default Spread* is the difference between the average yield on Moody's corporate bond ratings Aaa and Baa. *Illiquidity* is the average of individual stock illiquidity across all stocks in a given year. Only the coefficient estimates on the market condition proxies for firms with a high and low financial expert ratio are reported in columns (4) and (5), respectively, and the p-value of the test of differences between the coefficients for the two groups in column (6). More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 6

The Mediating Effect of Investment Inefficiency

	Panel A: ROA Regressions		*Panel B: Total Factor Productivity Regressions*	
Dep. Var.	*Inefficiency*	*ROA*	*Inefficiency*	*Total Factor Productivity*
	(1)	(2)	(1)	(2)
FinExp Ratio	-0.129***	0.030**	-0.131***	0.006
	(0.004)	(0.015)	(0.004)	(0.025)
Inefficiency		-0.833***		-0.544***
		(0.024)		(0.040)
Controls	YES	YES	YES	YES
Observations	29,980	29,980	29,547	29,547

Mediating effects

Indirect Effect	0.107	0.071
Sobel Z-statistic for indirect	25.125	12.639

effect		
Direct Effect (Path C)	0.030	0.006
Total effect (Path ABC)	0.137	0.077
% total effect mediated	78.10%	92.21%

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table presents the results of the mediating effect of investment inefficiency (*Inefficiency*) on the relationship between financial expert top managers (*FinExp Ratio*) and firm performance using the approach developed by Baron and Kenny (1986). Inefficiency is the absolute value of the residual estimates from investment model (3). Firm performance is proxied by forward-looking industry-adjusted return on assets, *ROA*, (Panel A) and *Total Factor Productivity* (Panel B). The table also shows the indirect, direct and total effect of *FinExp Ratio* on firm performance and Sobel Z-statistic for the indirect effect. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 7

The Effect of TMT's Financial Expertise on Investment Inefficiency - IV Approach

	Panel A: Investment Inefficiency		*Panel B: Overinvestment*		*Panel C: Underinvestment*	
	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage
Dep. Var.	*FinExp Ratio*	*Inefficiency*	*FinExp Ratio*	*Overinvestment*	*FinExp Ratio*	*Underinvestment*
FinExp_Over3years	0.663***		0.667***		0.659***	
	(0.004)		(0.006)		(0.005)	
FinExp_Ind	0.169***		0.126**		1.963***	
	(0.040)		(0.059)		(0.054)	
FinExp Ratio (predicted)		-0.045***		-0.040***		-0.040***
		(0.006)		(0.011)		(0.005)

Controls	YES	YES	YES	YES	YES	YES
Observations	28,103	28,103	11,522	11,522	16,581	16,581
Adj. R-squared	0.536	0.153	0.540	0.179	0.533	0.186
Cragg and Donald Test	p-value<0.001		p-value<0.001		p-value<0.001	
Sargan overidentification test	p-value=0.375		p-value=0.323		p-value=0.730	

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table presents 2SLS estimates from the regression of investment inefficiency proxies on the fraction of financial experts on the TMT. Panel A presents the results for the full-sample regression using overall investment inefficiency as a dependent variable, while Panels B and C report the results of the regressions performed on the subsamples used in overinvestment and underinvestment regressions, respectively. The dependent variable is indicated at the top of columns. *Inefficiency* (*Overinvestment*) (*Underinvestment*) is the absolute value of the residual estimates (positive residual estimates, including zero) (negative residual estimates) from investment model (3). The first-stage regressions use the ratio of financial experts on TMT appointed more than three years ago (FinExp_Over3years) and the industry median financial expert ratio (*FinExp Ind*) to predict a firm's TMT financial expert ratio (*FinExp Ratio*). The second-stage regressions predict a firm's investment inefficiency using the predicted values of the financial expert ratio from the first stage (*FinExp Ratio (predicted)*). More details on the analysis variables are provided in Table A.1 in the Appendix. The table also presents the heteroscedasticity-corrected Cragg-Donald (1993) statistic for weak instruments and Sargan overidentification test. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 8

Change in the Number of Financial Experts on TMT

Panel A: Increase in the Number of Financial Experts on TMT

Dep. Var.	*Inefficiency*	*Overinvestment*	*Underinvestment*
	(1)	(2)	(3)
Increase	-0.023***	0.005	-0.030***
	(0.001)	(0.003)	(0.001)
Controls	YES	YES	YES
Observations	23,873	9,077	14,796
Adjusted R-	0.166	0.188	0.207

Panel B: Decrease in the Number of Financial Experts on TMT

Dep. Var.	*Inefficiency*	*Overinvestment*	*Underinvestment*
	(1)	(2)	(3)
Decrease	0.011***	0.003	0.008***
	(0.002)	(0.003)	(0.002)
Controls	YES	YES	YES
Observations	19,359	7,402	11,957
Adjusted R-	0.185	0.219	0.213

squared	*squared*

Notes: The table presents OLS estimates from the regressions of investment inefficiency proxies on the increase (Panel A) and the decrease (Panel B) in the number of financial expert managers on the TMT. The sample in Panel A (Panel B) consists of firm-years with no change in the number of financial experts and firm-years with an increase (decrease) in the number of financial experts. *Increase* is an indicator variable equal to one if the number of financial experts on the TMT this year is greater than that in the previous year, and zero otherwise. *Decrease* is an indicator variable set to one if at least one financial expert manager left the TMT, and zero otherwise. The dependent variable is indicated at the top of columns. *Inefficiency* (*Overinvestment*) (*Underinvestment*) is the absolute value of the residual estimates (positive residual estimates, including zero) (negative residual estimates) from investment model (3). More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 9

Change in the Number of Financial Experts on TMT – Difference-in-Difference Analysis

Panel A: Increase in the Number of Financial Experts on TMT

Dep. Var.	*Inefficiency*	*Overinvestment*	*Underinvestment*
	(1)	(2)	(3)
Post × Treated	-0.015***	0.005	-0.026***
	(0.004)	(0.007)	(0.004)
Treated	0.005	-0.001	0.008***
	(0.003)	(0.006)	(0.003)
Observations	10,296	4,201	6,095
Adjusted R-squared	0.181	0.191	0.220

Panel B: Persistent Increase in the Number of Financial Experts on TMT

Dep. Var.	*Inefficiency*	*Overinvestment*	*Underinvestment*
	(1)	(2)	(3)
Post × Treated	-0.040***	-0.026*	-0.051***
	(0.010)	(0.016)	(0.012)
Treated	0.021**	0.010	0.031***
	(0.009)	(0.012)	(0.010)
Observations	4,410	1,884	2,526

Adjusted R-squared	0.210	0.219	0.234

Panel C: Decrease in the Number of Financial Experts on TMT

Dep. Var.	*Inefficiency*	*Overinvestment*	*Underinvestment*
	(1)	(2)	(3)
Post × Treated	-0.009	-0.007	-0.009
	(0.007)	(0.013)	(0.006)
Treated	0.003	0.001	0.005
	(0.007)	(0.010)	(0.005)
Observations	5,332	2,239	3,093
Adjusted R-squared	0.210	0.218	0.244

Notes: The table presents OLS estimates from regressions of investment inefficiency proxies on the Treated indicator and the difference-in-difference term, *Treated×Post*. The dependent variable is indicated at the top of columns. *Inefficiency* (*Overinvestment*) (*Underinvestment*) is the absolute value of the residual estimates (positive residual estimates, including zero) (negative residual estimates) from investment model (3). The sample includes six yearly observations for each firm around the measurement of the change in the number of financial experts (year t). *Post* is an indicator variable for the three years from the change measurement (including year t), and the three previous years form the pre-period. In Panel A, *Treated* firms are defined as those that appoint at least one additional financial expert manager in the current year, but do not experience any change in the number of financial expert managers over the previous three years. In Panel B, the definition for *Treated* firms is narrowed down by also excluding firms that experience any decrease in the number of financial expert managers over the two years following an increase in year t. In Panel C, *Treated* firms are defined as those with departures of at least one financial expert manager in the current year, but do not experience any change in the number of financial expert managers over the previous three years. Control firms in each Panel are those not experiencing any change in the number of financial experts on the TMT during the six-year measurement period. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 10

Variations in the Measurement of Financial Expert Ratio

	Panel A: Excluding CEO			*Panel B: Excluding Both CEO and Financial Roles*			*Panel C: Board/Non-Board Members Split*		
Dep. Var.	*Inefficiency*	*Over-investment*	*Under-investment*	*Inefficiency*	*Over-investment*	*Under-investment*	*Inefficiency*	*Over-investment*	*Under-investment*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FinExp Ratio ExCEO	-0.040*	-0.029*	-0.046*						

	**	**	**						
	(0.004)	(0.008)	(0.004)						
FinExp Ratio ExCEO&Non-FinRoles				-0.009**	-0.013	-0.007*			
				(0.004)	(0.008)	(0.004)			
FinExp Ratio Non-Board Members							-0.045***	-0.034**	-0.053***
							(0.005)	(0.009)	(0.004)
FinExp Ratio Board Members							-0.049***	-0.051**	-0.032***
							(0.008)	(0.018)	(0.007)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	0.075***	0.106***	0.039***	0.072***	0.106***	0.035**	0.076***	0.108***	0.041***
	(0.019)	(0.018)	(0.015)	(0.019)	(0.018)	(0.015)	(0.018)	(0.019)	(0.014)
Observations	30,142	12,409	17,733	29,608	12,231	17,377	30,142	12,409	17,733
Adjusted R-squared	0.158	0.180	0.183	0.155	0.180	0.175	0.159	0.181	0.185

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table presents OLS estimates from the regression of investment inefficiency proxies on one of the three variations of the financial expert ratio. In Panel A, the financial expert ratio excludes CEO from the TMT (*FinExp Ratio ExCEO*). In Panel B, in addition to the CEO, it excludes all finance-related positions from the TMT (*FinExp Ratio ExCEO&Non-FinRoles*). In Panel C, we use the ratio of financial expert managers who do not hold any board positions (*FinExp Ratio Non-Board Members*) and the ratio of financial expert managers who also sit on the board of the focal firm (*FinExp Ratio Board Members*). The dependent variable is indicated at the top of columns. *Inefficiency* (*Overinvestment*) (*Underinvestment*) is the absolute value of the residual estimates (positive residual estimates, including zero) (negative residual estimates) from investment model (3). More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 11

The Role of CEO Power and CEO Financial Experience

Panel A: High Power CEO

Dep. Var.	*Inefficiency*	
	Financial CEO	Non-Financial CEO

	(1)	(2)	(3)	(4)	(5)	(6)
FinExp Ratio ExCEO	-0.028***	-0.030***	-0.028**	-0.042***	-0.037***	-0.037***
	(0.010)	(0.010)	(0.011)	(0.005)	(0.005)	(0.006)
× High Compensation CEO	-0.032			-0.002		
	(0.025)			(0.014)		
× Long Tenure CEO		-0.005			0.002	
		(0.005)			(0.003)	
× Duality			-0.003			-0.012
			(0.018)			(0.009)
High Compensation CEO	0.017**			0.004		
	(0.007)			-0.004		
Long Tenure CEO		0.003			-0.019*	
		(0.020)			(0.010)	
Duality			-0.003			-0.012
			(0.018)			(0.009)
Observations	7,421	7,421	7,421	22,721	22,721	22,721
Adjusted R-squared	0.210	0.209	0.209	0.161	0.161	0.161

Panel B: Low Power CEO

Dep. Var.	*Inefficiency*					
	Financial CEO			Non-Financial CEO		
	(1)	(2)	(3)	(4)	(5)	(6)
FinExp Ratio ExCEO	-0.029***	-0.026***	-0.031**	-0.040***	-0.034***	-0.048***
	(0.010)	(0.007)	(0.014)	(0.005)	(0.004)	(0.007)
× Low Compensation CEO	-0.016			-0.025**		
	(0.027)			(0.012)		
× Short Tenure CEO		-0.004			-0.012*	

		(0.013)			(0.007)	
× No-Duality			0.003			0.012
			(0.018)			(0.009)

(continues)

Table 11
(continued)

	Inefficiency					
	Financial CEO	Financial CEO	Financial CEO	Non-Financial CEO	Non-Financial CEO	Non-Financial CEO
	(1)	(2)	(3)	(4)	(5)	(6)
Low Compensation CEO	0.003			0.003		
	(0.008)			(0.003)		
Short Tenure CEO		0.002			0.003*	
		(0.003)			(0.002)	
Duality			0.002			-0.002
			(0.005)			(0.003)
Observations	7,421	7,421	7,421	22,721	22,721	22,721
Adjusted R-squared	0.209	0.209	0.209	0.161	0.156	0.161

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table presents OLS estimates from the regression of investment inefficiency (*Inefficiency*) on the ratio of financial expert top managers excluding the CEO (*FinExp Ratio ExCEO*) and its interaction with proxies for high (Panel A) and low (Panel B) CEO power. The dependent variable is investment inefficiency (*Inefficiency*) defined as the absolute value of the residual estimates from investment model (3). *High* (*Low*) *Compensation CEO* and *Long* (*Short*) *Tenure CEO* are indicator variables equal to one if, respectively, the CEO pay slice and tenure lie in the top (bottom) quintile of all CEOs. *Duality* (*No-Duality*) as an indicator variable equal to one if a CEO is (is not) the Chairman of the board. Columns (1)-(3) and (4)-(6) of each panel use the subsamples of firms with and without financial expert CEOs, respectively. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include the same set of firm-level controls as in Table 2, year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 12

Decomposing Investment Inefficiency by Investment Types

Panel A: CAPEX Investment Inefficiency

	CAPEX Inefficiency	Overinvestment in CAPEX	Underinvestment in CAPEX
	(1)	(2)	(3)
FinExp Ratio	-0.004**	-0.006*	0.001
	(0.002)	(0.003)	(0.001)
Observations	30,129	11,262	18,867
Adjusted R-squared	0.279	0.303	0.515

Panel B: R&D Investment Inefficiency

	R&D Inefficiency	Overinvestment in R&D	Underinvestment in R&D
	(1)	(2)	(3)
FinExp Ratio	-0.023***	-0.034***	-0.010***
	(0.003)	(0.006)	(0.002)
Observations	30,129	12,499	17,630
Adjusted R-squared	0.337	0.341	0.415

Panel C: Acquisition Investment Inefficiency

	Acquisitions Inefficiency	Overinvestment in Acquisitions	Underinvestment in Acquisitions
	(1)	(2)	(3)
FinExp Ratio	-0.010***	-0.012*	-0.006***
	(0.002)	(0.007)	(0.000)
Observations	30,129	5,964	24,165
Adjusted R-squared	0.066	0.072	0.398

Notes: The sample consists of all non-financial, non-utility firms at the intersection of COMPUSTAT, CRSP, and BoardEx databases between 2003-2018 with nonmissing data for all analysis variables. The table repeats the main analysis from Table 2 using as dependent variables inefficiency proxies based on one of the components of investment. Panel A, B, and C estimate inefficiency based on, respectively, *CAPEX*, *R&D*, and *Acquisition* investments. The dependent variable is indicated at the top of columns. More details on the analysis variables are provided in Table A.1 in the Appendix. All models include

year and 2-digit SIC industry indicator variables, and use standard errors clustered by firm (in parentheses). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

FIGURES

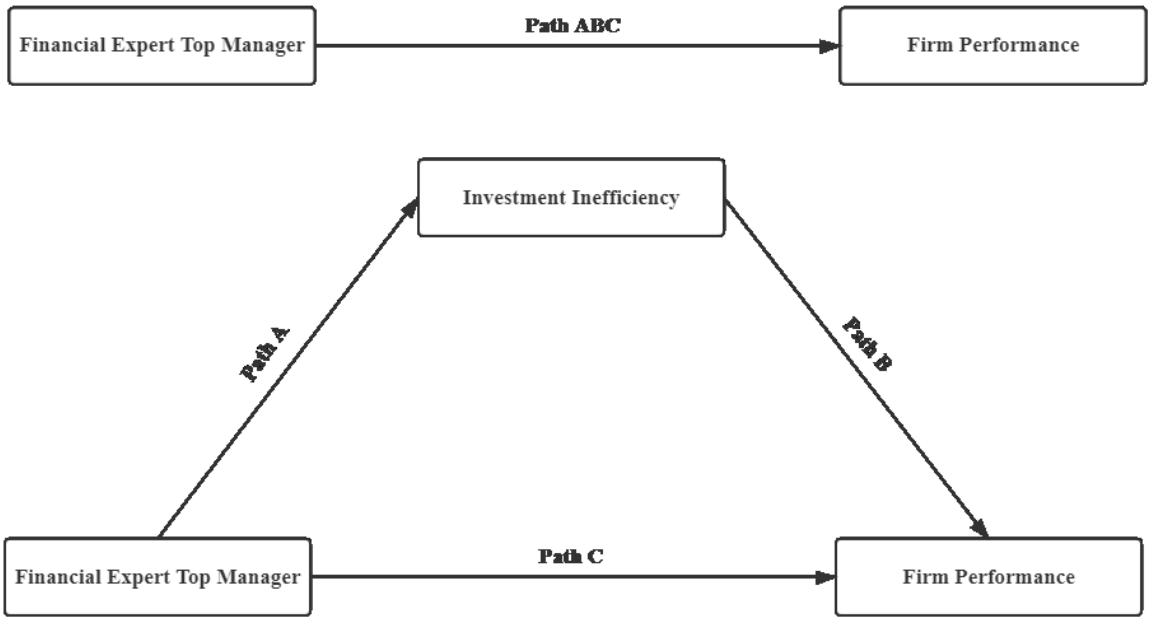


Figure 1 Causal Diagram of the Mediating Effect. This figure presents the direct and the indirect effects, as well as a total effect of financial expert top manager on firm performance. Path ABC represents the total effect of financial expert top managers on firm performance. The total effect is decomposed into Path A that corresponds to the effect of financial expert top managers investment inefficiency, Path B that demonstrates the effect of investment inefficiency on firm performance, and Path C that corresponds to the direct effect of financial expert top managers on firm performance.

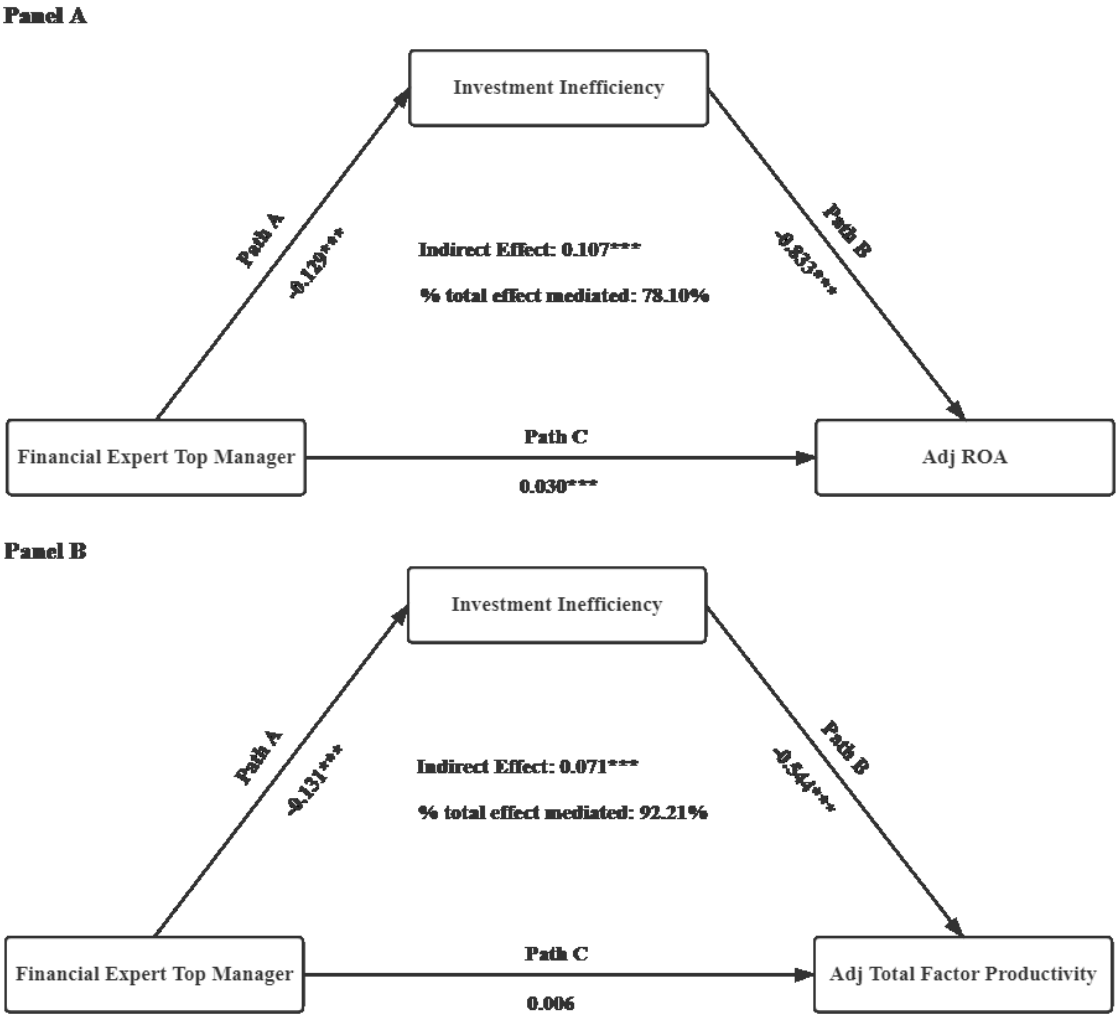
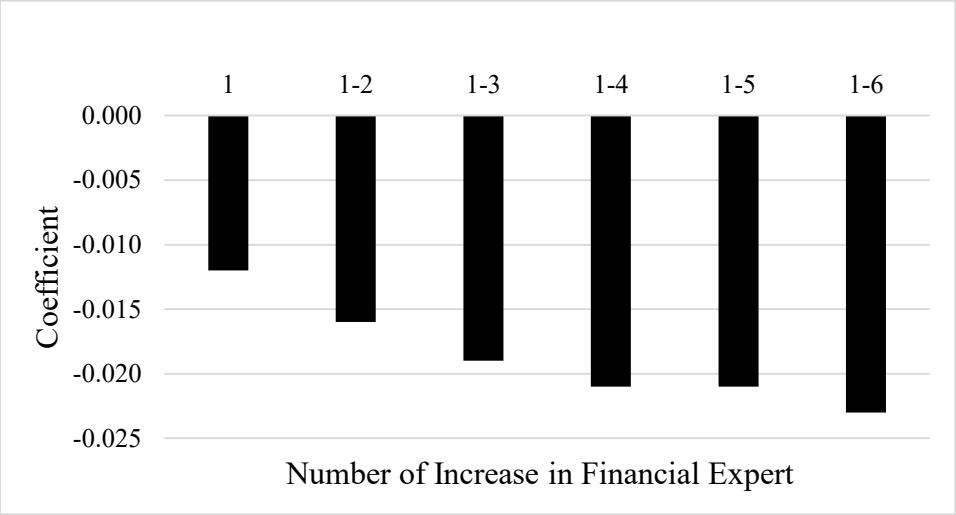
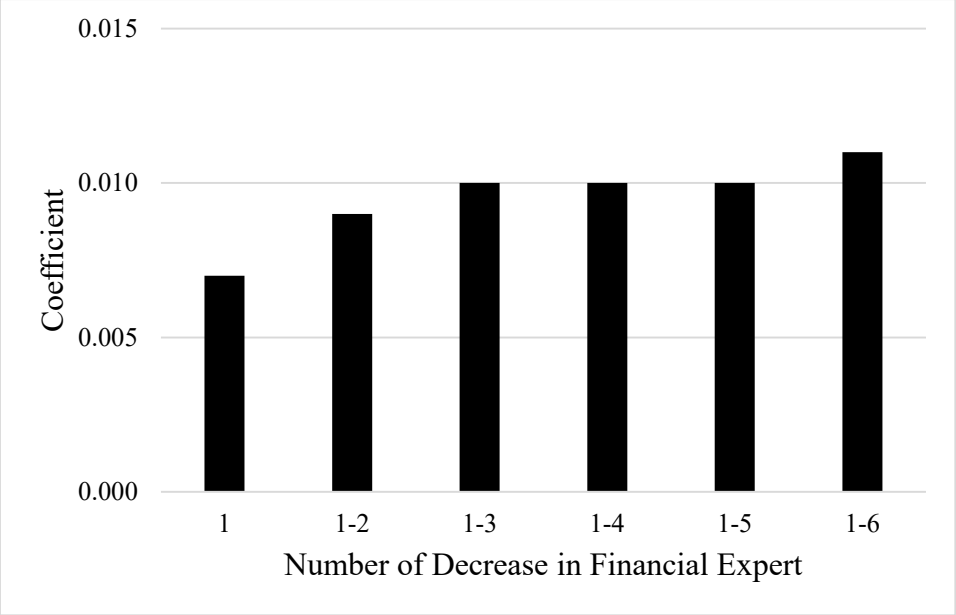


Figure 2 Mediating Effect of Investment Inefficiency on the Relationship Between Financial Expert Top Managers and Firm Performance. This figure presents the results on the mediating effect of investment inefficiency on the relationship between financial expert top managers and firm industry-adjusted ROA in Panel A and firm industry-adjusted Total Factor Productivity in Panel B.



Panel A: The Coefficient of Increase in the Number of Financial Expert



Panel B: The Coefficient of Decrease in the Number of Financial Expert

Figure 3 Change in the Number of Financial Expert Top Managers. This figure presents the coefficient of *Increase* (*Decrease*) in the number of financial expert top managers on firm overall investment inefficiency in Panel A (Panel B). The coefficients are estimated from six subsamples, including firms without any changes in the number of financial expert top managers and firms with the number of financial expert top managers ranging from one to six.