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Impact of founder controls on digital transformation: evidence from listed family firms in China

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Abstract

Purpose – Digital transformation is the key for family firms to gain a competitive advantage in the digital economy. This paper empirically examines the effect of founder control on family firms' digital transformation from the perspectives of risk-taking and founders' power.

Design/methodology/approach – This paper uses an unbalanced panel dataset to test the hypotheses using a sample of Chinese A-share listed family firms from 2010 to 2022.

Findings – Compared to non-founder-controlled firms, founder-controlled family firms are more capable of driving digital transformation and only facilitate substantive transformation rather than symbolic transformation. Mechanism analysis reveals that founder control is associated with a higher inclination for risk-taking and higher power, which leads to a greater willingness and ability to facilitate digital transformation. Heterogeneity analysis indicates that founder control is particularly advantageous for promoting substantive digital transformation in family firms without state capital participation, second-generation involvement and weak Confucian cultural embeddedness.

Originality/value – To study how family control affects digital transformation, this article splits family enterprises into founder and non-founder control. This study divides digital transformation into substantive and symbolic paths, each with distinctive objectives. This study improves the understanding of family enterprise digital transformation processes and provides policy insights for their digital evolution.

Keywords Founder control, Substantive digital transformation, Symbolic digital transformation, Risk-taking, Power

Paper type Research paper

Introduction

Digital transformation (DT) has become crucial for companies to gain a competitive advantage. DT is a comprehensive process involving integrating digital technologies into all business areas. It fundamentally changes how organizations operate and deliver customer value, necessitating substantial organizational structure, process, and culture changes (Hanelt *et al.*, 2021; Vial, 2019). Access to new technologies and organizational skills development are enablers of organizational DT (Sestino *et al.*, 2020). Conversely, organizational culture, capital, trained workforce, standardization, data security, vulnerability risk, and coordination issues across organizational units are obstacles (Horváth and Szabó, 2019).

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Research specifically addressing DT in family firms (FFs) is still in its infancy and has primarily focused on family control as a distinguishing characteristic. Some studies have indicated that FFs are more adaptable to changes in the business environment owing to their long-term vision and profit-maximization orientation; thus, they are more inclined to undergo DT (Ferraro and Cristiano, 2021). The firm will be able to gradually and effectively develop the essential capabilities for DT owing to the family's absolute control over the organization, its remarkable adaptability, and its unique approaches to knowledge acquisition (Soluk *et al.*, 2021; Xie *et al.*, 2023). Other research has suggested that FFs are less digitized compared to other types of firms owing to factors such as prioritizing non-economic goals centered around the family, emotional attachment to the firm, risk aversion, and the convergence of family knowledge (Ceipek *et al.*, 2021; Chen *et al.*, 2023; He *et al.*, 2023; Prügl and Spitzley, 2021).

The divergent results may be due to previous studies having primarily compared the DT disparities between family-owned and non-family-owned firms or examined the influence of family control intensity, treating the controlling family as a uniform entity and disregarding variations in the type of family control. FFs are highly heterogeneous, especially in relation to innovation behaviors and outcomes (Chrisman and Patel, 2012). Moreover, the current research has sometimes simplified DT by comparing it to research and development (R&D) advancements, ignoring that it is an intricate and time-consuming process. Enterprises may opt for different paths in this process.

This paper responds to recent calls to deepen our understanding of how to facilitate DT in FFs (Appleton and Holt, 2024; Xie *et al.*, 2023). It analyzes a sample of Chinese FFs. This geographical, economic, and cultural context is highly relevant because FFs play an important role in China's economy, contributing to 60% of its growth. A recent survey from 2022 by Tencent showed that most Chinese FFs are still in the early stages of DT, with only 1.54% having entered the mature application stage, and strategic consensus on DT is generally lacking. Therefore, identifying the determinants of DT in Chinese FFs is relevant.

Following Daspit *et al.* (2021), we define FFs as companies in which at least one related family member, in addition to the actual controller, owns, manages, or controls the company. This paper categorizes founder- and non-founder-controlled FFs to analyze the impact of family control on DT. Founder-controlled FFs include both first- and second-generation FFs but are still founder-controlled. In China, the founders of FFs often serve as the firms' de facto controllers. They also directly hold key roles such as chairman and CEO, which greatly influence important strategic decisions, corporate governance, and the organization's overall success. Generally, non-founder-controlled FFs prioritize capital flows and profit-seeking. Conversely, founder-controlled FFs possess a long-term vision, entrepreneurial mindset, and readiness to undertake high-risk strategies (Kannan-Narasimhan *et al.*, 2023). These varying characteristics have distinct effects on decisions related to DT.

DT comes in stages and follows different approaches (Matt, 2015; Verhoef *et al.*, 2021), and we analyze it by classifying it into two unique approaches, *Substantive DT* and *Symbolic DT*, each motivated by various and different objectives. *Substantive DT* is a comprehensive approach involving formulating a strategy to coordinate, prioritize, and implement digital initiatives across the organization. Fully exploiting the capabilities of DT is imperative (Davenport and Westerman, 2018). *Symbolic DT* focuses on immediately applying digital technologies to enhance specific business operations, products, or processes. This path is driven by a desire to comply with policies rather than a planned and comprehensive DT.

Using a sample of A-share listed FFs in China's stock markets from 2010–2022, this paper attempts to answer the following questions: (1) can founder control significantly facilitate DT? Does the choice of DT paths show any differences? (2) What are the potential mechanisms by which founder control affects a firm's DT? (3) Does any difference exist in the impact of founder control on FFs' DT under Chinese-context factors, such as state-owned capital involvement, second-generation involvement, or regional cultural embeddedness such as Confucianism?

This study's contributions are threefold. This research improves our understanding of how FF heterogeneity affects the chosen DT paths. Prior research has analyzed the differences between FFs and non-FFs in terms of DT or explored the controlling family as a homogeneous whole. However, we first consider the characteristics of family control and distinguish FFs into founder- and non-founder-controlled types to explore their impact on DT. We explore the mechanism by which founder control affects DT through risk preference and founder power. Furthermore, our study contributes to the body of knowledge concerning the diverse attributes of DT. The differentiation between *substantive* and *symbolic* transformation, beginning with motivation, aids in comprehending DT as a high-risk strategic choice for businesses. Context could constrain or expand FFs' DT (Al-Dajani *et al.*, 2024). This study also comprehensively examines the local Chinese context and broadens the boundaries of founder control that impact DT in relation to various governance elements, including the presence of state-owned capital, intergenerational succession, and regional cultural embeddedness.

This paper is organized as follows: Section 2 includes the literature review and research hypotheses; Section 3 describes the research design, including data source, variable interpretation, and model specification; Section 4 presents the empirical results; Section 5 discusses the results, and the final section gives the conclusions.

Literature review and research hypotheses

Literature review

DT of enterprises. Enterprise DT integrates digital technologies into all aspects of an organization and its operations, leading to fundamental changes in the way the organization operates and delivers value to its customers (Vial, 2019). DT is a continuous and intricate undertaking, and the term "transformation" emphasizes the all-encompassing nature of the actions that companies must undertake when faced with digital technologies (Singh and Hess, 2020). This process involves reshaping every aspect of a company's vision and strategy, organizational structure, processes, business model, capabilities, and culture, which can have a substantial impact on the company and its operations (Sebastian *et al.*, 2020). DT can empower knowledge creation (Chen *et al.*, 2024) and promote firm innovation (Cano-Marin, 2024; Khodor *et al.*, 2024; Li *et al.*, 2023b; Yu *et al.*, 2024), which presents firms with the chance to broaden and vary their current product and service offerings, thereby enhancing their long-term competitive advantage (Neff *et al.*, 2024). However, it necessitates a substantive investment of expertise and resources and carries a considerable risk of failure owing to limited experience in the new domain (Gallego-Losada *et al.*, 2022; Vial, 2019). Unlike information technology, DT is marked by rapidity, generativity, technological complexity, and frequently unpredictable objectives. Companies cannot accurately predict the scope of inputs and payback cycles when making substantial resource investments; this leads to potentially divergent outcomes from initial assumptions and heightened risks and uncertainties (Buck *et al.*, 2023; Hanelt *et al.*, 2021; Nambisan *et al.*, 2019). Consequently, organizations may adopt varying strategies in response to whether DT is perceived as an advantageous opportunity or potential threat (Liu *et al.*, 2023).

An essential aspect of a DT project's success is the formulation of a suitable strategy for efficiently utilizing digital technology (Correani *et al.*, 2020). The survey conducted by Kane *et al.* (2015) demonstrates that DT is influenced by the strategy employed rather than the technology itself. According to Sebastian *et al.* (2020), the starting point of DT for big, established firms involves establishing a distinct digital strategy. By providing a distinct vision, resolute leaders can prioritize their employees' efforts on a specific objective, thereby cultivating unique competencies that are challenging to imitate, ultimately leading to the strategy's successful execution. A decisive aspect in achieving an advantage in DT for organizations is the presence of a well-defined strategy for envisioning DT (Gurbaxani and Dunkle, 2019).

DT approaches: substantive and symbolic DT. The main approaches to DT, which represent different managerial intentions and goals, are two.

First, *symbolic DT* focuses on immediately applying digital technologies to enhance specific business operations, products, or processes. This approach often involves integrating advanced technologies to optimize workflows and improve process efficiency (Matt *et al.*, 2015). This approach also responds to the company's legitimation needs when institutional pressures to address DT are high (Liu *et al.*, 2023). However, *symbolic DT* may lack a cohesive strategy, potentially leading to fragmented efforts that do not align with broader organizational goals.

In contrast, *substantive DT* is a comprehensive approach involving formulating a strategy to coordinate, prioritize, and implement digital initiatives across the organization. This central concept integrates digital activities with business objectives, ensuring alignment with other business strategies and fostering a culture of innovation and continuous learning (Matt *et al.*, 2015). *Substantive DT* requires a holistic view of people, processes, technology, and data; this is crucial as it emphasizes the transformation of mindsets and organizational culture to effectively embrace change (Hoe, 2022). Furthermore, *substantive DT* focuses on value creation through innovative business models and data-driven perspectives (Fenton *et al.*, 2019). It reshapes or replaces entire business models, impacting products, processes, and customer interactions, enabling organizations to thrive in a rapidly changing digital environment (Matt *et al.*, 2015).

While *symbolic DT* can yield immediate operational benefits at most, *substantive DT* is essential for long-term success and sustainability in the digital age (Fenton *et al.*, 2019; Liu *et al.*, 2023).

FFs' DT. FFs make decisions in radically different ways than non-FFs. They use non-economic goals as a guide, have different governance structures with family involvement, and have different resource bases with family knowledge (Prügl and Spitzley, 2021; Qin *et al.*, 2023; Wei and Chen, 2023). This may mean that FFs' decisions on DT are also different. In recent years, scholars have developed a strong research interest in FFs' DT, and the research sample has gradually extended from developed countries such as Germany, France, and Italy to emerging economies such as China (Ano and Bent, 2022; Ceipek *et al.*, 2021; de Groote *et al.*, 2023; Liu *et al.*, 2023; Prügl and Spitzley, 2021).

Findings on the effect of family management or family involvement on FFs' DT are mixed. Some scholars believe that the family's absolute control over the firm, efficient decision-making and execution, and unique dynamic adjustment capabilities (de Groote *et al.*, 2023; Soluk *et al.*, 2021) help it quickly respond to digital challenges, thus gradually and effectively advancing DT. Others have argued that FFs are risk-averse and prioritize family-centered, non-economic objectives. Conversely, DT necessitates a comprehensive corporate overhaul that undermines family control and diminishes the competitive advantage derived from the family network of relationships. Family governance thus becomes a barrier to DT (Ceipek *et al.*, 2021; Prügl and Spitzley, 2021).

Founder-control effect. Organizations led by founders and those led by non-founders differ significantly in their performance (Grilli *et al.*, 2020). However, whether founders have a positive or negative effect on firms has not yet been established. Block *et al.* (2013) found that enterprises led by founder CEOs demonstrate superior innovation performance in comparison to agents, while the opposite is true for Duran *et al.* (2016). The positive effects are due to (1) founders owning a large share of equity in the firm, viewing the firm as their own life achievement, and having a strong emotional attachment to the firm (Wasserman, 2003), which means that they are more concerned about the firm's long-term interests; (2) founders having a higher level of ownership and being able to control the flow of resources in the organization from the top down, which means that they have more power and ability to realize their will. High power facilitates quick action and decision-making in a rapidly changing and uncertain external environment (Gupta *et al.*, 2018; Kannan-Narasimhan *et al.*, 2023); (3) founders are usually entrepreneurial, characterized by risk-taking, innovation, and proactivity (Deb and Wiklund, 2017). The negative effects are mainly due to the following: (1) excessive power can result in agency problems during the leader's tenure, perpetuating a harmful cycle of

entrenched executive teams that undermine organizational performance (Chen *et al.*, 2013); (2) the managerial experience and competencies that founders acquire during the initial stages of entrepreneurship may not be sufficient to meet the company's requirements for future expansion. This often leads to the dilemma of "throne versus kingdom" (Wasserman, 2017); (3) founders' influence on the organizational structure, processes, and culture creates an imprint (Nelson, 2003) and generates inertia.

Research hypotheses

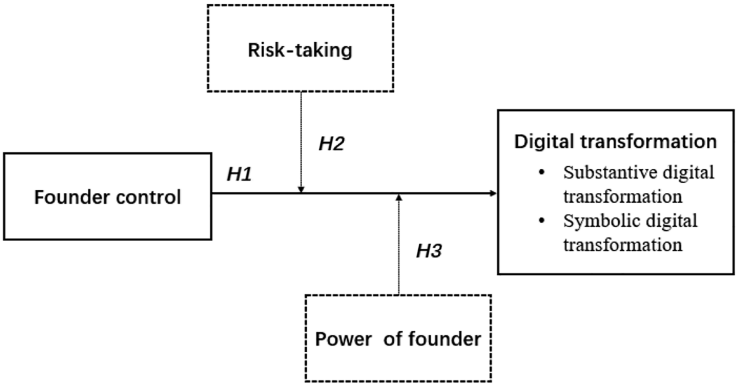
Impact of founder control on DT. Founders, the originators and creators of a business, play a crucial role in a company's strategic goals, primarily since many also serve as chairmen or CEOs. Founders' motivation and risk preferences directly affect their perceptions of digitization's importance and direction, as well as the required enablers and capabilities (Björkdahl, 2020). These factors influence the decision to digitize, the trajectory of DT, resource allocation, and other critical factors affecting the effective execution of DT. The "winner-take-all" dynamic, characteristic of the digital economy's era, reshapes the competitive market landscape. Failure to transform may result in companies losing market share to competitors or, in the worst-case scenario, bankruptcy. Founders view the firm as their "child" and life achievement, and they are more sensitive to firm decline than to the risks of DT. Consequently, they tend to take proactive measures, such as adopting digital technologies, to counteract the decline (Abebe and Tangpong, 2018).

Founder-controlled FFs focus more on the business' long-term growth. Only with a deep-rooted DT will firms be able to take full advantage of the current strengths and capabilities offered by digital technologies to maintain leadership and build to last (Sebastian *et al.*, 2020). Furthermore, while FFs possess unique family knowledge, they may still lack the financial resources necessary to navigate the DT (Appleton and Holt, 2024). With limited available organizational resources, founders adopt a *substantive DT approach* (Ano and Bent, 2022) and distribute resources to pertinent domains, which better align with the long-term strategic vision of corporate sustainability.

Thus, we propose the following (Figure 1):

H1. Founder control is more likely to facilitate DT in FFs than non-founder control and more likely to facilitate *substantive DT* than *symbolic DT.*

Risk-taking. FFs are conservative and risk-averse organizations. Introducing digital technology may force these firms to step outside their established comfort zone, disrupt their existing operating approaches, and present new difficulties and obstacles. Additionally,



Source(s): Authors' own work

Figure 1. The conceptual model

the likelihood of failure associated with this change is higher. If the transformation fails, it might result in financial hardships and jeopardize the organization's survival, reducing its willingness to pursue DT. Successful DT requires leadership to embrace risk-taking and promote teamwork and collaboration (Tagscherer and Carbon, 2023). Founders are linked to a high risk-taking propensity and tend to invest in newer yet risky ideas and products.

First, founders possess a greater entrepreneurial spirit. They are the operators or managers of organizations and are known for their innovation, risk-taking, and proactivity (Covin and Slevin, 1991). They are more inclined to assume greater immediate risk if it can yield long-term profitability. Although forecasting the exact risk of digitization is challenging, the founders' foresight helps them recognize the competitive trends in the digital era and the crucial role of digital technology for corporate value creation. Their innovative and risk-taking spirit encourages them to try new technologies and business models. They are willing to make relevant investments as DT is one of the most effective ways to achieve growth.

Additionally, founders lead organizations that eventually become publicly listed companies, surmounting substantial challenges, and they mostly owe this success to their own competitive attributes, thus presenting the trait of overconfidence and insensitivity to the ability to perceive risk (Lee *et al.*, 2017). Founders, with their competitive attributes, focus more on the benefits of digitization than its risks. Effective DT will revolutionize current business models, strengthen corporate governance, substantially mitigate business risks, bolster competitive advantages, and consequently raise company performance (Vial, 2019).

Thus, we propose the following:

H2. Founder-controlled FFs have a higher level of risk-taking and thus a greater willingness to promote *substantive* DT compared to non-founder-controlled FFs.

Power of founder. Founder power is top-down control over decision-making authority and resource flows within an organization (Gupta *et al.*, 2018). A digital strategy is only valuable if it drives resource allocation and capital investment (Olan *et al.*, 2024). To effectively accomplish DT, corporate executives must consider and address many vital aspects: the value of digitization, specific objectives and direction of digital initiatives, and necessary enablers and competences (Björkdahl, 2020). Founders typically possess considerable ownership, managerial authority, and decision-making power (Zhong *et al.*, 2022), which allows them to exert strong control over the company (Adams *et al.*, 2005). This enables them to act swiftly and make decisions with the board's support, particularly in a dynamic and unpredictable external environment (Chittoor *et al.*, 2019).

First, firm leaders' support is critical to DT's successful advancement. The process of DT encompasses all facets of the organization and may face resistance in several domains throughout its implementation. Upon recognizing DT's market opportunities and competitive advantages, influential founders can devise a suitable DT strategy based on the firm's circumstances. They can establish a shared vision, foster a consistent and comprehensive culture of values and norms (Björkdahl, 2020), and encourage coordination and collaboration among the firm's members. Furthermore, founders have acquired substantial explicit knowledge and tacit comprehension regarding the operations and systems of the family business and corporate capacities (Le Breton-Miller and Miller, 2015) since the business' inception until its growth into a sizable-listed company. They also possess the expertise to efficiently and effectively utilize resources to accomplish the new strategy (Dencker and Gruber, 2015; Ruzzene *et al.*, 2024). Consequently, founders will formulate effective digital strategies with a practical approach (Ano and Bent, 2022) and distribute resources to pertinent domains. Finally, owing to the founders' high power and absolute control over the board and executive team, founders being dismissed for investment failure is unlikely, even if strategic investment fails to achieve the desired goals or deviates (Chittoor *et al.*, 2019).

Thus, we propose the following:

H3. Founders in founder-controlled FFs have larger power and thus more ability to promote *substantive* DT compared to non-founder-controlled FFs.

Research design

Data source

China's e-commerce has had a considerable surge in growth since 2010, which is a main content of digital technology application. Therefore, this study focuses on FFs listed on the A-share stock market in China from 2010 to 2022. Before conducting our analysis, we performed the following pre-processing steps: (1) removed samples with abnormal business operations, labeled as *ST, S, S*ST, SST; (2) excluded the financial industry owing to differences in financial statements; (3) eliminated samples with missing observations. Ultimately, we obtain 15,398 firm-year observations. The data are sourced from the China Stock Market and Accounting Research Database and China Research Data Service Platform. Furthermore, to mitigate the influence of outliers on the empirical findings, this study winsorizes all continuous variables at the 1st and 99th percentiles.

Variables specification

Dependent variable. In fact, accurately measuring DT investment under the current Chinese accounting system is difficult; therefore, this paper refers to existing studies where DT is measured by the relevant word frequency statistics disclosed in the financial statements (Chen and Srinivasan, 2024). The word frequency statistics include the underlying technologies such as artificial intelligence, big data, cloud computing, and blockchain, as well as specific digital business scenarios based on practical application of the technology. Two aspects clarify the feature word mapping of enterprise DT:

(1) *Substantive DT:* Sums up the word frequencies related to the underlying technologies such as artificial intelligence, big data, cloud computing, and block chain and performs logarithmic processing.

(2) *Symbolic DT*: Sums up the word frequencies related to the applications of digital technologies and performs logarithmic processing.

Independent variable. Founder control (*foundercontrol*): referring to Xie *et al.* (2019), we first look for founders from the company's annual report and prospectus. If more than one founder is mentioned, or the number of founders is not explicitly stated, additional information from the annual report and company's official website is considered. The founder with the largest shareholding or the one who served as the chairman of the board of directors (or general manager) before the IPO is the founder. The founder's information is then compared with the disclosed information about the actual controllers in the company's annual report. Subsequently, the gathered data on the founder are juxtaposed with the information pertaining to the current controller as published in the enterprise's annual report. The value is 1 if the founder and current controller are identical and 0 otherwise.

Mechanism variables.

(1) Risk-taking (*risk*): According to Campbell *et al.* (2019), R&D investment is a metric to evaluate founders' risk-taking tendencies. CEOs with varying birth orders exhibit distinct tendencies in risk-taking endeavors, such as allocating investments to R&D for product innovation. We refer to Campbell *et al.* (2019) and use R&D investment intensity (R&D/operating revenue) to measure risk-taking.

(2) Power (*power*): As the number of important decision-makers decreases, the founder likely has increasing authority in decision-making (Adams *et al.*, 2005). Thus, we focus on whether the founder is both the board chairman and CEO, which gives them structural power. A binary variable represents the founder's power. The value is 1 if the founder holds both the positions of CEO and chairman; otherwise, it is 0. A founder, who also serves as the chairman and CEO, wields greater influence over strategic decision-making.

Control variables. Additionally, we choose various frequently employed variables that impact DT to mitigate any bias in model configuration. Referring to Ceipek *et al.* (2021) and Soluk *et al.* (2021), we incorporate firm-level control variables, including firm size (*size*), firm age (*firmage*), firm performance (*roa*), and firm leverage (*assetdebtratio*). Moreover, we consider firm governance variables, such as independent directors (*indirector*), and corporate governance variables, such as equity check and balance indicator (*balance*). Furthermore, we consider family characteristics such as family shareholding (*ownership*) and the degree of separation of control rights and cash flow rights (*separation*). Additionally, the model incorporates year-dummy variables and industry-dummy variables.

Model specification

We use the following model to investigate the impact of founder control on enterprises' DT. The specific form is as follows:

$$\text{SubstantiveDT}_{\text{it}} = \alpha_0 + \alpha_1 \text{foundercontrol}_{\text{it}} + \alpha_2 X_{it} + Year + Industry + \varepsilon_{it} \quad (1)$$

$$\text{SymbolicDT}_{\text{it}} = \beta_0 + \beta_1 \text{foundercontrol}_{\text{it}} + \beta_2 X_{it} + Year + Industry + \varepsilon_{it} \quad (2)$$

where $\text{SubstantiveDT}_{\text{it}}$ ($\text{SymbolicDT}_{\text{it}}$) is the level of *substantive* (*symbolic*) DT of firm *i* in year *t*; $\text{foundercontrol}_{\text{it}}$ is the independent variable (i.e. whether the actual controller is the founder); and X_{it} is a series of control variables. *Year* and *Industry* represent year and industry dummies, respectively. ε_{it} is the error term, and α_1 and β_1 are coefficients of interest.

To test the mechanisms of risk-taking and power, we construct the following model:

$$\begin{aligned}\text{SubstantiveDT}_{\text{it}}/\text{SymbolicDT}_{\text{it}} = {} & \gamma_0 + \gamma_1 \text{foundercontrol}_{\text{it}} + \gamma_2 \text{foundercontrol}_{\text{it}} \times risk_{it} \\ & + \gamma_3 risk_{it} + \gamma_4 X_{it} + Year + Industry + \varepsilon_{it}\end{aligned} \quad (3)$$

$$\begin{aligned}\text{SubstantiveDT}_{\text{it}}/\text{SymbolicDT}_{\text{it}} = {} & \delta_0 + \delta_1 \text{foundercontrol}_{\text{it}} + \delta_2 \text{foundercontrol}_{\text{it}} \times power_{it} \\ & + \delta_3 power_{it} + \delta_4 X_{it} + Year + Industry + \varepsilon_{it}\end{aligned} \quad (4)$$

where $risk_{it}$ denotes risk-taking, and $power_{it}$ is power. γ_2 and δ_2 are coefficients of interest.

Results

Descriptive statistics

Table 1 presents each variable's descriptive statistics. The average values for *substantive* DT and *symbolic* DT in listed FFs during the sample period are 0.960 and 0.969, respectively. The standard deviations for these values are 1.236 and 1.114, respectively. The two levels are relatively close, but DT varies considerably across FFs, particularly in terms of *substantive* DT. The average value of founder control is 0.799, which suggests that about 79.9% of the sample consists of FFs where the founders have control. This indicates that founder control is a prevalent characteristic among listed FFs in China.

Correlation analysis

Table 2 displays the correlation coefficients among the variables. The findings indicate a positive and significant correlation between founder control and substantive DT. However, a negative and statistically insignificant correlation exists between founder control and symbolic DT, which preliminarily confirms the research hypothesis. Additionally, all

Table 1. Summary statistics

VarName	Obs.	Mean	S.D.	Min.	Median	Max.
SubstantiveDT	15,398	0.960	1.236	0.000	0.000	4.710
SymbolicDT	15,398	0.969	1.114	0.000	0.693	4.159
foundercontrol	15,398	0.799	0.401	0.000	1.000	1.000
size	15,398	21.763	1.009	19.916	21.639	24.859
firmage	15,398	2.773	0.372	1.609	2.833	3.434
risk	15,397	0.050	0.045	0.001	0.039	0.280
roa	15,398	0.059	0.069	−0.263	0.060	0.245
assetdebtratio	15,398	0.356	0.183	0.045	0.343	0.817
power	15,398	0.430	0.495	0.000	0.000	1.000
indirector	15,397	0.380	0.052	0.333	0.364	0.571
balance	15,398	0.838	0.604	0.057	0.683	2.878
ownership	15,398	0.406	0.166	0.076	0.396	0.808
separation	15,398	0.470	0.499	0.000	0.000	1.000

Source(s): Authors' own work

correlation coefficients between the variables are below 0.7, which suggests that the model does not suffer from any significant covariance issue.

Regression results

Benchmark regression results. This research has undertaken multiple regression analyses using models (1) and (2) to examine the impact of founder control on FFs' DT. The regression analysis in column (1) of Table 3 reveals that the coefficient of founder control on *substantive* DT is positively significant at the 1% level Thus, founder-controlled FFs have a greater ability to drive *substantive* DT compared to non-founder-controlled FFs. The results in column (2) indicate that the regression coefficient for founder control on *symbolic* DT is not statistically significant. This implies no substantial difference in the effect of founder control on firms' *symbolic* DT compared to non-founder control. By merging the outcomes of the two models, we confirm the validity of Hypothesis 1, which states that founder-controlled FFs have a greater ability to facilitate significant DT in comparison to non-founder-controlled FFs.

Mechanism analysis. Risk-taking. As stated before, founders, compared to non-founders, are entrepreneurs who are innovative and adventurous. Consequently, they are more inclined to undertake significant DT efforts to achieve competitive success for their organizations. As shown in Table 4, the coefficient of *risk * foundercontrol* in column (1) is significant at the 1% level. This indicates that FFs with founder control are more likely to participate in risk-taking behaviors, which in turn leads to their *substantive* DT. Surprisingly, the coefficient of *risk * foundercontrol* in column (3) is significant at the 5% level. It indicates that founder control has an indirect influence on *symbolic* DT as founder-controlled FFs tend to engage in more risk-taking activities. Hypothesis 2 is partially supported.

Power. Another mechanism posits that founders own substantial power over the company, which enables them to exert considerable influence over decision-making processes. Additionally, founders often receive support from the board of directors, which further reduces the conflict experienced during DT implementation. Furthermore, founders with considerable influence are less prone to termination, even in cases where strategic expenditures prove unsuccessful or depart from the intended objectives. As shown in Table 4, the coefficient of *power * foundercontrol* in column (2) is significant at the 5% level. Thus, founders possess a considerable amount of power, which enables them to develop a unified digitalization vision, effectively manage different departments and members, and successfully implement various forms of resource support; this in turn facilitates their *substantive* DT. The coefficient of *power * foundercontrol* in column (4) is not statistically

Table 2. Correlation coefficient

	SubstantiveDT	SymbolicDT	foundercontrol	size	firmage	risk	roa	assetdebtratio	power	indirector	balance	ownership	separation
SubstantiveDT	1												
SymbolicDT	0.542***	1											
foundercontrol	0.025***	−0.009	1										
size	0.089***	0.149***	−0.138***	1									
firmage	0.093***	0.050***	−0.223***	0.205***	1								
risk	0.322***	0.119***	0.087***	−0.189***	−0.049***	1							
roa	−0.116***	−0.080***	−0.005	0.003	−0.073***	−0.151***	1						
assetdebtratio	0.035***	0.077***	−0.099***	0.497***	0.142***	−0.265***	−0.259***	1					
power	0.021***	0.009	0.050***	−0.123***	−0.044***	0.078***	0.006	−0.065***	1				
indirector	0.047***	0.043***	0.043***	−0.065***	0.027***	0.032***	−0.024***	−0.004	0.122***	1			
balance	0.058***	0.032***	0.037***	−0.034***	−0.002	0.082***	−0.007	−0.066***	−0.044***	−0.042***	1		
ownership	−0.083***	−0.042***	0.180***	−0.195***	−0.099***	−0.036***	0.214***	−0.168***	0.086***	0.143***	−0.120***	1	
separation	0.011	0.013	−0.177***	0.117***	0.013*	−0.015*	0.040***	0.070***	−0.022***	−0.066***	−0.081***	−0.120***	1

Note(s): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source(s): Authors' own work

Table 3. Founder control and FFs' DT

Variables	(1) SubstantiveDT	(2) SymbolicDT
foundercontrol	0.0547***	−0.0274
	(0.0202)	(0.0213)
size	0.1379***	0.1637***
	(0.0093)	(0.0098)
firmage	0.0423*	−0.0759***
	(0.0242)	(0.0251)
risk	2.8310***	0.6616***
	(0.2513)	(0.2372)
roa	−0.3440***	−0.4247***
	(0.1257)	(0.1274)
assetdebtratio	0.0936*	0.0425
	(0.0512)	(0.0530)
indirector	0.0521	0.0585
	(0.1470)	(0.1524)
power	0.0095	0.0243
	(0.0154)	(0.0156)
balance	0.0034	−0.0020
	(0.0124)	(0.0131)
ownership	−0.2002***	0.0404
	(0.0481)	(0.0499)
separation	−0.0127	−0.0282*
	(0.0157)	(0.0158)
Constant	−3.5930***	−3.5339***
	(0.2231)	(0.2411)
Industry and year	Control	Control
Observations	15,396	15,396
R-squared	0.4628	0.3026

Note(s): Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' own work

Table 4. Mechanisms of founder controls influence FFs' DT

Variables	(1) SubstantiveDT	(2) SubstantiveDT	(3) SymbolicDT	(4) SymbolicDT
*risk * foundercontrol*	1.4988***		1.0621**	
	(0.4584)		(0.4739)	
risk	1.6001***		−0.2106	
	(0.4147)		(0.4354)	
power foundercontrol*		0.0906**		−0.0093
		(0.0437)		(0.0466)
power		−0.0662*		0.0332
		(0.0401)		(0.0432)
foundercontrol	−0.0146	0.0149	−0.0765**	−0.0205
	(0.0277)	(0.0302)	(0.0314)	(0.0332)
Constant	−3.5133***	−3.3655***	−3.4775***	−3.3446***
	(0.2225)	(0.2502)	(0.2420)	(0.2829)
Controls	Control	Control	Control	Control
Industry and year	Control	Control	Control	Control
Observations	15,396	13,261	15,396	13,261
R-squared	0.4633	0.4644	0.3029	0.3013

Note(s): Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' own work

significant. Therefore, founders of FFs with controlling ownership do not actively encourage *symbolic* DT, even when they hold significant power. Hypothesis 3 is confirmed.

Heterogeneity analysis. First, the impact of state-owned capital participation. The Chinese government has been actively promoting mixed ownership reform and encouraging state-owned capital to enter family-owned private enterprises. The introduction of state-owned capital can influence FFs' attitude toward risk and weaken the founders' power, which in turn can influence their decisions about DT.

Regarding risk-taking, state-owned equity offers FFs the necessary capital, technology, and talent for DT (Li *et al.*, 2023a). Additionally, state-owned shareholders aid FFs when they encounter financial challenges during the DT process. Consequently, involving state-owned capital offers a reliable safeguard for FFs, enhances their ability to take risks, boosts their investment in DT, and facilitates DT expansion in terms of scope and intensity. From the perspective of power, state-owned shareholders can monitor the controlling shareholders of FFs based on their official backgrounds. This supervision prevents these controlling shareholders from exerting excessive influence over strategic decisions on DT and other company strategies. Consequently, involving state-owned capital in FFs enhances these firms' risk-taking capacity while diminishing the founders' authority, thereby limiting their control.

This research conducts regressions using sub-samples based on the occurrence of state capital participation. It aims to assess the influence of founder control on the DT of FFs in different samples. Columns (1) and (2) of Table 5 show the regression results of *substantive* DT, where the coefficient of founder control is significantly positive at the 1% level in the group without state capital participation while it is not significant in the group with state capital participation. Founder control has a more pronounced effect on *substantive* DT and is more strongly facilitated in FFs without state capital participation. Columns (3) and (4) of Table 5 indicate that *symbolic* DT is not statistically significant, regardless of whether state capital is involved.

Second, the impact of second-generation involvement. FFs exhibit a decline in their propensity for risk-taking when they transition into intergenerational inheritance (Grundström *et al.*, 2012). DT is a complex and costly investment process that involves a lengthy development cycle and substantial capital expenditures. It also carries a high level of uncertainty. If digitalization fails to deliver the expected benefits, it can negatively impact the successor's establishment of authority in the organization. This can lead to serious consequences, including potential conflicts among successors vying for control, ultimately

Table 5. Founder control and FFs' DT: State-owned capital participation

Variables	(1) SubstantiveDT	(2) SubstantiveDT	(3) SymbolicDT	(4) SymbolicDT
	State-owned capital participation	Without state-owned capital participation	State-owned capital participation	Without state-owned capital participation
foundercontrol	0.0615	0.0559***	0.0022	−0.0317
	(0.0769)	(0.0213)	(0.0709)	(0.0226)
Constant	−2.7905***	−3.7122***	−1.9944**	−3.6771***
	(0.9155)	(0.2387)	(1.0081)	(0.2576)
Controls	Control	Control	Control	Control
Industry and year	Control	Control	Control	Control
Observations	1,064	14,094	1,064	14,094
R-squared	0.5254	0.4602	0.3695	0.3024

Note(s): Robust standard errors in parentheses $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$
Source(s): Authors' own work

resulting in a decline in the enterprise's core competitiveness. Thus, fathers (founders) allocate limited innovation resources to low-risk areas to establish the authority of the second generation and prepare for their succession. This helps balance short-term performance and long-term planning. Firms only make longer-term strategic decisions once the successor's legitimacy has been established in the later stages of inheritance.

Therefore, we examine the effect of founder control on FFs' DT in a subgroup regression based on whether second-generation members are involved in the firm's management (Table 6). The results in columns (1) and (2) show that the coefficient of founder control is significantly negative at the 5% level when the second generation is involved while it is significantly positive at the 1% level with no second-generation involvement. Founder control has a significant dampening impact on FFs' *substantive* DT when they enter the inheritance phase. The results in columns (3) and (4) show that the coefficient of founder control is significantly negative at the 1% level when second-generation involvement is present, and it is insignificant with no second-generation involvement. The founder control has an inhibitory effect on the *symbolic* DT when FFs enter the inheritance phase. Therefore, second-generation involvement reduces the risk-taking inclination of FFs and inhibits the positive effect of founder control on firms' DT.

Third, the influence of Confucianism embeddedness. Traditional culture influences the behavioral standards of business organizations, subsequently impacting their investment decisions (Chen *et al.*, 2021). This study investigates the influence of Confucianism, the predominant and extensive traditional culture in Chinese society, on the relationship between founder control and DT. Keeping reforming and innovating is a key value of Confucianism. Robust Confucian cultures shape FFs, leading them to participate in high-risk projects such as DT (Chen *et al.*, 2021). Furthermore, Confucian culture places great importance on the moral values of loyalty and trust, fostering a stronger sense of trust among family members and a greater acceptance of failure among family members, regardless of their status as founders or not. This, in turn, enhances their inclination to participate in projects that involve a certain degree of risk. Familism is another key element of Confucianism. The authority of the core corporate figures, such as the founder's centralized power, is a prominent manifestation of this value in corporate management. The founder has more power to launch DT in areas characterized by a robust Confucian culture.

This research used the count of regional Confucian temples as a proxy variable to represent Confucian culture (Chen *et al.*, 2021). We conduct group regressions based on the average

Table 6. Founder control and FFs' DT: Second-generation involvement

Variables	(1) SubstantiveDT	(2) SubstantiveDT	(3) SymbolicDT	(4) SymbolicDT
	Second-generation involvement	Without second-generation involvement	Second-generation involvement	Without second-generation involvement
foundercontrol	−0.0849**	0.0922***	−0.1655***	0.0012
	(0.0427)	(0.0256)	(0.0403)	(0.0287)
Constant	−2.5316***	−3.8200***	−2.3209***	−3.6041***
	(0.4704)	(0.2736)	(0.4712)	(0.3044)
Controls	Control	Control	Control	Control
Industry and year	Control	Control	Control	Control
Observations	3,450	10,701	3,450	10,701
R-squared	0.4004	0.4880	0.3119	0.3166

Note(s): Robust standard errors in parentheses $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$
Source(s): Authors' own work

value of this variable, dividing it into two categories: high and low Confucian cultural embeddedness. As shown in Columns (1) and (2) of Table 7, founding control is significantly positive at the 1% level for *substantive* DT at low Confucian cultural embedding; conversely, it is not significant in the group with high Confucian culture embedding. A possible reason is that the founder control's preference for action is consistent with the values promoted by Confucian culture, that is, Confucianism has a positive effect on DT (Pan *et al.*, 2024). Only regions with a weak Confucian culture can experience the influence of founder control on DT. Columns (3) and (4) show no significant difference in the effect of founder control on *symbolic* DT between high and low Confucian cultural embeddedness.

Robustness test. We conduct a robustness analysis by altering the methodology used to measure key variables and expanding the scope of the sample. The results are not given owing to space limitations and are available to interested readers upon request.

(1) *Replacing the measurements of substantive and symbolic DT.* Following Liu *et al.* (2023), we use the logarithm of DT intangibles to measure *substantive* DT as strategic change is always measured by changes in key resource allocation indicators. The sum of keyword word frequency related to using digital underlying technologies and technology practices in the annual reports of listed companies is used as a proxy for *symbolic* DT. The companies align with the prevailing trend of DT and present themselves as desirable, appropriate, or proper. The results are consistent with those in Table 3, indicating the robustness of the findings.

(2) *Changing the scope of the sample.* Variances in the definition of FFs among previous studies have a consequential impact on the research findings. This paper examines the criterion of control proportion in FFs as discussed in the previous literature. It sequentially eliminates samples with family control proportions below 10 and 20% and subsequently conducts a regression analysis. The coefficient of founder control remains significantly positive. The main findings of this paper remain unchanged after changing the sample scope.

Discussion

Theoretical implications

In the current digital economy expansion, DT has emerged as a crucial strategy for FFs to preserve competitive advantage and generate business value (Soluk *et al.*, 2021). However,

Table 7. Founder control and FFs' DT: Confucian culture embeddedness

Variables	(1) SubstantiveDT	(2) SubstantiveDT	(3) SymbolicDT	(4) SymbolicDT
	High Confucian Culture Embeddedness	Low Confucian Culture Embeddedness	High Confucian Culture Embeddedness	Low Confucian Culture Embeddedness
foundercontrol	−0.0223	0.0893***	−0.0456	−0.0249
	(0.0362)	(0.0248)	(0.0361)	(0.0263)
Constant	−2.4287***	−4.0954***	−3.4682***	−3.3938***
	(0.3862)	(0.2830)	(0.3874)	(0.3084)
Controls	Control	Control	Control	Control
Industry and year	Control	Control	Control	Control
Observations	5,302	10,094	5,302	10,094
R-squared	0.5281	0.4333	0.3560	0.2954

Note(s): Robust standard errors in parentheses $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$
Source(s): Authors' own work

despite differing viewpoints on the benefits of DT for FFs (Ceipek *et al.*, 2021; Ferraro and Cristiano, 2021; Prügl and Spitzley, 2021), this paper argues that the lack of consensus may be attributed to the oversight of the diverse range of family control and underlying motivations driving DT. Taking into account risk-taking and founder power perspectives, this study uses an empirical approach to analyze the impact of founder control on FFs' DT based on a sample of A-share-listed FFs in China from 2010 to 2022. Additionally, the study distinguishes between *substantive* and *symbolic* DT approaches based on the motivation to undertake DT (Liu *et al.*, 2023).

Our results indicate that founder control significantly drives *substantive* DT but not *symbolic* DT. This finding aligns with those of previous research in the field of corporate innovation indicating that founders are inclined to engage in riskier investment strategies (Block *et al.*, 2013; Lee *et al.*, 2020). Mechanistic analyses reveal that high founder control enables *substantial* DT of FFs through high risk-taking (Covin and Slevin, 1991) and power concentration (Zhong *et al.*, 2022). FFs' willingness to undertake *substantive* DT is attributed to high risk-taking, while the execution of *substantive* DT is linked to founders exerting high power for decision-making (De Massis *et al.*, 2014).

This paper delves into the boundary conditions affecting the relationship between founder control and FFs' DT, examining various internal and external governance factors, including state capital, second-generation participation, and Confucian cultural embeddedness. The results reveal that founder control is more conducive to substantive DT in the sample group without state capital involvement, second-generation involvement, and low Confucian cultural embeddedness. This study enriches the research on FFs' DT decisions in terms of control heterogeneity and motivational heterogeneity, providing a deeper understanding of the complex and dynamic strategic decisions between FFs' characteristics and DT.

Practical implications

Our findings offer valuable insights for strategically managing FFs, particularly in facilitating DT.

First, the results underscore founders' critical role in driving DT initiatives due to their ability to take risks and their centralized decision-making power. FFs led by founders are more inclined to undertake *substantive* DT as founders often possess a long-term vision that aligns with the benefits of adopting digital technologies. For FFs, this suggests that preserving and leveraging founders' authority is vital for steering the organization toward successful DT. Founders should take the lead in crafting a clear digital strategy and ensuring that resources are allocated to maximize the impact of technologies such as artificial intelligence, big data, and blockchain.

Second, succession planning plays a pivotal role in sustaining DT within FFs. The study reveals that second-generation involvement may hinder *substantive* DT owing to their tendency toward risk aversion and a focus on stability. This highlights the need for FFs to integrate DT into their succession strategies. Successors should be progressively involved in innovation-driven projects to develop confidence in the benefits of digital adoption. Moreover, founders must actively mentor the next generation to embrace a digital mindset, ensuring that the firm remains competitive in an increasingly digitized business environment. Properly managing the balance between tradition and innovation during succession is crucial for maintaining long-term growth.

Third, the participation of state-owned capital presents both opportunities and challenges for FFs undergoing DT. While it provides financial stability and access to resources necessary for large-scale digital initiatives, it can also dilute the founder's control, potentially reducing the firm's agility in implementing innovative strategies. To mitigate this, FFs should seek to maintain a degree of autonomy in decision-making while leveraging its benefits. This balance can allow FFs to combine the financial support and stability provided by state-owned investors with the founder's vision and entrepreneurial spirit, ensuring that DT initiatives are ambitious and feasible.

Fourth, the cultural context contributes to shaping the trajectory of DT in FFs, particularly in China, where Confucian values strongly influence organizational behavior. The study shows that regions with strong Confucian cultural embedding may either facilitate or inhibit DT, depending on how these cultural norms are managed. For FFs, this implies that aligning the digital agenda with traditional cultural values, such as loyalty, trust, and respect for authority, can enhance acceptance and commitment to DT efforts. Leaders should foster a corporate culture that both honors familial traditions and embraces digital innovation, positioning DT as a tool for preserving the family's legacy in the modern economy. Effectively leveraging the rich traditional culture is crucial.

Finally, the study highlights the importance of balancing conservatism with innovation. While FFs are often seen as conservative, the findings reveal that founders can act as catalysts for digital change. Thus, FFs should establish a corporate culture that encourages innovation while preserving their core family values. Founders should lead by example, adopting emerging technologies in strategic areas of the business. This balance between tradition and innovation will enable FFs to remain resilient and adaptable in the face of technological disruption, ensuring their long-term competitiveness and sustainability.

Limitations and future research

First, this paper only differentiates between founder and non-founder control and can distinguish the type of family control from multiple dimensions, such as management, ownership, and control, to study the impact of FFs heterogeneity on DT. Future work can explore the impact of more heterogeneous FFs' characteristics on DT.

Second, DT may be subject to measurement bias when measured by relevant word frequency statistics disclosed in financial statements. We should develop more effective indicators in the future to depict the breadth and depth of enterprise DT and conduct a comprehensive examination of this transformation.

Conclusion

This paper contributes to the theoretical and empirical understanding of how to facilitate DT in FFs by a sample of Chinese list FFs in 2010–2022. Previous research has compared family and non-family enterprises in DT; however, this paper primarily examined the influence of founder control on family firms' DT. We suggest two pathways to DT depending on motivation: *substantive* and *symbolic* DTs. The results indicate that founder-controlled FFs are both eager and capable of facilitating *substantial* DT rather than *symbolic* DT. Founders are the architects of a business, playing a vital part in the firm's strategic objectives. In the winner-take-all era of the digital economy, founders exhibit greater sensitivity to corporate demise than to the risks associated with DT.

Then, we investigated how founder control affects DT from the perspectives of founders' risk-taking and power and found that founders with a higher level of risk-taking and power can better promote *substantive* DT. Founders have a greater entrepreneurial spirit characterized by innovation, risk-taking, and proactivity, which makes them brave to try new technologies and business models. Additionally, founders tend to be overconfident and insensitive to perceived risk, which makes them focus more on the benefits of digitization than the risks. Founder power, the top-down control over decision-making authority and resource flows within a firm, is necessary for undergoing DT.

Finally, we investigated the impact of founder control on FFs' DT by considering several Chinese context factors, such as state-owned capital involvement, second-generation involvement, or regional cultural embeddedness (e.g. Confucianism). The participation of state capital in FFs amplifies their risk-taking ability while also undermining the founders' authority, thereby constraining their control. Consequently, founders are more inclined to advocate for DT in FFs without state-capital participation. FFs undergo a phase of inheritance

wherein the founders direct constrained innovation resources to low-risk domains to assert the authority of the second generation and facilitate their succession preparation. Consequently, founders are more adept at promoting DT in FFs without second-generation participation. The Confucian principle of innovation could encourage FFs to pursue DT, and familialism strengthens the founder's authority to realize DT, which serves as a replacement for founder characteristics. Consequently, founders are more effective in advancing DT in areas with weak Confucian cultural embeddedness. This study enhances the comprehension of DT decision-making in family enterprises and offers valuable policy insights for their digital evolution.

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