

Boardroom bridges: the impact of directors' overseas experience on firm-level FinTech adoption

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Abstract

Purpose – This study aims to examine how board directors' overseas experience affects financial technology (FinTech) adoption in Chinese financial firms. Directors' overseas experience is shown to enhance firm-level FinTech, particularly its technological application, with the effect operating through both independent and non-independent directors. The findings highlight the strategic value of overseas experienced directors in fostering financial innovation under the dual pressures of state-led regulation and BigTech competition.

Design/methodology/approach – The authors construct a panel of 1,152 firm-year observations from 132 Chinese listed financial firms over 2008–2023. A firm-level FinTech index is built from text mining of annual reports and decomposed into technological-application and business-innovation sub-indices. Two-way fixed-effects regressions form the baseline specification, with Heckman selection models and propensity-score matching addressing self-selection and sample-composition concerns. Construct validity of the text-based index is assessed against audited software-asset holdings. Cross-sectional analyses explore boundary conditions related to governance, firm size, institutional holdings and ownership type.

Findings – Directors' overseas experience significantly enhances firm-level FinTech adoption, particularly in technological applications like AI and blockchain. The positive association holds for both independent and non-independent directors. Cross-sectional tests show the effect is larger in firms with stronger internal governance, greater scale, higher institutional ownership and state-ownership status.

Research limitations/implications – For firms, nominating committees of financial institutions can treat directors' overseas experience as a measurable element of board human capital, particularly when evaluating candidates for firms characterized by stronger corporate governance structures, larger asset size, higher institutional ownership and state ownership. For boards, the findings suggest that independent and non-independent directors contribute through complementary channels.

Practical implications – For firms, appointing directors with overseas experience strategically enhances FinTech capability. For policymakers, it validates talent attraction programs as effective tools for fostering national financial technology innovation and competitiveness.

Social implications – The research suggests that leveraging globally experienced talent can accelerate financial inclusion and technological advancement, potentially improving access to and efficiency of financial services for broader segments of society.

Originality/value – The study provides new evidence on an underexplored link between board directors' overseas experience and firm-level FinTech adoption in a regulated financial setting. On measurement, the authors construct a firm-year text-based FinTech index from audited annual reports and validate it against an audited balance-sheet measure of software-asset holdings, addressing concerns about whether text-based proxies capture adoption rather than disclosure intensity. On scope, the authors extend the literature on directors' overseas experience into the FinTech setting in regulated financial institutions, and document



an asymmetric pattern across the technology-application and business-model-innovation dimensions that prior work has not examined. In addition, by showing that the effect is conditional on organizational complementarities, the findings support a more nuanced view of how directors' overseas experience translates into firm-level FinTech adoption.

Keywords Board directors, Overseas experience, FinTech, Corporate governance

Paper type Research paper

1. Introduction

Financial technology (FinTech), broadly defined as the integration of finance and digital innovation, is reshaping how financial services are delivered and consumed (Gomber *et al.*, 2018). From its origins in payments and lending, FinTech has expanded into wealth management, insurance, credit assessment and regulatory compliance, moving well beyond digitization toward a reconfiguration of business models and operational processes (Choudhary and Thenmozhi, 2024; Frost, 2020). This transformation carries particular significance for the financial industry. Unlike manufacturing or retail, financial firms operate under intense regulatory scrutiny, including capital adequacy requirements, anti-money laundering protocols and data protection mandates. These impose constraints on how technology can be adopted and deployed (Charoenwong *et al.*, 2024; Thakor, 2020). The data that financial institutions handle is among the most sensitive in any sector, including transaction records, credit histories, personal financial information. And the data requires technology solutions that satisfy stringent security and privacy standards (Huang *et al.*, 2025). Moreover, the interconnected nature of financial systems means that operational failures at a single institution can propagate across the sector, creating systemic risk that elevates the stakes of technology decisions far above those in most industries (Chen and Shen, 2024). At the same time, incumbents face competitive pressure from BigTech firms and agile FinTech startups that leverage advanced analytics and user-centric design to encroach on traditional financial services (Anagnostopoulos *et al.*, 2025; Frost *et al.*, 2019). In China, this competitive dynamic is especially pronounced, as platforms such as Ant Group and Tencent have built vast financial ecosystems that directly challenge licensed institutions (Hua and Huang, 2021). These features collectively make financial firms an important setting for studying the determinants of FinTech adoption.

Despite the widely recognized strategic value of FinTech, its adoption among financial firms is far from uniform. Internally, large financial institutions often carry decades of accumulated IT infrastructure whose replacement costs are prohibitive, creating a technological lock-in that resists modernization (Stulz, 2019). The deployment of new technologies must pass through extended compliance review and risk assessment processes, adding substantial cost and time to implementation (Charoenwong *et al.*, 2024). Board-level decision-making in financial firms tends to be risk-averse, particularly toward investments with long payback periods and uncertain returns. And the tendency reinforced by regulatory expectations of prudent governance (Srivastav and Hagendorff, 2016). Externally, several forces simultaneously push financial firms toward FinTech adoption while creating variation in their responses. Regulatory reforms set both the direction and the boundaries of technological innovation, including China's FinTech Development Plans (People's Bank of China, 2019, 2021) and comparable frameworks in other jurisdictions. Competitive pressure from peer institutions that have already committed to digital transformation amplifies the urgency. Rapid advances in enabling technologies continually expand the technical frontier of what is feasible, including generative artificial intelligence and distributed ledger systems.

Consumer expectations for personalized, on-demand financial services have also risen substantially (Kim *et al.*, 2024). Finally, capital market participants increasingly incorporate a firm's digital capabilities into their valuation assessments, linking FinTech investment to financing costs and equity pricing (Chen *et al.*, 2019). The interplay of these internal frictions and external pressures produces significant heterogeneity in FinTech adoption across financial institutions, raising an important question: what firm-level factors determine FinTech adoption.

Prior research has begun to address this question from several angles. Firm-level characteristics such as bank size and capital adequacy have been linked to FinTech investment (Bellardini *et al.*, 2022), while competitive dynamics with FinTech entrants have been shown to drive digital innovation strategies among incumbents (Carbó-Valverde *et al.*, 2022). The regulatory environment also shapes investment decisions, as less regulated competitors prompt incumbents toward more aggressive technology acquisition (Bellardini *et al.*, 2022). However, these studies focus predominantly on financial characteristics and market-level forces, leaving corporate governance largely unexamined as a determinant of FinTech adoption, specifically the human capital composition of the board (Verhoeef *et al.*, 2021). This gap is notable because the board of directors is the primary governance body responsible for setting a firm's strategic direction and overseeing major investment decisions (Hillman *et al.*, 2000; Klarner *et al.*, 2021). A parallel gap exists in the literature on directors' overseas experience. A substantial body of research has documented that such directors improve corporate governance and transparency (Cao *et al.*, 2019; Hao *et al.*, 2021; Ullah *et al.*, 2021), promote innovation and environmental performance (Liu, 2024; Tawiah *et al.*, 2024; Yuan and Wen, 2018) and enhance firm value and productivity (Giannetti *et al.*, 2015). Yet this literature has systematically excluded financial firms from its samples, owing to their distinctive capital structures and regulatory environments (Giannetti *et al.*, 2015; Tao *et al.*, 2022). The intersection of these two streams (whether overseas-experienced directors promote FinTech adoption in financial firms) therefore remains empirically untested. We argue that directors with overseas experience may be particularly consequential in this context through three channels. First, they serve as conduits for resources and knowledge: exposure to advanced financial technology ecosystems abroad provides them with direct awareness of frontier applications in areas such as AI-based risk assessment and blockchain settlement, reducing the information asymmetry that surrounds large-scale FinTech investments (Giannetti *et al.*, 2015; Lee and Roberts, 2015). The international professional networks of these directors connect domestic financial institutions to global technology providers and regulatory knowledge, expanding the firm's external resource base (Iliev and Roth, 2018). Second, their overseas educational and professional experiences shape cognitive frameworks that are more receptive to technological change. In an industry where governance culture tends toward conservatism, this cognitive orientation can be particularly influential in shifting strategic priorities toward long-term innovation (Balsmeier *et al.*, 2017; Barker and Mueller, 2002; Hambrick and Mason, 1984). Third, their independence from local business networks strengthens their monitoring capacity, helping firms commit to long-payback FinTech investments despite managerial short-termism (Giannetti *et al.*, 2015; Jensen and Meckling, 1976).

This study examines whether and how directors' overseas experience affects firm-level FinTech adoption in Chinese listed financial firms. Analyzing 1,152 firm-year observations from 132 firms over the period 2008–2023, we construct a firm-level FinTech index through text mining of annual reports and use two-way fixed effects models with a battery of endogeneity tests. Our results confirm that directors' overseas experience significantly promotes FinTech adoption: a one-standard-deviation increase in the proportion of

overseas-experienced directors is associated with a 1.74 percentage-point increase in the FinTech index. This effect is robust to alternative variable specifications, model configurations and endogeneity treatments. It holds for both independent and non-independent directors, and for both educational and professional forms of overseas exposure. When we disaggregate FinTech into its component dimensions, the effect is concentrated in technological application (e.g. AI, blockchain) rather than in business model innovation. Cross-sectional analyses further reveal that the effect is amplified in firms with stronger internal governance, larger asset bases, higher institutional ownership and state ownership, suggesting a complementary relationship between directors' overseas experience and the firm's organizational and resource endowments.

Our study makes three contributions to the literature. First, we advance the measurement of firm-level FinTech by constructing an index derived from annual report text that distinguishes between technological application and business innovation dimensions. Existing approaches rely on either macro-level indices (e.g. the Peking University Digital Financial Inclusion Index that cannot capture firm-specific heterogeneity) or internet-based text analysis [e.g. search engine data (Cheng and Qu, 2020) that is susceptible to noise and sentiment bias]. Our measure draws on audited, management-verified disclosures, and we demonstrate its construct validity by showing a significant positive correlation with firms' actual software asset investments. Second, we extend the literature on directors' overseas experience to the financial sector, which prior studies have systematically excluded. Our findings go beyond confirming a positive effect: by showing that overseas-experienced directors promote technological application but not business model innovation, we reveal a technology-oriented bias in how their human capital translates into firm-level outcomes. Third, we identify important boundary conditions that qualify the effect. Rather than treating directors' overseas experience as a universally beneficial resource, we demonstrate that its influence on FinTech adoption depends on the presence of complementary organizational attributes (firms characterized by stronger corporate governance structures, larger asset size, higher institutional ownership and state ownership). This finding contributes to an emerging understanding that board-level human capital does not operate in isolation but requires supportive institutional and organizational ecosystems to generate tangible innovation outcomes. The remainder of the paper is structured as follows: Section 2 develops our hypotheses, Section 3 describes the research design, Section 4 presents the baseline results, Section 5 addresses endogeneity, Section 6 reports cross-sectional analyses and Section 7 concludes.

2. Literature review and hypothesis development

2.1 *FinTech adoption in financial institutions*

A growing body of research examines the factors that drive FinTech adoption among financial institutions. At the macro level, regulatory environments shape the boundaries and incentives for technology investment. For instance, the emergence of RegTech reflects how compliance demands can both constrain and stimulate innovation (Charoenwong *et al.*, 2024), while competitive pressure from BigTech firms and FinTech startups has forced incumbents to reconsider their technology strategies (Anagnostopoulos *et al.*, 2025; Frost *et al.*, 2019). At the firm level, internal characteristics also matter. Bank size and capital adequacy are positively associated with FinTech investment, as larger and better-capitalized institutions can absorb the fixed costs and risks of technology adoption (Bellardini *et al.*, 2022). Competitive dynamics with less regulated entrants further drive incumbents toward more aggressive investment in digital capabilities (Bellardini *et al.*, 2022; Carbó-Valverde *et al.*, 2022). The motivations behind these investments are both defensive and strategic:

firms seek to accelerate digital transformation, optimize operations through technologies such as big data analytics and expand financial inclusion (Muganyi *et al.*, 2022), while mergers and acquisitions with FinTech firms serve as a channel for acquiring external technological capabilities (Ochirova and Miriakov, 2025). More broadly, the digital transformation of financial institutions has been shown to reshape organizational structures and alter risk profiles, with studies documenting both performance benefits and implementation challenges across financial firms (Stulz, 2019; Thakor, 2020). This literature establishes that FinTech adoption is shaped by a combination of environmental pressures and firm-specific resources, but it concentrates on financial characteristics and market-level forces.

What remains largely absent from this literature is a systematic examination of how corporate governance affects FinTech adoption. This omission is notable. The board of directors is the primary governance body responsible for approving strategic investments and setting the direction of organizational change (Hillman *et al.*, 2000; Klarner *et al.*, 2021). FinTech adoption decisions share several features, including large upfront capital outlays, long and uncertain payback periods, high technical complexity and potential regulatory implications. These features make them the type of strategic investment over which boards exercise significant influence (Balsmeier *et al.*, 2017; Jewer and McKay, 2012). Yet existing FinTech studies have treated governance as a background condition rather than an active determinant. A small number of studies have considered governance-adjacent factors such as ownership structure or CEO characteristics in the context of digital transformation (Aghion *et al.*, 2013; Gerstner *et al.*, 2013), but the role of board composition has not been examined as a driver of FinTech adoption in financial firms, specifically the human capital that individual directors bring to the boardroom. This gap motivates our focus on a specific dimension of board human capital: directors' overseas experience.

A related challenge in this literature concerns the measurement of firm-level FinTech. Many studies rely on macro-level indices, such as the Peking University Digital Financial Inclusion Index, which are useful for regional comparisons but cannot capture heterogeneity across individual firms. Others construct firm-level measures from public internet information, such as search engine data (Cheng and Qu, 2020), but these are susceptible to noise and sentiment bias inherent in media sources. A more recent approach uses text mining of corporate annual reports to construct firm-specific indices (Qi *et al.*, 2022; Wu *et al.*, 2023), on the grounds that annual reports represent audited, management-verified accounts of a firm's strategic priorities and operational investments. This approach offers a closer proxy for a firm's substantive engagement with FinTech, though it requires careful attention to construct validity. And we return to this point in our research design (Section 3.2.1).

2.2 Board human capital and corporate innovation: the role of directors' overseas experience

Research in corporate governance has long recognized that the human capital of board members shapes firm strategy and performance. Resource dependence theory frames directors as providers of external resources, information and legitimacy that reduce environmental uncertainty (Hillman *et al.*, 2000; Pfeffer and Salancik, 1978), while upper echelons theory holds that the cognitive frameworks of senior decision-makers influence the strategic choices firms make (Hambrick and Mason, 1984). Empirical work has confirmed that specific dimensions of board human capital matter for innovation outcomes. CEO characteristics such as educational background and prior managerial experience have been linked to corporate innovation in the private sector (Lin *et al.*, 2011) and culturally diverse boards have been shown to generate higher innovation output (Tang *et al.*, 2021). Beyond these individual-level attributes, research has established that boards with greater functional

diversity and industry-specific expertise are more effective at steering firms through periods of strategic change and technological disruption (Balsmeier *et al.*, 2017; Dalziel *et al.*, 2011). Directors' professional backgrounds have also been found to shape investment decisions and risk-taking behavior (Bernile *et al.*, 2018; Burak Güner *et al.*, 2008). Among the various dimensions of board human capital, directors' overseas experience has attracted increasing attention as a source of distinctive networks and governance capacity.

A first set of findings concerns the governance and transparency effects of directors' overseas experience. Studies of Chinese listed firms report that such directors enhance the information environment by promoting voluntary disclosure and increasing the informativeness of stock prices (Hao *et al.*, 2021; Ullah *et al.*, 2021). These improvements are associated with reduced information asymmetry and a lower probability of stock price crashes (Cao *et al.*, 2019). Directors with overseas experience also display lower levels of tax avoidance (Wen *et al.*, 2020) and stronger adherence to transparent dividend policies (Tao *et al.*, 2022). The common thread across these findings is that overseas experience confers greater independence from local networks and deeper internalization of international governance norms. Giannetti *et al.* (2015) argued that the weaker local ties of these directors strengthen their monitoring capacity, enabling more effective oversight of managerial decisions. Similar governance improvements have been documented in studies examining the effects of board internationalization on audit quality and earnings management across different institutional contexts (Du *et al.*, 2017; Hooghiemstra *et al.*, 2019). This governance channel is directly relevant to the FinTech context, where information asymmetry between the board and management regarding the value and risks of technology investments is likely to be pronounced.

A second set of findings documents the innovation and strategic effects of directors' overseas experience. Yuan and Wen (2018) showed that managerial overseas experience is positively associated with corporate innovation in Chinese non-financial firms, and Tawiah *et al.* (2024) extended this finding to green innovation among returnee directors. Liu (2024) reports that directors' overseas experience reduces corporate carbon emissions through enhanced green innovation capabilities, while Usman *et al.* (2020) found a positive link between board internationalization and green innovation. Beyond innovation narrowly defined, these directors contribute to firm performance and value creation more broadly. Giannetti *et al.* (2015) documented increased total factor productivity and improved financial performance. The theoretical explanation for these effects centers on cognitive diversity: international exposure broadens directors' awareness of emerging technology trends, increases their tolerance for the uncertainty associated with long-term investments.

Despite the breadth of this evidence, the literature on directors' overseas experience contains two significant gaps that our study addresses. First, prior research has systematically excluded financial firms from its samples. Giannetti *et al.* (2015), Tao *et al.* (2022) and Tawiah *et al.* (2024), among others, explicitly drop financial industry observations on the grounds that financial firms have distinctive capital structures and regulatory environments. While this exclusion is methodologically understandable, it means that the effects of directors' overseas experience within the financial sector remain unknown. Second, existing studies measure innovation outcomes primarily through patents, R&D expenditure or general productivity indicators. These measures do not capture FinTech, which involves not only discrete technological outputs but also the integration of digital technologies into business processes and service delivery. The intersection of these two gaps defines the research question of this study: the effect of directors' overseas experience on FinTech adoption in financial firms.

2.3 Hypothesis development

Building on the literature reviewed above, we argue that directors' overseas experience has a positive association with firm-level FinTech adoption in financial institutions. Our reasoning proceeds through three complementary channels.

The first channel concerns knowledge and resources. FinTech adoption in the financial sector involves frontier technologies, including AI-based risk assessment models, blockchain-enabled settlement systems, cloud computing architectures and big data analytics platforms. Directors who have studied or worked in these environments have had direct exposure to the technology ecosystems in which these applications originate (Giannetti *et al.*, 2015; Lee and Roberts, 2015). From the perspective of resource dependence theory (Pfeffer and Salancik, 1978), such directors serve as conduits through which external knowledge and international networks flow into the firm. This is particularly valuable for FinTech investment decisions, which are characterized by high technical complexity and substantial information asymmetry between those who understand the technology and those who do not. Unlike general innovation, FinTech in the financial sector often depends on specific technical architectures and implementation practices that are better understood through firsthand international exposure. Directors with overseas experience can reduce the uncertainty associated with evaluating and deploying these technologies, thereby lowering the effective barriers to adoption.

The second channel operates through cognition and strategic orientation. Upper echelons theory posits that the strategic choices of firms are shaped by the cognitive frameworks and values of their senior decision-makers (Hambrick and Mason, 1984). Educational and professional experiences abroad expose directors to different approaches to risk tolerance and innovation management. In the context of financial firms, this cognitive diversity can be consequential. Directors with overseas experience are more likely to view FinTech as a strategic opportunity rather than an operational risk and to support the allocation of resources toward technology initiatives that may not produce immediate returns. Prior evidence that overseas experience is associated with higher corporate innovation output in non-financial firms (Tawiah *et al.*, 2024; Yuan and Wen, 2018) supports the existence of this pro-innovation cognitive orientation. In the financial sector, where the threshold for initiating technology-driven change is arguably higher than in manufacturing or technology industries, this cognitive channel may be especially important in overcoming organizational inertia.

The third channel relates to monitoring and agency conflict mitigation. Agency theory predicts that managers may underinvest in long-term, uncertain projects such as FinTech because the personal costs of failure (career risk, reputational damage) outweigh the personal benefits of success, which accrue primarily to shareholders (Jensen and Meckling, 1976). FinTech investments are a particularly clear example of this problem: they require large upfront commitments, their outcomes are difficult to evaluate in the short term and their failure is highly visible to regulators and markets. Directors with overseas experience tend to have weaker ties to local business networks, which enhances their independence from management and strengthens their monitoring capacity (Giannetti *et al.*, 2015). Empirical evidence that such directors improve information environments (Hao *et al.*, 2021), reduce tax avoidance (Wen *et al.*, 2020) and lower stock price crash risk (Cao *et al.*, 2019) confirms that their monitoring function is effective. In the FinTech context, this enhanced oversight can counteract managerial short-termism and ensure that technology investment decisions reflect the firm's long-term strategic interests rather than management's risk preferences.

These three channels are expected to operate through both independent and non-independent directors. The functional distinction between the two groups manifests at the channel level rather than in the predicted direction of the effect. Non-independent directors

are directly engaged in managerial decision-making and operational execution, so their overseas exposure is most likely to channel frontier technical knowledge and cross-border relational capital into concrete FinTech investment decisions, making Channel 1 (knowledge and resources) and Channel 2 (cognition and strategic orientation) particularly salient for this group. By contrast, independent directors are primarily tasked with board-level monitoring and strategic oversight; their overseas experience is therefore most likely to operate through Channel 3 (monitoring and agency conflict mitigation), strengthening their capacity to evaluate long-horizon FinTech investments and to constrain managerial short-termism that would otherwise deter such commitments. Yet neither group's dominant channel is sufficient on its own: frontier knowledge without independent oversight risks being captured by managerial short-termism, while monitoring capacity without substantive technological understanding cannot meaningfully evaluate FinTech proposals. The two director types are therefore complementary within the board rather than substitutes.

These three channels are likely to operate simultaneously and reinforce each other. A director who brings frontier technology knowledge (Channel 1) and holds a pro-innovation cognitive orientation (Channel 2) will be more effective if the governance environment supports independent oversight (Channel 3). Together, they generate a clear prediction: boards with a higher proportion of overseas-experienced directors should exhibit greater FinTech adoption. We therefore propose the following hypotheses:

- H1.* Directors' overseas experience is positively associated with firm-level FinTech adoption.
- H2.* The positive association between directors' overseas experience and FinTech adoption holds for both independent and non-independent directors.

3. Research design

3.1 Sample and data source

Our analysis focuses on financial industry firms listed on Shanghai and Shenzhen exchanges from 2008 to 2023, with industry classification following the China Association for Public Companies (CAPCO) criteria. Data on directors' overseas background became available through the China Stock Market and Accounting Research (CSMAR) database in 2008, determining our starting point. We obtain financial and governance data from CSMAR and exchange websites. Following standard practices, we drop observations with ST/*ST status, pre-financial-classification years and missing key variables. Continuous variables are winsorized at 1% and 99% levels. This yields 1,152 observations across 132 companies.

3.2 Variables measurements

3.2.1 Dependent variables. The measurement of FinTech varies considerably across the existing literature, encompassing both macro-level and micro-level approaches. Many studies use macro-level indicators, such as the Peking University Digital Financial Inclusion Index, which are valuable for regional analysis but cannot capture firm-specific strategic initiatives. Other scholars construct firm-level indices by applying text mining to public internet information, such as search engine data (Cheng and Qu, 2020). While offering granularity, these measures are susceptible to the interference of noise and sentiment biases inherent in media data.

To address these limitations, we construct a firm-specific FinTech index based on the textual analysis of annual reports. We argue that annual reports provide a more reliable data source than public media, as they represent an audited, management-verified overview of a

firm's strategic priorities and operational investments. Therefore, the language used in these reports offers a clearer and more direct signal of a firm's substantive commitment to FinTech.

The construction of our FinTech index begins with the development of specialized FinTech lexicons, which are adapted from the bank-focused keyword list of [Wu et al. \(2023\)](#). At the same time, following the conceptual framework introduced by [Qi et al. \(2022\)](#), the keywords are partitioned into two dimensions: technological application and business innovation. The full keywords are provided in [Appendix A](#). Using Python, we calculate the frequency of these keywords in the full text of the annual reports. Our final FinTech index (*FTShare*) is derived by computing the proportion of FinTech-related keywords relative to the total number of words in annual report. This approach generates a firm-specific measure that reflects the intensity of FinTech application and innovation at the individual firm. For robustness, we also use alternative lexicons following prior research ([Wang et al., 2024](#)) in subsequent tests.

3.2.2 Construct validity of dependent variables. A concern with text-based measures of firm behavior is that they may capture managerial disclosure propensity rather than the underlying activity itself. We address this concern for *FTShare* in three complementary ways: an external validation against an audited balance-sheet measure of technology assets, support from the broader literature documenting the informativeness of annual-report text in the Chinese listed-firm setting and a design-based defense rooted in the structure of our identification strategy.

For the external validation, we construct *SoftwareRatio* as the book value of software intangible assets scaled by total assets. Both are obtained from audited financial statements and are reported independently of the textual disclosures from which *FTShare* is derived, providing a benchmark that does not share a common source of measurement error with *FTShare*. *SoftwareRatio* is available for 992 firm-year observations, covering 86.1% of the sample. This coverage is higher than that of alternative balance-sheet proxies of technology investment in our financial-firm sample. We compute the correlation between *FTShare* and *SoftwareRatio* in two complementary ways. The Pearson correlation is 0.083 ($p < 0.01$). To isolate within-firm co-movement and remove time-invariant cross-sectional differences across firms, we residualize both variables on firm and year fixed effects and recompute the correlation on the residuals. The within-firm Pearson correlation is 0.053 ($p < 0.1$). Both estimates are positive.

The magnitudes are modest and this is consistent with the construct validity of *FTShare*. *FTShare* is designed to capture the breadth of a firm's FinTech engagement across both technology application and business-model innovation, while *SoftwareRatio* captures only one narrow channel through which technology investment enters the balance sheet, namely, capitalized software. In the financial-industry setting, a substantial share of FinTech-related expenditure does not flow through this channel: cloud-service procurement and IT outsourcing are typically expensed rather than capitalized, investments in FinTech subsidiaries are recorded under long-term equity investments and joint ventures with technology providers do not generate software intangibles. *FTShare* reflects genuine FinTech adoption while *SoftwareRatio* captures only a partial, accounting-bound slice of the same underlying construct.

Beyond the direct external benchmark, our use of annual-report text as a measure of substantive firm activity is supported by prior work. [Loughran and McDonald \(2016\)](#) in their comprehensive survey of textual analysis in accounting and finance, document that annual-report language carries substantive information about firms' actual operations and risks, and that disclosure-based measures correlate meaningfully with subsequent real outcomes. Using a sample of Chinese listed firms and combining textual analysis with manual reading of

annual reports, [Zhai et al. \(2022\)](#) showed that text-based measures of digital transformation align with firms' actual operating performance and innovation outcomes. This evidence supports the view that mandatory annual-report narratives carry substantive informational content rather than serving as pure impression management, and that textual measures derived from such disclosures can serve as meaningful proxies for the underlying firm-level activity they describe.

In addition, the disclosure-propensity concern is mitigated by the structure of our empirical design. Disclosure tendencies are typically institutional characteristics that are relatively stable within a firm over time: a firm with a cautious or expansive narrative style tends to maintain that style across reporting years. Our main specifications include firm fixed effects, which absorb all such time-invariant within-firm characteristics, including disclosure style. The variation in *FTShare* is therefore the within-firm, year-to-year change in textual FinTech intensity, which is far more plausibly driven by actual changes in technology activity than by year-to-year fluctuations in disclosure preference. Combined with the positive external correlation reported above and the literature on the informativeness of annual-report text, this design feature supports the interpretation of *FTShare* as a measure of firm-level FinTech adoption.

3.2.3 Independent variables. Our key independent variable is the overseas experience of board members. Following established literature ([Giannetti et al., 2015](#); [Tao et al., 2022](#)), directors are considered to possess overseas experience when they have pursued education or undertaken employment outside mainland China. We quantify this as the share of directors with such experience on the board, denoted as *BoardOverseaRatio*. To test whether the impact of overseas experience differs across director roles, we adopt the approach of [Wen et al. \(2020\)](#) and construct two additional variables. *OverseaIndepRatio* measures the share of independent directors possessing such experience, whereas *OverseaNonIndepRatio* represents the corresponding share for non-independent directors. Furthermore, we substitute the primary variable with two refined measures: *OverseasEduRatio*, capturing the share of directors possessing overseas educational experience and *OverseasWorkRatio*, reflecting the share of directors possessing overseas work experience.

3.2.4 Control variables. Following prior studies ([Giannetti et al., 2015](#); [Tawiah et al., 2024](#); [Wen et al., 2020](#)), we incorporate control variables that may affect firm-level FinTech. These controls capture firm-specific and board-related characteristics. Firm-level controls include firm asset (*lnSize*), financial leverage (*Leverage*), return on equity (*ROE*), firm age (*lnFirmAge*) and state ownership (*SOE*). Board-level controls comprise the share of independent directors (*IndepDirRatio*), the average age of board members (*lnBoardAgeAvg*), the frequency of board meetings (*lnMtgFreq*), the presence of CEO duality (*Duality*) and the shareholding of the ten largest shareholders (*TopTenHoldersRate*). Variables definitions are presented in [Appendix 2](#).

3.3 Estimation methodology

We adopt two-way fixed effects to address omitted variable bias. Firm fixed effects control for time-invariant unobservables, while year fixed effects absorb macroeconomic shocks and common trends. Standard errors are clustered at the firm level to account for heteroskedasticity and serial correlation. The empirical model is expressed as follows:

$$FTShare_{it} = \beta_0 + \beta_1 BoardOverseaRatio_{it} + \gamma Z_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (1)$$

FTShare denotes the FinTech disclosure intensity in firm *i*'s annual report in year *t* and *BoardOverseaRatio* reflects the proportion of board members possessing overseas experience. *Z* contains other firm-specific and board-related controls. Unobserved

heterogeneity across firms and years is captured by μ_i and λ_t . Variables definitions are presented in [Appendix 2](#).

3.4 Descriptive statistics and correlation analysis

[Table 1](#) presents the descriptive statistics. The sample mean of our dependent variable is 14.50%. For our primary independent variables, the average share of directors possessing overseas experience is 16.90%, which includes independent directors with overseas experience (*OverseaIndRatio*, mean = 10.50%) and non-independent directors with overseas experience (*OverseaNonIndRatio*, mean = 6.30%). In addition, the ratios of directors possessing overseas education experience (*OverseaEduRatio*) and overseas work experience (*OverseaWorkRatio*) are 11.40% and 10.80%, respectively. The sample is characterized by substantial state ownership, with 55.20% of firms being state-owned enterprises (SOEs). With respect to corporate governance, CEO duality is observed in 10.50% of firm-year observations and the top ten shareholders hold an average of 64.80% of shares.

The Pearson correlation matrix is displayed in [Table 2](#). As anticipated, the alternative proxies for directors' overseas experience show high positive correlations with one another. To address potential multicollinearity concerns, we include these measures in separate regression models rather than simultaneously. The correlations among the remaining variables are within acceptable ranges. In addition, in unreported tests, we confirm that the variance inflation factor (VIF) for all regression models remains below 5, providing further evidence that multicollinearity does not undermine our results. Importantly, the matrix reveals positive and statistically significant associations between *FTShare* and the key independent variables, offering preliminary support for our main hypothesis.

4. Main empirical results

4.1 Baseline results

4.1.1 Directors' overseas experience and firm FinTech. Column (1) of [Table 3](#) shows $\beta_1 = 0.111$ ($p < 0.01$), supporting our main hypothesis. From an economic perspective, a one-

Table 1. Descriptive statistics

Variable	N	Mean	SD	P25	Median	P75
<i>FTShare</i>	1,152	0.145	0.120	0.065	0.105	0.186
<i>BoardOverseasRatio</i>	1,152	0.169	0.157	0.000	0.138	0.267
<i>OverseaIndRatio</i>	1,152	0.105	0.105	0.000	0.091	0.182
<i>OverseaNonIndRatio</i>	1,152	0.063	0.089	0.000	0.000	0.111
<i>OverseaEduRatio</i>	1,152	0.114	0.133	0.000	0.077	0.182
<i>OverseaWorkRatio</i>	1,152	0.108	0.116	0.000	0.091	0.176
<i>lnSize</i>	1,152	26.197	2.313	24.606	26.024	27.864
<i>Leverage</i>	1,152	0.775	0.180	0.708	0.806	0.920
<i>ROE</i>	1,152	0.096	0.078	0.056	0.095	0.135
<i>lnFirmAge</i>	1,152	3.064	0.342	2.904	3.128	3.291
<i>SOE</i>	1,152	0.552	0.497	0.000	1.000	1.000
<i>IndDirRatio</i>	1,152	0.371	0.043	0.333	0.364	0.400
<i>lnBoardAgeAvg</i>	1,152	3.982	0.063	3.942	3.988	4.027
<i>lnMtgFreq</i>	1,152	2.255	0.345	1.946	2.303	2.485
<i>Duality</i>	1,152	0.105	0.307	0.000	0.000	0.000
<i>TopTenHoldersRate</i>	1,152	64.804	18.513	51.240	64.255	77.425

Note(s): [Appendix 2](#) provides variables definitions

Table 2. Pearson correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. FTShare	1.000							
2. BoardOverseaRatio	0.245***	1.000						
3. OverseaIndepRatio	0.146***	0.840***	1.000					
4. OverseaNonIndepRatio	0.253***	0.764***	0.295***	1.000				
5. OverseaEduRatio	0.237***	0.892***	0.789***	0.633***	1.000			
6. OverseaWorkRatio	0.250***	0.840***	0.673***	0.679***	0.630***	1.000		
7. InSize	0.389***	0.504***	0.448***	0.360***	0.496***	0.445***	1.000	
8. Leverage	0.270***	0.306***	0.244***	0.251***	0.325***	0.238***	0.766***	1.000
9. ROE	0.090***	0.283***	0.206***	0.260***	0.223***	0.276***	0.374***	0.279***
10. lnFirmAge	0.130***	0.105***	0.057*	0.118***	0.103***	0.146***	0.033	-0.078***
11. SOE	-0.239***	0.035	0.070**	-0.022	0.043	0.009	0.046	-0.040
12. IndDirRatio	0.137***	0.110***	0.197***	-0.047	0.166***	0.064***	0.090***	0.076***
13. lnBoardAgeAvg	0.198***	0.330***	0.320***	0.203***	0.286***	0.326***	0.548***	0.315***
14. lnMitgFreq	0.013	0.060**	0.065**	0.023	0.096***	0.024	0.126***	0.069***
15. Duality	0.053*	-0.002	-0.012	0.020	-0.035	0.034	-0.121***	-0.103***
16. TopTenHoldersRate	0.071**	0.293***	0.296***	0.161***	0.300***	0.218***	0.320***	0.127***

Note(s): Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(continued)

Table 2. Continued

Variable	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1. FTShare								
2. BoardOverseaRatio								
3. OverseaIndepRatio								
4. OverseaNonIndepRatio								
5. OverseaEduRatio								
6. OverseaWorkRatio								
7. lnSize								
8. Leverage								
9. ROE	1.000							
10. lnFirmAge	-0.118***	1.000						
11. SOE	0.032	-0.014	1.000					
12. IndDirRatio	-0.051*	0.041	-0.009	1.000				
13. lnBoardAgeAvg	0.181***	0.121***	0.047	0.263***	1.000			
14. lnMtgFreq	0.043	0.056*	0.099***	0.027	0.058**	1.000		
15. Duality	-0.046	0.019	-0.022	0.050*	-0.070**	-0.069**	1.000	
16. TopTenHoldersRate	0.092***	0.020	0.366***	0.088***	0.174***	0.208***	-0.052*	1.000

standard-deviation increase in the share of overseas-experienced directors corresponds to a 1.74 percentage-point gain in *FinTech*.

Following prior studies (Wen *et al.*, 2020), we further explore whether the impact of directors' overseas experience on firm *FinTech* differs between independent and non-independent directors. Theoretically, non-independent directors who are more actively engaged in managerial decision-making and operational processes, may advocate *FinTech* adoption to strengthen competitive positioning and improve efficiency. Conversely, independent directors may foster *FinTech* development as part of their monitoring function, enhancing information transparency and governance quality. As represented in Column (2) of Table 3, the coefficients for the proportions of independent and non-independent directors possessing overseas experience are 0.103 and 0.119, respectively, both statistically significant. Although the coefficient associated with non-independent directors is marginally higher, the findings indicate that both groups contribute positively to firm-level *FinTech*. This evidence suggests that firm *FinTech* is jointly driven by the strategic expertise of non-independent directors and the monitoring roles of independent directors possessing overseas experience.

Following the methodological approaches of Zhang *et al.* (2018) and Tao *et al.* (2022), we further disaggregate directors' overseas experience into two dimensions: educational and professional. *OverseaEduRatio* denotes the share of directors who have received education abroad, whereas *OverseaWorkRatio* captures the share who have acquired overseas work experience. The findings reported in Columns (3) and (4) of Table 3 suggest that both *OverseaEduRatio* (coefficient = 0.165) and *OverseaWorkRatio* (coefficient = 0.142) exhibit positive and statistically significant relationships with firm-level *FinTech*.

Table 3. Directors' overseas experience and firm *FinTech*

Variable	(1) FTShare	(2) FTShare	(3) FTShare	(4) FTShare
BoardOverseaRatio	0.111*** (2.65)			
OverseaIndepRatio		0.103* (1.89)		
OverseaNonIndepRatio		0.119* (1.72)		
OverseaEduRatio			0.165*** (3.63)	
OverseaWorkRatio				0.142*** (2.80)
lnSize	-0.014 (-0.76)	-0.015 (-0.78)	-0.012 (-0.68)	-0.014 (-0.73)
Leverage	-0.080 (-0.97)	-0.079 (-0.97)	-0.090 (-1.11)	-0.080 (-0.97)
ROE	0.078* (1.67)	0.079* (1.66)	0.080* (1.75)	0.078 (1.64)
lnFirmAge	0.036 (0.50)	0.036 (0.48)	0.032 (0.42)	0.035 (0.53)
SOE	-0.023 (-1.20)	-0.023 (-1.23)	-0.021 (-1.08)	-0.025 (-1.31)
IndDirRatio	-0.015 (-0.15)	-0.009 (-0.09)	-0.051 (-0.51)	-0.002 (-0.02)
lnBoardAgeAvg	-0.092 (-0.96)	-0.090 (-0.95)	-0.087 (-0.97)	-0.097 (-0.96)
lnMtgFreq	0.003 (0.32)	0.003 (0.32)	0.003 (0.35)	0.002 (0.19)
Duality	0.008 (0.88)	0.008 (0.88)	0.009 (1.05)	0.010 (1.15)
TopTenHoldersRate	0.003*** (4.74)	0.003*** (4.69)	0.003*** (4.74)	0.003*** (4.88)
Constant	0.639 (1.11)	0.636 (1.09)	0.610 (1.11)	0.640 (1.11)
Year fixed	Yes	Yes	Yes	Yes
Firm fixed	Yes	Yes	Yes	Yes
Observations	1,149	1,149	1,149	1,149
Within R^2	0.127	0.126	0.138	0.130
Adjusted R^2	0.728	0.728	0.732	0.729

Note(s): Appendix 2 provides variables definitions. *t*-statistics (in brackets) use firm-level clustered errors
Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.1.2 *Disaggregating the effect: technological application versus business innovation.* To explore the heterogeneous effects of directors' overseas experience on firm-level FinTech, we follow the classification framework proposed by [Qi et al. \(2022\)](#) and [Wu et al. \(2023\)](#), dividing FinTech into two core dimensions: technological application (*FTShare_Tech*) and business innovation (*FTShare_Business*). The technological application dimension captures the extent to which firms adopt digital technologies, such as Information Technology and Internet Technology. In contrast, the business innovation dimension reflects enhancements in the design and delivery of financial products and services. The corresponding empirical results are shown in [Table 4](#).

The findings indicate a positive and significant association between directors' overseas experience and firms' technological application. One plausible explanation is that directors with overseas experience possess expertise in frontier technologies. This knowledge enables them to provide critical guidance and resources, enhancing the firm's absorptive capacity for sophisticated technology. Moreover, their global perspective may foster a greater tolerance for the high-risk and long-term investments in technological innovation.

In addition, we find no significant association between directors' overseas experience and business innovation. This result likely stems from the fact that business model innovation is deeply embedded in the local context. And business innovation requires a nuanced understanding of domestic market conditions, consumer behavior and institutional frameworks. While directors with overseas experience offer a valuable global perspective, they may lack the specific local knowledge and social capital necessary to drive customer-facing innovation within the unique Chinese market. Consequently, the detachment from local networks that may strengthen their monitoring role could simultaneously impede their effectiveness in market-specific business innovation.

Table 4. Disaggregating the effect: technological application versus business innovation

Variable	(1) FTShare_Tech	(2) FTShare_Business
BoardOverseaRatio	0.095** (2.58)	0.013 (1.44)
lnSize	-0.011 (-0.71)	-0.004 (-1.08)
Leverage	-0.062 (-0.90)	-0.015 (-1.00)
ROE	0.071* (1.71)	0.003 (0.25)
lnFirmAge	0.027 (0.46)	0.008 (0.45)
SOE	-0.019 (-1.33)	-0.004 (-0.62)
IndDirRatio	-0.047 (-0.52)	0.028 (1.26)
lnBoardAgeAvg	-0.054 (-0.62)	-0.039** (-2.15)
lnMtgFreq	0.004 (0.51)	-0.001 (-0.58)
Duality	0.008 (1.06)	-0.000 (-0.05)
TopTenHoldersRate	0.002*** (4.52)	0.000*** (3.68)
Constant	0.437 (0.88)	0.223* (1.93)
Year fixed	Yes	Yes
Firm fixed	Yes	Yes
Observations	1149	1149
Within R ²	0.122	0.056
Adjusted R ²	0.705	0.729

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2 Robustness checks

4.2.1 Alternative measures of variables. We use several alternative variable specifications to further check the robustness. First, we substitute the dependent variable with the alternative proxy for FinTech intensity, defined as the natural logarithm of one plus the frequency of FinTech-related words (*lnFTFreq*). Second, we adopt an alternative FinTech lexicon following prior research (Wang et al., 2024) to construct a new dependent variable *FTShare1*, with the detailed keywords provided in Appendix 3. Finally, following (Tao et al., 2022), we substitute the primary independent variable with the absolute count of directors possessing overseas experience (*BoardOverseaNum*).

As shown in Columns (1) and (2) of Table 5, β_1 remains positive and statistically significant when either *lnFTFreq* or *FTShare1* is used as the dependent variable. Moreover, Column (3) demonstrates that *BoardOverseaNum* also exhibits a positive and significant association with *FTShare*. Collectively, these results reinforce the robustness across alternative measurement specifications.

4.2.2 Alternative model specifications. Table 6 examines alternative fixed-effects specifications. Column (1) reproduces the baseline with firm and year effects ($\beta_1 = 0.111$, $p < 0.01$). Column (2) replaces firm effects with industry effects following CAPCO classification, maintaining statistical significance. Column (3) uses a more stringent specification with firm and industry-by-year interaction effects to absorb time-varying sectoral shocks. Across all models, the positive association persists, confirming the estimated relationship is not driven by cross-sectional composition or contemporaneous industry fluctuations.

4.2.3 Additional robustness tests. We conduct several additional checks to further assess the robustness. First, to mitigate potential reverse causality issues that firms' existing FinTech strategy might influence the hiring of directors possessing overseas experience, we

Table 5. Alternative measures of variables

Variable	(1) <i>lnFTFreq</i>	(2) <i>FTShare1</i>	(3) <i>FTShare</i>
<i>BoardOverseaRatio</i>	0.476** (2.18)	0.017** (2.37)	
<i>BoardOverseaNum</i>			0.007** (2.00)
<i>lnSize</i>	0.007 (0.05)	-0.003 (-0.99)	-0.015 (-0.79)
<i>Leverage</i>	0.333 (0.71)	-0.005 (-0.43)	-0.081 (-0.98)
<i>ROE</i>	0.929*** (2.90)	0.007 (0.96)	0.086* (1.77)
<i>lnFirmAge</i>	0.250 (0.80)	-0.014 (-1.47)	0.039 (0.53)
<i>SOE</i>	-0.117 (-1.05)	-0.004* (-1.85)	-0.023 (-1.19)
<i>IndDirRatio</i>	-0.068 (-0.16)	-0.034** (-2.11)	0.010 (0.10)
<i>lnBoardAgeAvg</i>	0.134 (0.25)	-0.022 (-1.27)	-0.087 (-0.90)
<i>lnMtgFreq</i>	0.026 (0.45)	-0.003 (-1.60)	0.003 (0.32)
<i>Duality</i>	0.087 (1.18)	0.000 (0.28)	0.008 (0.94)
<i>TopTenHoldersRate</i>	0.015*** (4.27)	0.000** (2.29)	0.003*** (4.80)
Constant	1.534 (0.43)	0.225** (2.35)	0.628 (1.06)
Year fixed	Yes	Yes	Yes
Firm fixed	Yes	Yes	Yes
Observations	1,149	1,149	1,149
Within R^2	0.086	0.050	0.121
Adjusted R^2	0.803	0.700	0.727

Note(s): Appendix 2 provides variables definitions. *t*-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Alternative model specifications

Variable	(1) FTShare	(2) FTShare	(3) FTShare
BoardOverseaRatio	0.111*** (2.65)	0.114** (2.09)	0.079** (2.26)
lnSize	−0.014 (−0.76)	0.016** (2.53)	0.025** (2.45)
Leverage	−0.080 (−0.97)	−0.129 (−1.32)	−0.024 (−0.69)
ROE	0.078* (1.67)	0.017 (0.12)	0.018 (0.59)
lnFirmAge	0.036 (0.50)	−0.009 (−0.54)	0.026 (0.46)
SOE	−0.023 (−1.20)	−0.038*** (−3.40)	−0.009 (−0.88)
lnDirRatio	−0.015 (−0.15)	0.141 (1.29)	−0.042 (−0.53)
lnBoardAgeAvg	−0.092 (−0.96)	−0.208 (−1.50)	−0.041 (−0.72)
lnMtgFreq	0.003 (0.32)	−0.008 (−0.57)	−0.004 (−0.59)
Duality	0.008 (0.88)	0.043* (1.85)	0.002 (0.23)
TopTenHoldersRate	0.003*** (4.74)	0.000 (0.96)	0.001** (2.00)
Constant	0.639 (1.11)	0.624 (1.11)	−0.457 (−1.40)
Year fixed	Yes	Yes	
Firm fixed	Yes		Yes
Industry fixed		Yes	
Industry × year fixed			Yes
Observations	1,149	1,149	1,149
Within R^2	0.127	0.123	0.039
Adjusted R^2	0.728	0.365	0.798

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

re-estimate the baseline model using a one-year lagged value of the main explanatory variable. In Table 7, Column (1) reports a β_1 of 0.097 for the lagged proportion of directors with overseas experience (*L1_BoardOverseaRatio*), which remains statistically significant. This finding suggests that the prior board’s overseas experience significantly predicts the firm’s subsequent FinTech application and innovation.

Second, we perform a subsample analysis to address potential self-selection bias, where firms appointing directors with overseas experience may differ systematically from those that do not. We narrow down the sample to firms that appointed at least one such director during the observation period. As reported in Column (2) of Table 7, β_1 remains positive and statistically significant, thereby alleviating concerns regarding potential self-selection bias.

Third, we use a firm-level clustered bootstrap procedure with 2,000 replications to compute bias-corrected and accelerated (BCa) confidence intervals, thereby relaxing the reliance on asymptotic assumptions of cluster-robust standard errors. In Column (3) of Table 7, the 99% BCa confidence interval for *BoardOverseaRatio* does not contain zero and the coefficients on the control variables are qualitatively similar to our baseline estimates. This finding reinforces the robustness of our statistical inferences.

5. Addressing potential endogeneity issues

5.1 Heckman two-step analysis

The appointment of directors with overseas experience is unlikely to be random. Firms that ultimately recruit such directors may differ systematically from those that do not along dimensions, that are themselves correlated with the propensity to adopt FinTech. Treating the appointment decision as exogenous would therefore conflate a selection effect with the

Table 7. Additional robustness checks

Variable	(1) FTShare	(2) FTShare	(3) FTShare
L1_BoardOverseaRatio	0.097** (2.04)		
BoardOverseaRatio		0.113*** (2.70)	0.111*** (2.64)
lnSize	−0.016 (−0.70)	−0.022 (−1.04)	−0.014 (−0.69)
Leverage	−0.153 (−1.59)	−0.081 (−0.96)	−0.080 (−0.89)
ROE	0.089* (1.80)	0.065 (1.31)	0.078 (1.50)
lnFirmAge	0.028 (0.35)	0.032 (0.44)	0.036 (0.47)
SOE	−0.021 (−1.05)	−0.023 (−1.20)	−0.023 (−1.15)
IndDirRatio	−0.011 (−0.10)	−0.038 (−0.37)	−0.015 (−0.15)
lnBoardAgeAvg	−0.046 (−0.50)	−0.112 (−1.07)	−0.092 (−0.94)
lnMtgFreq	0.005 (0.51)	0.004 (0.41)	0.003 (0.32)
Duality	0.008 (0.90)	0.008 (0.79)	0.008 (0.85)
TopTenHoldersRate	0.003*** (4.09)	0.003*** (4.61)	0.003*** (4.49)
Constant	0.597 (0.91)	0.928 (1.51)	0.639 (1.02)
Year fixed	Yes	Yes	Yes
Firm fixed	Yes	Yes	Yes
Observations	1,017	1,036	1,149
Within R^2	0.118	0.133	0.127
Adjusted R^2	0.733	0.721	0.728

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

causal channel of interest (Tao *et al.*, 2022; Yuan and Wen, 2018). To address this concern, we estimate a Heckman (1979) two-step model.

In the first stage, we model the probability that a firm appoints at least one director with overseas experience using a probit specification. The dependent variable (*Oversea_Dummy*) equals one if the firm has appointed such a director in a given firm-year and zero otherwise. The first stage includes the full set of firm-level controls used in the baseline regression as well as year fixed effects, with standard errors clustered at the firm level. From this stage we recover the inverse Mills ratio (*Mills_Ratio*), which is then included as an additional regressor in the second-stage outcome equation. The second stage retains the two-way fixed-effects structure of the baseline (firm and year), with standard errors clustered at the firm level.

5.1.1 Exclusion restrictions. We leverage two historically determined, geography-driven instruments that are plausibly exogenous to firms' current FinTech adoption decisions yet predictive of both the local availability of and receptiveness toward talent with international exposure. To sharpen identification and avoid relying on a purely cross-sectional historical marker, we interact each historical variable with a national, time-varying measure of China's overseas-returnee wave (*Return_Ratio*, the national annual ratio of returning overseas students to outbound overseas students), consistent with the "historical-stock $\times$ contemporary-shock" design (Nunn and Qian, 2014). We denote the two exclusion restrictions as *IV1* (*BRITISH* $\times$ *Return_Ratio*) and *IV2* (*Christian_College* $\times$ *Return_Ratio*).

BRITISH equals one if the firm's headquarters city was a British concession or leased territory during the late Qing period (Ang *et al.*, 2014; Tawiah *et al.*, 2024; Wen *et al.*, 2020). Following this literature, we interpret the variable as a marker of historical exposure to Western institutions: cities with this feature developed early and persistent contact with

foreign legal, commercial and educational practices, leaving an imprint on local foreign-language infrastructure and the social acceptability of returnee professionals. Interacting *BRITISH* with *Return_Ratio* yields an instrument that captures how strongly a city's historical exposure to Western institutions translates into actual returnee-director appointments.

Christian_College equals one if the firm's headquarters province hosted a Christian (missionary-founded) college by 1920. These institutions were the principal early conduits through which Chinese students were prepared for and channelled toward overseas study, leaving a lasting educational-internationalization legacy. Interacted with *Return_Ratio*, the variable (*IV2*) measures how strongly a province's missionary-college educational legacy converts into returnee-director appointments as the national returnee tide rises.

The two instruments capture two conceptually independent historical mechanisms. *IV1* reflects a city's broad early exposure to Western institutions through the territorial presence of a foreign power; *IV2* reflects a province's specific historical investment in the educational pipeline. Because the two variables originate in different historical processes, geographically overlap only partially and load on different dimensions of openness to foreign-trained talent, they offer two largely independent identification strategies. We exploit this independence directly by estimating two separate Heckman models and treat consistency between the two as the central robustness criterion.

The exclusion restriction is defensible on three grounds. First, both *BRITISH* and *Christian_College* are predetermined historical characteristics measured at the regional level and fixed long before the emergence of modern corporate FinTech. Second, identification does not come from the cross-sectional levels of these historical variables alone, but from their interaction with *Return_Ratio*, whose time variation is national in scope and therefore orthogonal to any individual firm's FinTech adoption decision. Third, the second stage absorbs firm and year fixed effects. Because *BRITISH* and *Christian_College* are time-invariant at the firm level, any direct effect they might have on FinTech adoption through a stable local characteristic (e.g. the general level of financial development in historically cosmopolitan cities) is absorbed by the firm fixed effect. Similarly, any direct effect of *Return_Ratio* through common national trends (e.g. a rising technology climate) is absorbed by the year fixed effect. Identification of the interacted instrument therefore relies on a much narrower source of variation: within-firm deviations that are correlated with the national returnee wave only through the historical channel and that are not shared across all firms in a given year.

5.1.2 Results. Table 8 reports the Heckman estimates from the two specifications. Columns (1) and (2) use *IV1*; Columns (3) and (4) use *IV2*. Within each block, the first column reports the first-stage probit and the second column reports the second-stage outcome equation.

The first stages confirm instrument relevance. In Column (1), *IV1* enters the selection equation positively and significantly ($\beta = 0.0052$, $z = 2.33$, $p = 0.020$). In Column (3), *IV2* is likewise positive and significant ($\beta = 0.0041$, $z = 2.32$, $p = 0.021$). The second stages reported in Columns (2) and (4), are estimated by two-way fixed-effects OLS with firm-clustered standard errors. The coefficient on *BoardOverseaRatio* is positive, statistically significant at the 1% level and economically very close across the two models: $\beta = 0.111$ ($t = 2.70$, $p = 0.008$) under *IV1* and $\beta = 0.110$ ($t = 2.64$, $p = 0.009$) under *IV2*. That two specifications deliver nearly identical coefficients with overlapping confidence intervals of [0.030, 0.192] and [0.028, 0.193].

Table 8. Heckman two-step analysis

Variable	(1)	(2)	(3)	(4)
	Model 1: <i>IV1</i> First stage <i>Oversea_Dummy</i>	Model 1: <i>IV1</i> Second stage <i>FTShare</i>	Model 2: <i>IV2</i> First stage <i>Oversea_Dummy</i>	Model 2: <i>IV2</i> Second stage <i>FTShare</i>
<i>Exclusion restriction</i>				
<i>IV1</i>	0.0052** (2.33)	—	—	—
<i>IV2</i>	—	—	0.0041** (2.32)	—
Main regressor				
<i>BoardOverseaRatio</i>	—	0.1111*** (2.70)	—	0.1104*** (2.64)
<i>Selection correction</i>				
<i>Mills_Ratio</i>	—	0.0875 (1.63)	—	−0.0309 (−0.63)
<i>Firm-level controls</i>				
<i>LnSize</i>	0.3964*** (4.80)	0.0031 (0.14)	0.3795*** (4.56)	−0.0203 (−0.90)
<i>Leverage</i>	−1.4283 (−1.61)	−0.1411 (−1.47)	−1.6013* (−1.86)	−0.0563 (−0.57)
<i>ROE_main</i>	0.6929 (0.54)	0.1149** (2.19)	0.5661 (0.44)	0.0648 (1.19)
<i>lnFirmAge</i>	0.1835 (0.64)	0.0454 (0.63)	0.2513 (0.93)	0.0321 (0.45)
<i>SOE</i>	−0.2314 (−1.18)	−0.0321* (−1.74)	−0.2645 (−1.39)	−0.0195 (−1.01)
<i>IndDirRatio</i>	0.0780 (0.05)	−0.0056 (−0.06)	0.1700 (0.11)	−0.0192 (−0.20)
<i>lnBoardAgeAvg</i>	−0.3762 (−0.24)	−0.1129 (−1.20)	−0.0194 (−0.01)	−0.0926 (−0.96)
<i>lnMtgFreq</i>	−0.4636** (−2.13)	−0.0129 (−0.92)	−0.3624* (−1.69)	0.0073 (0.60)
<i>Duality</i>	−0.1125 (−0.58)	0.0037 (0.41)	−0.0779 (−0.41)	0.0086 (0.99)
<i>TopTenHoldersRate</i>	0.0110** (2.04)	0.0034*** (4.76)	0.0121** (2.19)	0.0027*** (3.47)
Constant	−6.420 (−1.08)	0.241 (0.40)	−7.805 (−1.39)	0.809 (1.23)
Year fixed	Yes	Yes	Yes	Yes
Firm fixed	No	Yes	No	Yes
Observations	1,152	1,149	1,152	1,149
Pseudo <i>R</i> ²	0.225		0.224	
Within <i>R</i> ²	—	0.131	—	0.127
Adjusted <i>R</i> ²		0.729		0.728

Note(s): Columns (1) and (3) report the first-stage probit selection equation, with *Oversea_Dummy* (=1 if the firm has appointed at least one director with overseas experience) as the dependent variable. Columns (2) and (4) report the second-stage outcome equation, estimated by two-way (firm and year) fixed-effects OLS with the inverse Mills ratio (*Mills_Ratio*) recovered from the corresponding first stage included as an additional regressor. The dependent variable in the second stage is *FTShare*, the firm-level FinTech adoption measure. *BRITISH* is a city-level dummy equal to One if the firm's headquarters city was a British concession or leased territory during the late Qing period. *Christian_College* is a province-level dummy equal to one if the headquarters province hosted a Christian (missionary-founded) college by 1920. *Return_Ratio* is the national annual ratio of returning overseas students to outbound overseas students (in percent). *IV1* is constructed as *BRITISH* × *Return_Ratio*; *IV2* is constructed as *Christian_College* × *Return_Ratio*. Year fixed effects are included in all specifications; firm fixed effects are included in the second-stage outcome equations. Three singleton observations are dropped in each second-stage estimation. Standard errors are clustered at the firm level. z-statistics (Columns 1 and 3) and t-statistics (Columns 2 and 4) are reported in parentheses. Significance: **p* < 0.10, ***p* < 0.05, ****p* < 0.01

The inverse Mills ratio carries information about the nature of any selection bias. In Column (2) and (4), the coefficients on *Mills_Ratio* are not statistically significant. And the coefficient on *BoardOverseaRatio* remains positive and significant (*p* < 0.01). In sum, two Heckman specifications yield essentially the same conclusion as the baseline OLS regression: the share of directors with overseas experience exerts a statistically significant and economically meaningful effect on firm-level FinTech adoption, and this conclusion is not an artefact of self-selection into appointing such directors.

5.2 Propensity score matching method

A further concern is that firms with overseas-experienced directors may differ systematically from those without, and that these underlying differences could drive our findings. To address this potential selection bias on observables, we implement propensity score matching (PSM) using two complementary treatment definitions. We begin with a strict binary specification that defines treatment status by the mere presence of any overseas-experienced director (Panel A), and then turn to the mean-split specification used in our main analysis and in prior work on returnee directors (Tawiah *et al.*, 2024) (Panel B). Comparing the two panels is informative about both the structural matching challenges that arise in our financial-industry sample and the appropriate identification strategy for testing our hypothesis.

5.2.1 Propensity score matching with a binary treatment definition. We first construct a binary treatment indicator (*Treat_Oversea*), that equals one if the firm has at least one overseas-experienced director on its board and zero otherwise. We estimate the propensity score using a logistic regression of *Treat_Oversea* on all baseline control variables and year fixed effects, and then implement three matching algorithms: radius matching with a caliper of 0.01, nearest-neighbor matching with five neighbors and kernel matching. Standard errors in the post-matching regressions are clustered at the firm level.

The first-stage logistic regression yields a pseudo R^2 of 0.209, indicating that the presence of overseas-experienced directors is highly predictable from observable firm characteristics. Firm size ($z=9.17$), shareholding concentration ($z=4.11$), leverage ($z=-4.02$), state ownership ($z=-3.32$) and board meeting frequency ($z=-3.28$) all enter the model as strong predictors. In substantive terms, large, state-controlled financial institutions with concentrated ownership almost invariably appoint overseas-experienced directors, whereas smaller and privately controlled institutions often do not. This pattern implies that the binary treatment distinguishes two structurally different types of financial firms, rather than otherwise comparable firms whose director composition varies idiosyncratically.

The matching diagnostics confirm this concern. Between 14.0% and 21.7% of treated observations fall outside the common support region across the three algorithms and are excluded from matching. More importantly, the post-matching joint balance test rejects the null of no systematic difference between treated and control groups across all three specifications ($p < 0.001$), with Rubin's B statistic ranging from 52.2% to 62.3% (well above the 25% threshold). The single most informative diagnostic concerns state ownership: prior to matching, the treated and control groups exhibit a negligible difference in SOE (standardized bias = 1.2%, $p = 0.857$), but after matching the bias rises sharply to between 30.2% and 47.0% ($p < 0.001$ in all specifications). This deterioration arises because the matching algorithm, in its attempt to balance firm size, is forced to pair large state-owned financial institutions with smaller non-state-owned firms, thereby introducing imbalance on dimensions that were originally balanced. Firm size itself remains significantly imbalanced after matching (standardized bias between 11.0% and 25.8%) and similar patterns appear for board meeting frequency and CEO duality. These diagnostics indicate that the binary treatment definition creates a structural matching problem in the financial-industry sample that cannot be resolved by standard matching algorithms.

Panel A of Table 10 reports the post-matching regression results. The coefficient on *BoardOverseaRatio* remains positive across all three matching methods (0.031–0.039), consistent in sign with our baseline estimates, but it is not statistically significant in any specification. We interpret the lack of significance not as evidence against an underlying effect, but because of the matching failure documented above: when the matching procedure

cannot achieve covariate balance, the resulting estimates lack the statistical power needed for reliable inference.

5.2.2 Propensity score matching with a continuous-treatment-based definition. To address the structural matching challenge identified above, we adopt the treatment definition used by [Tawiah et al. \(2024\)](#) in their study of returnee directors and corporate green innovation. Under this specification, *Treat_Oversea* equals one if the firm's proportion of overseas-experienced directors exceeds the sample mean and zero otherwise. The intuition is that it preserves a substantially larger overlap region between the treated and control distributions: firms with very low (but non-zero) proportions of overseas-experienced directors under the binary definition are pooled with the highest-proportion firms in the treated group. But now these firms serve as control observations whose covariate profiles are closer to those of the treated firms. As a result, the matching procedure is asked to balance comparable firms rather than to bridge a structural divide.

The first-stage logistic regression for this specification has a Pseudo R^2 of 0.206, comparable in magnitude to that of Panel A. However, the matching quality differs sharply between the two specifications. Only 13.7% of treated observations fall outside the common support region and critically the post-matching joint balance test fails to reject the null of no systematic difference across all three matching methods ($p = 0.430, 0.584$ and 0.773 for nearest-neighbor, radius and kernel matching, respectively). The mean standardized bias declines to between 4.1% and 5.1% and Rubin's B statistic falls to between 17.6 and 21.9, below the 25% threshold. [Table 9](#) reports the variable-by-variable balance statistics for radius matching, showing that none of the ten covariates differs significantly between the matched groups.

Panel B of [Table 10](#) presents the post-matching regression results. The coefficient on *BoardOverseaRatio* is positive and statistically significant at the 1% level across all three matching methods, with magnitudes (0.124–0.131) comparable to the baseline estimate. The consistency of these results, together with the successful balance diagnostics, indicates that the positive association between directors' overseas experience and firm-level FinTech adoption is not attributable to observable firm heterogeneity.

5.2.3 Interpreting the two panels. In a sample where the assignment of overseas-experienced directors is highly correlated with structural firm characteristics (as is the case in the Chinese financial industry), a strict binary treatment definition collapses two structurally distinct populations into a single comparison and standard matching algorithms cannot reconcile. By contrast, the mean-split specification leverages variation along a continuous treatment intensity that exists within otherwise comparable firms, and is therefore better suited to identifying the marginal effect of director composition.

6. Underlying mechanisms: cross-sectional analyses

6.1 The moderating effect of internal corporate governance

A strong corporate governance framework may foster an environment in which the unique human capital of directors with overseas experience can be more effectively used. Conversely, for poorly governed firms, innovative proposals from these directors might be marginalized by entrenched management. Therefore, we argue that strong internal governance acts as a complementary mechanism, amplifying the positive effect.

Subsequently, the sample is partitioned into two subgroups according to the share of independent directors. Consistent with prior research ([Briano-Turrent and Rodríguez-Ariza, 2016](#); [Tawiah et al., 2024](#)), firms are classified as exhibiting good governance when their share of independent directors exceeds the sample mean and as poor governance otherwise. The results are shown in [Table 11](#). For the good governance group, β_1 retains positive and

Table 9. Covariate balancing analysis (Panel B, radius matching)

Variable	Panel A: Before matching (mean)			Panel B: After radius matching (mean)			p-value
	(1) Treated	(2) control	(3) Standardized difference (%)	(5) Treated	(6) control	(7) Standardized difference (%)	
lnSize	27.298	25.385	89.5***	26.855	27.012	-7.3	0.317
Leverage	0.828	0.735	54.2***	0.813	0.816	-1.7	0.803
ROE	0.117	0.081	47.8***	0.112	0.108	4.2	0.541
lnFirmAge	3.102	3.036	19.1***	3.068	3.062	1.6	0.813
SOE	0.585	0.528	11.5*	0.588	0.582	1.1	0.874
lnDirRatio	0.376	0.367	19.6***	0.375	0.378	-8.9	0.230
lnBoardAgeAvg	4.004	3.965	64.5***	3.996	4.001	-7.5	0.261
lnMtgFreq	2.274	2.241	9.6	2.27	2.303	-9.5	0.171
Duality	0.106	0.104	0.7	0.107	0.093	4.6	0.495
TopTenHoldersRate	70.183	60.837	51.6***	67.246	66.343	5.0	0.455

Note(s): This table reports the covariate balance test for Panel B's mean-split treatment definition (*Treat_Oversea* = 1 if the firm's proportion of overseas-experienced directors exceeds the sample mean and 0 otherwise). The propensity score is estimated by a logistic regression of *Treat_Oversea* on all baseline control variables and year fixed effects and treated firms are matched to control firms via radius matching with a caliper of 0.01. Columns (1)–(4) report pre-matching means and standardized differences; columns (5)–(8) report the same statistics after matching. After matching, Rubin's B = 20.1, mean standardized bias = 5.1% and the joint balance test does not reject the null of no systematic difference between treated and control groups ($p = 0.584$). Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10. The regression results using PSM procedure

Variable	Panel A: Binary treatment (any versus none)			Panel B: Mean-split treatment (above versus below mean)			
	(1)	(2)	(3)	(4)	(5)	(6)	
	Radius FTShare	NN(5) FTShare	Kernel FTShare	Radius FTShare	NN(5) FTShare	Kernel FTShare	
BoardOverseasRatio	0.039 (0.92)	0.036 (0.85)	0.031 (0.71)	0.127*** (2.82)	0.131*** (2.97)	0.124*** (2.73)	
InSize	0.011 (0.64)	0.012 (0.64)	0.010 (0.54)	-0.010 (-0.36)	-0.009 (-0.34)	-0.013 (-0.47)	
Leverage	-0.111 (-1.58)	-0.152* (-1.84)	-0.141* (-1.76)	-0.189* (-1.82)	-0.189* (-1.74)	-0.175 (-1.62)	
ROE	0.055 (1.20)	0.046 (0.99)	0.050 (1.14)	0.015 (0.24)	-0.001 (-0.01)	0.014 (0.26)	
InFirmAge	0.016 (0.30)	-0.020 (-0.32)	-0.008 (-0.13)	0.085 (1.09)	0.082 (1.08)	0.080 (1.03)	
SOE	0.025** (2.01)	0.022 (1.61)	0.010 (0.80)	-0.003 (-0.18)	-0.004 (-0.28)	-0.003 (-0.18)	
IndDirRatio	0.084 (0.81)	0.062 (0.61)	0.058 (0.56)	-0.118 (-1.15)	-0.124 (-1.19)	-0.121 (-1.18)	
InBoardAgeAvg	-0.115 (-1.14)	-0.114 (-1.11)	-0.085 (-0.84)	-0.137 (-1.09)	-0.157 (-1.19)	-0.130 (-1.04)	
InMigFreq	0.017* (1.98)	0.015* (1.66)	0.012 (1.44)	0.000 (0.02)	0.001 (0.08)	0.002 (0.18)	
Duality	0.010 (1.05)	0.013 (1.22)	0.009 (0.85)	0.004 (0.35)	0.002 (0.20)	0.001 (0.07)	
TopTenHoldersRate	0.002*** (3.02)	0.002*** (3.27)	0.002*** (3.54)	0.003*** (3.11)	0.003*** (3.23)	0.002*** (2.88)	
Constant	0.161 (0.29)	0.253 (0.43)	0.153 (0.26)	0.727 (0.88)	0.789 (0.97)	0.800 (0.92)	
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	
Firm fixed	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	967	1,020	1,032	1,082	906	1,082	
Within R ²	0.087	0.109	0.103	0.131	0.137	0.123	
Adjusted R ²	0.856	0.820	0.820	0.810	0.790	0.780	
Matching diagnostics:							
First-stage pseudo R ²	0.209	0.209	0.209	0.206	0.206	0.206	
Off-support treated (%)	21.7%	14.0%	14.0%	13.7%	13.7%	13.7%	
Post-match pseudo R ²	0.047	0.066	0.053	0.007	0.009	0.006	
Post-match mean bias (%)	14.3	17.9	16.3	5.1	4.9	4.1	
Rubin's B	52.2	62.3	55.4	20.1	21.9	17.6	
Joint balance test (p)	0.000	0.000	0.000	0.584	0.430	0.773	

Note(s): This table reports the post-matching second-stage regressions for two PSM specifications. Panel A defines treatment as a binary indicator equal to 1 if the firm has at least one overseas-experienced director and 0 otherwise. Panel B defines treatment as a binary indicator equal to 1 if the firm's proportion of overseas-experienced directors exceeds the sample mean and 0 otherwise. In both panels, the propensity score is estimated by a logistic regression of *Treat_Oversea* on all baseline control variables and year fixed effects. Columns (1) and (4) use radius matching with a caliper of 0.01; columns (2) and (5) use nearest-neighbor matching with five neighbors; columns (3) and (6) use kernel matching. The dependent variable in the second stage is *FTShare* and *BoardOverseasRatio* is used as the explanatory variable. Both firm and year fixed effects are included. Results are qualitatively identical when the first-stage propensity score is estimated by a probit model (available upon request). The matching diagnostics at the bottom report the first-stage Pseudo R², the share of treated observations falling outside the common support, the post-matching Pseudo R², the mean standardized bias across covariates, Rubin's B statistic and the p-value of the joint covariate balance test.

Appendix 2 provides variable definitions. t-statistics in parentheses are based on firm-clustered standard errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11. The moderating effect of internal corporate governance

Variable	(1) Good internal governance	(2) Poor internal governance
BoardOverseaRatio	0.161*** (2.79)	0.079 (1.65)
lnSize	−0.036* (−1.96)	0.013 (0.45)
Leverage	0.072 (0.93)	−0.153 (−1.41)
ROE	0.112* (1.98)	0.043 (0.57)
lnFirmAge	0.031 (0.23)	0.045 (0.61)
SOE	−0.025 (−1.00)	−0.016 (−0.61)
IndDirRatio	0.077 (0.46)	−0.028 (−0.15)
lnBoardAgeAvg	−0.181 (−1.17)	0.003 (0.03)
lnMtgFreq	0.016 (1.41)	−0.006 (−0.46)
Duality	0.009 (0.62)	−0.003 (−0.22)
TopTenHoldersRate	0.003** (2.63)	0.003*** (4.44)
Constant	1.425* (1.75)	−0.419 (−0.54)
Year fixed	Yes	Yes
Firm fixed	Yes	Yes
Observations	456	664
Within R^2	0.135	0.141
Adjusted R^2	0.760	0.714

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

statistically significant, whereas it remains insignificant for the poor governance group. These findings indicate that directors' overseas experience and strong internal corporate governance are complementary in promoting firm FinTech.

6.2 The moderating effect of institutional ownership

We next explore whether the influence varies with the extent of institutional ownership. A considerable body of studies indicates the crucial effect of institutional investors in shaping corporate policies through active oversight. Such investors often engage directly with management and exert influence via voting rights at shareholder meetings (Firth *et al.*, 2016). Moreover, institutional ownership is often cited as a critical factor driving corporate innovation (Aghion *et al.*, 2013). This raises an important empirical question of whether their presence substitutes for the role of directors possessing overseas experience, or complements it by creating a supportive environment.

We partition firms by median institutional ownership. Firms with institutional ownership exceeding the median are defined as the high institutional ownership, and the low institutional ownership otherwise. Table 12 shows overseas experience positively affects firm FinTech in the high institutional ownership subsamples (Column 1, $p < 0.01$), while the effect disappears in the low institutional ownership subsamples (Column 2), supporting a complementary role.

The complementary nature of this relationship can be explained through several channels. First, institutional investors provide monitoring and oversight that reduce agency problems, allowing directors with overseas experience to pursue innovative strategies without excessive short-term pressure. Second, institutional investors often possess superior information and resources that can enhance the implementation of strategic initiatives proposed by these directors. Third, the presence of institutional investors may signal

Table 12. The moderating effect of institutional ownership

Variable	(1) High institutional ownership	(2) Low institutional ownership
BoardOverseaRatio	0.177*** (3.38)	0.041 (0.69)
lnSize	0.036 (1.51)	-0.015 (-0.54)
Leverage	-0.231*** (-2.79)	-0.075 (-0.62)
ROE	-0.041 (-0.68)	0.011 (0.18)
lnFirmAge	0.057 (0.62)	0.084 (0.83)
SOE	-0.051** (-2.47)	0.015 (0.50)
lnDirRatio	-0.184* (-1.90)	0.261 (1.52)
lnBoardAgeAvg	0.044 (0.34)	-0.189 (-1.15)
lnMtgFreq	0.008 (0.69)	0.011 (0.81)
Duality	-0.005 (-0.45)	0.022* (1.81)
TopTenHoldersRate	0.004*** (3.75)	0.003*** (2.75)
Constant	-1.291 (-1.63)	0.812 (0.97)
Year fixed	Yes	Yes
Firm fixed	Yes	Yes
Observations	558	558
Within R^2	0.173	0.117
Adjusted R^2	0.752	0.775

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

credibility to external stakeholders, facilitating resource acquisition and market entry for FinTech projects.

6.3 The moderating effect of firm size

Generally, large firms possess greater financial and organizational resources, which facilitate their ability to implement digital transformation (Wu *et al.*, 2024). However, they are often constrained by organizational inertia, which may hinder the adoption of advanced technologies (Kaganer *et al.*, 2023).

We further explore whether the effect depends on firm size. Therefore, the sample is divided into large and small firms based on the sample median of total assets. The findings summarized in Table 13 reveal a clear asymmetry. In Column (1), for large firms, β_1 remains positive and statistically significant, whereas it becomes insignificant for small firms in Column (2). These results indicate that the positive effect is more significant among larger firms. One potential reason is that while directors with overseas experience can offer valuable strategic insights, it is primarily the larger firms that have the necessary resources to implement these advanced initiatives and achieve tangible outcomes.

6.4. SOEs versus non-SOEs

We next examine whether the relationship is conditioned by state ownership. The unique institutional context of China offers competing theoretical predictions. On one hand, the effect may be stronger in non-SOEs. Operating under harder budget constraints and facing greater market competition, these firms have a powerful incentive to gain a competitive edge through innovation (Zhang *et al.*, 2024).

However, the impact could be more significant in SOEs. First, SOEs are often tasked with advancing national strategic objectives, and FinTech innovation is a key government

Table 13. The moderating effect of firm size

Variable	(1) Large firms	(2) Small firms
BoardOverseaRatio	0.206*** (4.12)	0.039 (0.87)
lnSize	0.083** (2.59)	0.006 (0.89)
Leverage	-0.752*** (-3.46)	0.016 (0.67)
ROE	-0.012 (-0.09)	0.041 (1.39)
lnFirmAge	0.031 (0.37)	-0.051 (-0.85)
SOE	-0.028 (-1.53)	-0.025 (-1.42)
IndDirRatio	-0.137 (-1.43)	-0.007 (-0.07)
lnBoardAgeAvg	-0.356** (-2.60)	0.086 (1.32)
lnMtgFreq	-0.003 (-0.22)	0.003 (0.39)
Duality	0.010 (0.50)	0.006 (0.94)
TopTenHoldersRate	0.002* (1.72)	0.001 (1.22)
Constant	-0.256 (-0.26)	-0.275 (-0.85)
Year fixed	Yes	Yes
Firm fixed	Yes	Yes
Observations	572	570
Within R^2	0.129	0.050
Adjusted R^2	0.734	0.830

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

industrial policy. In this context, directors with overseas experience may be particularly influential in these large and resource-rich organizations. Second, from the Resource-Based View, directors in SOEs typically have superior access to crucial resources that the firms possess. These internal resources can facilitate the implementation of firm FinTech strategies.

To investigate between these competing views, we partition the sample into two subsamples: SOEs and non-SOEs. SOEs are defined as firms whose ultimate controlling shareholder is a government entity. Table 14 presents the results. For SOEs, β_1 remains positive and statistically significant, whereas it remains insignificant for non-SOEs. These findings indicate that while non-SOEs are more likely to be limited by resource constraints, SOEs can effectively use their substantial financial and political capital to better capitalize on directors' overseas experience.

7. Conclusion

This study examines whether and how directors' overseas experience shapes firm-level FinTech adoption in China's listed financial sector. Across baseline two-way fixed-effects regressions, Heckman selection-correction models and propensity-score-matched comparisons, we find a robust positive association between the share of directors with overseas experience and firms' FinTech adoption intensity. The effect is more pronounced for the technology-application dimension of FinTech than for the business-model-innovation dimension, and it holds for both independent and non-independent directors. Combining the three channels developed in Section 2.3, the asymmetric pattern is consistent with the knowledge-and-resources channel and the cognitive-orientation channel. Through the two channels, boards transfer external technological knowledge and shift strategic priorities toward frontier applications. The two channels play a more visible role than the monitoring-

Table 14. SOEs versus non-SOEs

Variable	(1) SOEs	(2) Non-SOEs
BoardOverseaRatio	0.072** (2.05)	0.086 (1.02)
lnSize	-0.009 (-0.44)	-0.024 (-0.78)
Leverage	-0.068 (-0.88)	-0.039 (-0.26)
ROE	0.044 (0.72)	0.091 (1.55)
lnFirmAge	0.077 (1.24)	-0.019 (-0.17)
lnDirRatio	-0.079 (-0.92)	0.087 (0.47)
lnBoardAgeAvg	-0.026 (-0.40)	-0.111 (-0.52)
lnMtgFreq	-0.007 (-0.72)	0.025 (1.49)
Duality	0.012 (1.46)	0.010 (0.51)
TopTenHoldersRate	0.003*** (4.37)	0.003** (2.62)
Constant	0.130 (0.24)	1.070 (0.90)
Year fixed	Yes	Yes
Firm fixed	Yes	Yes
Observations	633	508
Within R^2	0.107	0.095
Adjusted R^2	0.734	0.724

Note(s): Appendix 2 provides variables definitions. t-statistics (in brackets) use firm-level clustered errors. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

and-agency channel in our financial-industry setting. Business-model innovation typically requires not only the introduction of external knowledge but also robust internal governance, consistent with the findings in Section 6.1 (the main effect is conditional on supportive governance environments).

The cross-sectional heterogeneity tests indicate that the association is more pronounced under four conditions: stronger internal governance, larger firm scale, higher institutional ownership and state ownership. We interpret this pattern through the lens of the managerial rents model, which holds that managerial human capital generates firm-level outcomes when it is paired with supportive organizational conditions (Castanias and Helfat, 2001). The four conditions identified above share a common feature: each provides organizational complementarities that allow board-level human capital to be translated into adoption outcomes. We frame these results as boundary conditions on the main effect.

The paper makes three incremental contributions to the literature reviewed in Section 2. First, on measurement, we construct a firm-year text-based FinTech index from audited annual reports and validate it against an audited balance-sheet measure of software-asset holdings (Section 3.2.1), addressing concerns about whether text-based proxies capture adoption rather than disclosure intensity. Second, on scope, we extend the literature on directors' overseas experience into the FinTech setting in regulated financial institutions, and document an asymmetric pattern across the technology-application and business-model-innovation dimensions that prior work has not examined. Third, on theory, by showing that the effect is conditional on organizational complementarities, the findings support a more nuanced view of how directors' overseas experience translates into firm-level FinTech adoption.

Our findings have several limitations. First, our identification strategy rests on the combined Heckman, propensity-score-matching and two-way fixed-effects design described in Section 5, rather than on instrumental-variable causal identification, which the size and

geographic concentration of the financial-sector sample do not adequately support. Second, the dependent variable is a text-based proxy: although it is validated against audited software-asset holdings and protected from time-invariant disclosure preferences by firm fixed effects, it remains an indirect measure of FinTech activity. Third, findings drawn from China's listed financial sector may not transfer directly to settings with different regulatory environments, or stages of FinTech market development.

These limitations point toward correspondingly focused directions for practice and for future research. For practice, nominating committees of financial institutions can treat directors' overseas experience as a measurable element of board human capital, particularly when evaluating candidates for firms characterized by stronger corporate governance structures, larger asset size, higher institutional ownership and state ownership. For future research, on measurement, future work could complement text-based indices with process-level adoption indicators drawn from internal IT-audit disclosures, supervisor reports. On generalizability, comparative work in countries with different regulatory regimes or in markets at different stages of FinTech maturity would help understand the boundary conditions.

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Appendix 1

Table A1. Lexicons for firm FinTech index

Category	Subindex	Keywords
Technology	Information technology	Informatization construction, Information science, IT governance, IT architecture, Online, Quick Response code, Opening, Informatization, Automation, Digitalization, Intelligent, Scene, Instant messaging, 5G, Information system, Information security, Open, Interconnect, Sharing, Virtual reality, Cyber-physical systems, FinTech, Financial Technology
	Artificial intelligence	Artificial intelligence, Face recognition, Real-time monitoring, Fingerprint identification, Deep learning, Wearable, Intelligence, Smart, Machine learning, Face swiping, Voiceprint, Intelligent speech, Biometric identification, Biometric authentication, Text mining, Brain-inspired computing, Image understanding, Natural language processing
	Blockchain technology	Blockchain, Alliance chain, Secure multi-party computation, Distributed computation
	Cloud technology	Cloud computing, Cloud serving, Finance cloud, Cloud computing architecture, IaaS, PaaS, SaaS
	Data technology	Big data, Data mining, Data stream, Data set, Information Mining, CRM
	Internet technology	Internet, Cellphone, Mobile, Mobile device, Network, Remote, Electronic, API, Internet of Things, Mobile communications
	Business (service) channels	Internet finance, Biosphere, Electronic wallet, E-finance, Online financial products, Electronic commerce, E-commerce, Open system interconnection, Online supply chain, Intelligent retail, Contactless commerce, Scene finance
	Gross settlement	Third party payment, Mobile payment, Online payment, Net payment, Mobile phone and payment, NFC payment, Digital currency, Electronic payment, Barcode payment, Two-dimensional barcode payment, EB-class storage, Wearable payment, Senseless payment
	Resource allocation	Internet financing, Peer-to-peer lending, P2P lending, Crowdfunding, Internet lending, Network financing, Online investment, Equity-based crowdfunding, Investment decision aid system, Online financing, Financial inclusion, Personalized pricing, Scene financing
	Financial management	Consumer finance, Online wealth management, Robot financing, Expert advisor, Intelligent advisor
Business	Risk management	Big data credit, big data risk control

Note(s): This table presents the lexicons used to construct the firm-level FinTech index. Keywords are based on [Wu et al. \(2023\)](#) and [Qi et al. \(2022\)](#) with minor modifications. They are grouped into two broad categories: Technology (covering IT, AI, blockchain, cloud, data, internet) and business (covering channels, settlement, resource allocation, financial management and risk management)

Appendix 2

Table A2. Variables definitions

Variable name	Definition
<i>Dependent variables</i>	
<i>FTShare</i>	Ratio of FinTech keywords to the total word count in the annual report
<i>FTShare_Tech</i>	Ratio of keywords related to technological application to the total word count in the annual report
<i>FTShare_Business</i>	Ratio of keywords related to business innovation to the total word count in the annual report
<i>lnFTFreq</i>	The natural logarithm of one plus the frequency of FinTech keywords in the annual report
<i>FTShare1</i>	Ratio of FinTech keywords using alternative lexicons to the total word count in the annual report
<i>Independent variables</i>	
<i>BoardOverseaRatio</i>	Number of directors with overseas experience/total board size
<i>BoardOverseaNum</i>	Count of directors with overseas experience
<i>OverseaIndepRatio</i>	Number of independent directors with overseas experience/total board size
<i>OverseaNonIndepRatio</i>	Number of non-independent directors with overseas experience/total board size
<i>OverseaEduRatio</i>	Number of directors with overseas education experience/total board size
<i>OverseaWorkRatio</i>	Number of directors with overseas work experience/total board size
<i>Oversea_Dummy</i>	Equals 1 if at least one director with overseas experience on the board and 0 otherwise
<i>Treat_Oversea</i>	Equals 1 if a firm's proportion of directors with overseas experience is above the sample average and 0 otherwise
<i>Other variables</i>	
<i>lnSize</i>	The natural logarithm of total assets at year-end
<i>Leverage</i>	Total liabilities/total assets
<i>ROE</i>	Net profit/average shareholders' equity
<i>lnFirmAge</i>	The natural logarithm of number of years from the time the firm was established
<i>SOE</i>	Equals 1 if ultimate controller is state-owned, else 0
<i>IndepDirRatio</i>	Number of independent directors/total board size
<i>lnBoardAgeAvg</i>	The natural logarithm of average age of board members
<i>lnMtgFreq</i>	The natural logarithm of number of board meetings per year
<i>Duality</i>	Equals 1 if chairperson and CEO are the same person, else 0
<i>TopTenHoldersRate</i>	The proportion of shares held by the top ten shareholders
<i>BRITISH</i>	Dummy variable equals 1 if a firm is headquartered in a city that was a British concession or leased territory during the late Qing dynasty and 0 otherwise.
<i>Christian_College</i>	The number of colleges established by Christian missionaries in the provinces by 1920

Appendix 3. Alternative lexicons for firm FinTech index

Keywords: EB-level storage, NFC payment, Differential privacy technology, Big data, Third-party payment, Secure multi-party computing, Distributed computing, Equity crowdfunding financing, Internet finance, Machine learning, Open banking, Brain-like computing, Quantitative finance, stream computing, Green computing, In-memory computing, Blockchain, Artificial intelligence, Cognitive computing, Converged architecture, Business intelligence, Identity verification, Deep learning, Biometrics, Data visualization, Data mining, Digital currency, Investment decision aid system, Graph computing, Image understanding, Netlink, text mining, Internet of Things, Information physical system, Virtual reality, Mobile internet, Mobile payment, Billion concurrency, Heterogeneous data, Semantic search, Speech recognition, Cloud computing, Credit, Intelligent financial contract, Smart customer service, Innovative data analysis, Smart investment advisor and natural language processing.

Table A3. Yearly sample distribution and state-ownership proportion

Year	Number of firms (firm-year obs.)	SOE proportion
2008	27	0.667
2009	30	0.700
2010	36	0.667
2011	40	0.725
2012	42	0.667
2013	43	0.651
2014	45	0.667
2015	50	0.660
2016	68	0.529
2017	79	0.519
2018	96	0.500
2019	108	0.509
2020	119	0.479
2021	121	0.488
2022	124	0.516
2023	124	0.524
Total	1,152	0.552

Note(s): The “number of firms” column reports the count of firm-year observations meeting the CAPCO financial-industry classification in each year (after dropping ST/*ST and missing-key-variable observations). The SOE proportion is the share of these firm-years for which the ultimate controller is the state. The total SOE proportion of 0.552 is the unweighted average across all 1,152 firm-year observations and matches the figure reported in [Table 1](#)

Table A4. Geographic concentration of the sample

Rank	City	Number of firms	% of sample	Cumulative (%)
<i>Panel A. Top five cities by number of sample firms</i>				
1	Beijing	24	18.2	18.2
2	Shanghai	18	13.6	31.8
3	Shenzhen	9	6.8	38.6
4	Hangzhou	8	6.1	44.7
5	Nanjing	7	5.3	50.0
	All other 38 cities	66	50.0	100.0
	Total	132	100.0	
<i>Panel B. Top five provinces by number of sample firms</i>				
1	Beijing	24	18.2	18.2
2	Shanghai	18	13.6	31.8
3	Jiangsu	15	11.4	43.2
4	Guangdong	13	9.8	53.0
5	Zhejiang	11	8.3	61.4
	All other 22 provinces	51	38.6	100.0
	Total	132	100.0	
Indicator				Value
<i>Panel C. Summary</i>				
Total number of firms				132
Total number of distinct cities				43
Total number of distinct provinces (including province-level municipalities)				27
Top five cities – combined share of sample				50.0%
Top five provinces – combined share of sample				61.4%
Provinces containing only one sample firm				9
Provinces containing two or fewer sample firms				11

Table A5. Pre-analysis comparison of firms with and without overseas-experienced directors

Variable	Group 0: no overseas director (<i>n</i> = 314) Mean (SD)	Group 1: at least one (<i>n</i> = 838) Mean (SD)	Mean difference (G0 – G1)	<i>t</i>	<i>p</i>
FTShare	0.109 (0.092)	0.159 (0.127)	–0.050	–6.36	<0.001
BoardOverseaRatio	0.000 (0.000)	0.232 (0.139)	–0.232	–29.60	<0.001
lnSize	24.73 (1.49)	26.75 (2.33)	–2.02	–14.30	<0.001
Leverage	0.704 (0.190)	0.801 (0.168)	–0.097	–8.43	<0.001
ROE	0.064 (0.091)	0.109 (0.069)	–0.045	–8.97	<0.001
lnFirmAge	3.064 (0.312)	3.063 (0.353)	0.000	0.01	0.993
SOE	0.548 (0.499)	0.554 (0.497)	–0.006	–0.18	0.857
lnDirRatio	0.371 (0.042)	0.371 (0.043)	0.000	–0.06	0.950
lnBoardAgeAvg	3.961 (0.059)	3.989 (0.063)	–0.028	–6.82	<0.001
lnMtgFreq	2.262 (0.355)	2.252 (0.342)	0.009	0.41	0.683
Duality	0.137 (0.344)	0.093 (0.291)	0.044	2.16	0.031
TopTenHoldersRate	59.00 (16.46)	66.98 (18.78)	–7.98	–6.63	<0.001

Note(s): Comparison based on the full pooled sample of 1,152 firm-year observations. Group 0 contains firm-year observations for which *BoardOverseaRatio* equals zero; Group 1 contains observations for which *BoardOverseaRatio* is strictly positive