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Does family ownership reduce exploratory innovation in family firms? The moderating role of the generational stage

Junjie Guang[1] · Yang (Eric) Zhou[1] · Lei Gong[2] · Li Xia[1,3] · Zhiying Liu[1]

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Abstract

Existing literature suggests that family ownership (FO) reduces exploratory innovation (ERI). Contrary to this conventional view, some family firms are among the world's innovation leaders. Our study aims to reconcile this discrepancy by examining the role of restricted and extended socioemotional wealth in the relationship between FO and ERI. We posit that while FO may inhibit the capacity for ERI due to rigid mental models and cognitive convergence, it fosters the willingness for ERI owing to a long-term orientation. We argue that FO exhibits an inverted U-shaped effect on ERI. Empirical evidence from 938 Chinese-listed family firms between 2011 and 2021 supports our hypothesis. Our findings indicate that FO's influence on ERI is not uniformly detrimental and that a moderate level of FO can promote ERI. Additionally, the latter generational stage (GS) attenuates the inverted U-shaped curve, implying that family firms in the latter GS may exhibit lower levels of ERI. This study offers theoretical and practical insights into FO and technological innovation research domains.

Keywords Family ownership · Exploratory innovation · Technological innovation · China

Family ownership (FO) is a predominant form of business ownership globally (Anderson & Reeb, 2003; Salvato et al., 2019), exerting a significant impact on firms' strategic decisions (Dou et al., 2019). The influence varies based on the equity proportion held by the controlling family (Cirillo et al., 2018). Increasingly, the degree of FO is acknowledged as a crucial determinant of the innovation capacity within family firms (Chen & Hsu, 2009; Liu et al., 2017). However, the effect of FO on exploratory innovation (ERI)—a unique innovation strategy defined by experimentation, distant search, and divergence from a firm's core competencies (Benner & Tushman, 2003; March, 1991)—remains ambiguous. ERI aims to

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acquire new knowledge, skills, and capabilities, offering novel products and services to emerging markets (Jansen et al., 2006). Consequently, ERI refers to a mechanism for firms to secure new competencies, facilitating long-term growth (Gao et al., 2021; Phelps, 2010; Su & Yang, 2018). Family firms, motivated by the aspiration to maintain family dynasties (Bennedsen et al., 2007; Dou et al., 2019), should place considerable emphasis on ERI despite its high risks, substantial investment expenditures, and delayed returns (Saldanha et al., 2020).

Existing literature primarily concentrates on the impact of FO on either innovation input or output (Chen & Hsu, 2009; Chrisman & Patel, 2012; Duran et al., 2016; Islam et al., 2022). However, little research has explored the relationship between FO and ERI (Brinkerink, 2018), often positing that FO negatively influences ERI due to risk aversion and family control (Ardito & Capolupo, 2022). Nevertheless, FO is not invariably detrimental to the innovation activities of family firms. Some studies argue that FO enhances the firms' long-term orientation and proactive stakeholder engagement of family firms (Cennamo et al., 2012; Dou et al., 2019), potentially yielding a positive influence on ERI. Certain family firms, such as BYD—a leading Chinese high-tech enterprise—excel in ERI. BYD has strong innovation capabilities in new energy vehicles, rail transportation, batteries, and electronics. According to the Boston Consulting Group's list of the world's most innovative companies of 2023, BYD ranks ninth globally and first among Chinese listed firms. Thus, the relationship between FO and ERI may not be linear. Therefore, our paper employs the ability-willingness framework to scrutinize the relationship between FO and ERI (Chrisman et al., 2015). Utilizing data from Chinese-listed family firms spanning 2011 to 2021, we posit that FO exhibits an inverted U-shaped influence on ERI through mechanisms of restricted and extended socioemotional wealth (SEW).

The preservation of Socioemotional Wealth (SEW), defined as the non-financial attributes or "affective endowments" that a family value (Berrone et al., 2012), typically drives the strategic decisions of family firms. Miller and Le Breton–Miller (2014) suggest that SEW can be categorized into restricted and extended types, each having distinct impacts on a family firm's ability and willingness to engage in ERI (Jiang & Min, 2023; Pan et al., 2023). Restricted SEW focuses on the intra-family objective of maintaining SEW with the firm, while extended SEW underscores efforts to achieve sustainability beyond the firm's confines (Pan et al., 2023). Restricted SEW often results in rigid mental models and cognitive convergence (König et al., 2013; Miller & Le Breton–Miller, 2014), constraining the firm's capacity for ERI (Carnes & Ireland, 2013). Conversely, extended SEW, oriented towards pursuing opportunities to ensure longevity (Laffranchini et al., 2020), enhances the firm's willingness to undertake ERI (Dou et al., 2019). Pan et al. (2023) note that family firms often pursue both restricted and extended SEW simultaneously, and they predicate optimal ERI on the confluence of both ability and willingness (De Massis et al., 2014; Veider & Matzler, 2016). Accordingly, this paper posits an inverted U-shaped relationship between FO and ERI, proposing that a moderate level of FO is optimal for maximizing ERI.

Interestingly, a McKinsey survey reveals that "less than 30 percent of family businesses survive into the third generation of family ownership",[1] suggesting that transgenerational succession may significantly contribute to the challenges of maintaining family legacies. Motivated by these generational heterogeneities, this study examines the moderating role of generational stage (GS)—defined as whether the family firm leader is the founder or the successor (Gu et al., 2019). While existing literature has primarily scrutinized the direct impacts of generational differences on financial performance (Xu et al., 2015), innovation output (Carney et al., 2019), and strategic change (Zhao et al., 2020) within family firms, limited research has considered the contextual function of GS (Kraiczy et al., 2015). Gu et al. (2019) posit that family leaders in the latter GS exhibit diminished affective attachment and identification to family firms, reducing emphasis on restricted and extended SEW. This decrease in SEW attenuates both the ability and willingness to engage in ERI, thus serving as a moderating variable that flattens the relationship curve.

This study is significant for multiple reasons. First, this study proposes an inverted U-shaped relationship between FO and ERI. Previous literature presents diverging perspectives on this relationship (Adams et al., 2006; Ardito & Capolupo, 2022), mainly attributable to a narrow focus on a singular SEW dimension. Motivated by these inconsistencies, this research adopts a comprehensive approach that amalgamates restricted and extended SEW mechanisms, elucidating the nonlinear relationship between FO and ERI. Second, the study sheds light on the moderating role of GS. While extant literature on family firms has investigated both the consequences and antecedents of transgenerational succession (Amore et al., 2021; Carney et al., 2019; Gagné et al., 2021; Xu et al., 2015), researchers have paid scant attention to the contextual influence of GS (Gu et al., 2019; Schierstedt et al., 2020). By incorporating GS as a contextual variable, this research enriches the current understanding of its moderating effects on the relationship between FO and ERI. Lastly, unlike prior studies primarily focused on developed countries, this research investigates the relationship between FO and ERI within the unique context of China, a prototypical emerging economy teeming with family firms (Pan et al., 2023), thereby responding to the call for research on FO in developing economies (Ardito & Capolupo, 2022).

The remainder of this article is structured as follows: Section II provides an overview of relevant literature and formulates research hypotheses. Section III delineates the methodology, data sources, and measurement variables. Section IV presents the primary findings along with a series of robustness tests. Section V engages in a detailed discussion of the study's findings, including both theoretical and practical implications.

Literature review and hypotheses

Family firms and restricted and extended SEW

Gómez-Mejía et al. (2007) introduce the SEW theory to account for the unique behaviors exhibited by family firms. This framework suggests that family firms

[1] [Online]. Available: https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/the-five-attributes-of-enduring-family-businesses

are often guided more by the preservation of SEW (Gomez-Mejia et al., 2011) than by traditional economic objectives. Such firms are inclined to pursue non-financial goals, including family control, transgenerational succession, family altruism, and the enhancement of family social capital (Berrone et al., 2010). When formulating strategic decisions, the SEW considerations are often a pivotal reference point (Berrone et al., 2012). Although numerous studies have leveraged the SEW framework to elucidate differences in behavior between family and nonfamily firms—in areas such as stakeholder engagement (Cennamo et al., 2012), R&D investment (Chrisman & Patel, 2012), misconduct (Ding & Wu, 2014) —the SEW theory has yet to explore the internal variations among family firms fully. This oversight has resulted in contradictory findings in the literature on family firms (Gu et al., 2019). For instance, while the preservation of SEW may deter family firms from engaging in high-risk ventures such as R&D investments to uphold family control (Cirillo et al., 2018; Duran et al., 2016), it may also incentivize strategic choices that forgo immediate returns in favor of long-term organizational growth (Cennamo et al., 2012; Dou et al., 2019). To reconcile these inconsistencies, Miller and Le Breton–Miller (2014) have divided SEW into two distinct categories: restricted and extended.

Restricted SEW focuses on family-centric goals, seeking non-financial advantages such as ensuring long-term job security for family members, leveraging business resources to address family disputes, and installing family members in key leadership roles irrespective of their qualifications to strengthen family control (Miller & Le Breton–Miller, 2014; Schierstedt et al., 2020). Such priorities encourage strategic conservatism in family firms, often sidelining nonfamily stakeholders (Wu et al., 2007) and exacerbating homogeneity within the firm in aspects such as culture, expertise, and experience (Arzubiaga et al., 2019). Consequently, restricted SEW hampers firms' capacity for distant search and innovative resource allocation, undermining their ability to acquire new knowledge and develop novel capabilities (Carnes & Ireland, 2013; Yang et al., 2020).

Extended SEW emphasizes a broader stakeholder perspective, targeting non-financial gains that extend beyond the family, such as facilitating transgenerational succession, enhancing the firm's image and reputation, and maintaining enduring relationships with both internal and external stakeholders (Laffranchini et al., 2020; Miller & Le Breton–Miller, 2014). Consequently, extended SEW fosters a long-term orientation in family firms and predisposes them to strategic decisions that require a long investment horizon (Cennamo et al., 2012; Dou et al., 2019), which is likely to contribute to superior growth and longevity for family firms (Chen et al., 2022).

Drawing upon the ability-willingness framework in existing literature (De Massis et al., 2014; Jiang & Min, 2023; Pan et al., 2023; Ray et al., 2018), we propose that both ability and willingness are indispensable conditions for achieving ERI in family firms (Chrisman et al., 2015; De Massis et al., 2014). ERI in family firms necessitates the synergistic interplay of these two facets. FO differentially influences ability and willingness through restricted and extended SEW mechanisms, ultimately leading to a nonlinear relationship (Haans et al., 2016; Xia et al., 2022).

FO and its impact on corporate innovation

FO serves as the foundational governance structure of family firms (Villalonga & Amit, 2006). A plethora of studies have scrutinized the association between FO and corporate innovation (Ardito & Capolupo, 2022; Block, 2012; Chen & Hsu, 2009; Chi, 2023; Chrisman & Patel, 2012; Duran et al., 2016; Munari et al., 2010). Following Duran et al. (2016), our investigation distinguishes between two primary streams of research, as depicted in Fig. 1: the impact of FO on innovation input and innovation output. While our focus primarily lies on innovation output, we deem it essential to briefly explore the relationship between FO and innovation input, given its direct influence on the former (Liang et al., 2013).

One strand of research concentrates on the relationship between FO and innovation input, but consensus remains elusive. Most researchers argue that FO negatively influences R&D investment (Block, 2012; Chen & Hsu, 2009; Duran et al., 2016; Li & Ryan Jr., 2022; Munari et al., 2010). Nonetheless, certain conditions can mitigate or even reverse this negative association. Factors contributing to this include performance falling below aspiration levels (Chrisman & Patel, 2012), minimal overlap between family wealth and firm equity (Sciascia et al., 2015), the presence of growth opportunities (Choi et al., 2015), abundant organizational slack (Liu et al., 2017), the involvement of private equity investors (Cirillo et al., 2018), and active family management (Islam et al., 2022). A minority of scholars advocate for a positive impact of FO on R&D investment (Ashwin et al., 2015; Singh & Gaur, 2013). Moreover, certain studies suggest a nonlinear relationship between FO and R&D investment (Agnihotri & Bhattacharya, 2022; García-García et al., 2020). These scholars argue that FO has an inverted U-shaped effect on R&D and that when FO increases, R&D investment increases, but when FO reaches a certain level, R&D investment decreases as FO increases.

The other strand of research focuses on the influence of FO on innovation output, which consists of two primary streams: the overall corporate innovation

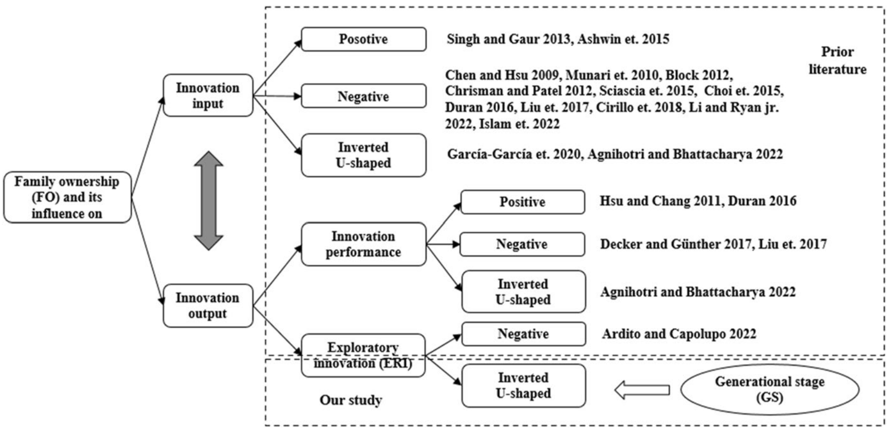

Fig. 1 Research context

performance and specific innovation strategies. Following organizational learning ambidexterity, innovation strategies are generally categorized as either ERI or exploitative innovation (Jansen et al., 2006). This study delves explicitly into ERI, which is typically poorly performed by family firms (Ardito & Capolupo, 2022). While a considerable body of work has explored the first stream, indicating both linear and nonlinear impacts of FO on corporate innovation performance (Agnihotri & Bhattacharya, 2022; Decker & Günther, 2017; Duran et al., 2016; Hsu & Chang, 2011; Liu et al., 2017), the second stream has received scant attention. Few studies have examined FO's impact on ERI, which can be instrumental in equipping firms with new competencies for sustainable growth (Zhu et al., 2022).

Furthermore, extant literature, primarily grounded in SEW preservation, has predominantly investigated the 'ability' mechanisms underlying FO's influence on ERI (Ardito & Capolupo, 2022), overlooking the 'willingness' mechanisms. However, optimal ERI in family firms may necessitate both ability and willingness concurrently (Chrisman et al., 2015; De Massis et al., 2014). Some research posits that FO fosters a long-term orientation within family firms, thus increasing their propensity to adopt long-term development strategies such as proactive environmental strategies (Dou et al., 2019) and proactive stakeholder engagement (Cennamo et al., 2012). Contrary to these studies, the present research integrates ability and willingness mechanisms, proposing a nonlinear relationship between FO and ERI.

Relationship between FO and ERI

FO is intrinsically linked with restricted and extended SEW (Berrone et al., 2012; Laffranchini et al., 2020). Specifically, FO fosters greater involvement of family members in management roles (Xu et al., 2019), who are generally inclined to pursue restricted SEW (Tsao et al., 2021). A higher concentration of family managers intensifies the focus on safeguarding family-centric benefits (Al-Tabbaa et al., 2023) and enhances the firm's capacity to achieve restricted SEW objectives (Jiang & Min, 2023). Moreover, elevated levels of FO encourage a long-term orientation within firms (Dou et al., 2019), leading to a more pronounced influence of family members on strategic decision-making (Miller et al., 2013), which fosters a heightened willingness to pursue extended SEW (Schierstedt et al., 2020; Tsao et al., 2021). In summary, we posit that FO is a catalyst for family firms to pursue restricted and extended SEW.

On the one hand, we argue that a focus on restricted SEW by FO compromises the ability of family firms to engage in ERI. ERI inherently demands external inputs in the form of new knowledge, resources, and skill sets (Jansen et al., 2006). A preoccupation with restricted SEW isolates family firms from external investors, such as private equity investors, institutional investors, and government investors (Romano et al., 2001). Such external investors often bring invaluable expertise across various industries and technological spheres (De Massis et al., 2015b) while making family firms more receptive to external exploratory stimuli (Kammerlander et al., 2020). Concurrently, an emphasis on restricted SEW limits the scope for distant search and cross-sectoral collaborations, obstructing the acquisition of new capabilities and knowledge (Chen et al., 2022; Yang et al., 2020). Given the homogeneity in the background of family members (Arzubiaga et al., 2019; Carnes & Ireland, 2013)—encompassing knowledge, skills, experiences, and networks—family firms are prone to cognitive rigidity and tunnel vision (Gomez-Mejia et al., 2001; König et al., 2013). This lack of cognitive diversity impedes their capacities to undertake ERI effectively (Ardito & Capolupo, 2022).

Additionally, the prioritization of restricted SEW can foster family nepotism, leading to increased family members in managerial and leadership roles (Miller & Le Breton–Miller, 2014). This amplification of family influence renders owners more emotionally tied to the firm's existing resources, both tangible and intangible (König et al., 2013; Pan et al., 2023; Sydow et al., 2009). This emotional attachment inhibits the agile reallocation of resources, the strategic reconfiguration of human assets, and the dynamic reorchestration of organizational architecture (König et al., 2013; Veider & Matzler, 2016). Furthermore, the resulting homogeneity within management teams induces organizational rigidity (Pitcher & Smith, 2001), which is detrimental to ERI. Restricted SEW also creates the unique organizational resource termed "familiness" (Pearson et al., 2008; Tokarczyk et al., 2007), which acts as a barrier to pioneering resource bundling—a process crucial for merging new external capacities with existing capabilities (Sirmon et al., 2007). In summary, the focus on restricted SEW undermines family firms' ability to engage in ERI effectively.

On the other hand, while restricted SEW may hamper the ability to pursue ERI, the focus on extended SEW enhances a family firm's willingness to engage in ERI, fueled by a long-term orientation. ERI offers new competencies that can cater to emerging markets and customer needs (Jansen et al., 2006; Slavova & Jong, 2021), allowing firms to adapt to dynamic environments and ultimately achieve long-term sustainability (Benner & Tushman, 2003; Phelps, 2010). Such a focus aligns closely with the objectives of extended SEW, which emphasizes the firm's long-term viability and sustainability (Laffranchini et al., 2020). Committed to bequeathing a profitable and enduring business to the next generation, family owners motivated by extended SEW are less susceptible to management myopia, favoring long-term strategic decision-making instead (Chen et al., 2021; De Massis et al., 2015a; Zellweger et al., 2012). This mindset aligns well with the complexities and challenges of a dynamic business environment, positioning ERI as a viable strategy for ensuring long-term survival (Ardito & Capolupo, 2022; Gao et al., 2021). Previous research indicates that a higher FO bolsters the long-term orientation of family firms, making them more amenable to riskier strategies with longer investment horizons and deferred returns (Cennamo et al., 2012; Dou et al., 2019). Therefore, we argue that FO can enhance the preservation of extended SEW, increasing the willingness to pursue ERI.

In summary, we posit that FO has a dual impact on pursuing ERI in family firms. On the one hand, FO negatively influences the ability to engage in ERI through restricted SEW. On the other hand, FO positively shapes the willingness to pursue ERI by enhancing extended SEW. Figure 2 elucidates these contrasting mechanisms through which FO influences ERI. Grounded in the ability-willingness framework, both ability and willingness act as necessary conditions for family firms to successfully engage in ERI (Chrisman et al., 2015; De Massis et al., 2014; Veider & Matzler,

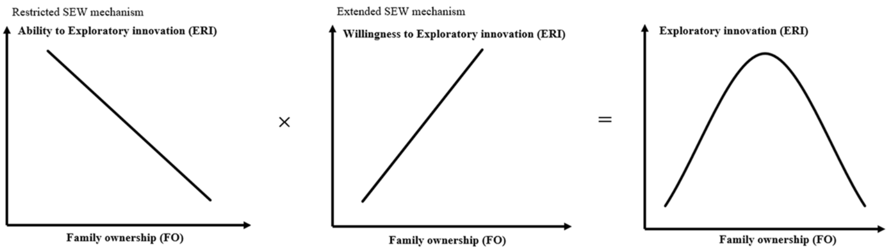

Fig. 2 Latent mechanism of the inverted U-shaped relationship

2016). Building on the insights of Haans et al. (2016), who assert that the "combined effect of ability or opportunity and motivation on an outcome, often a strategic choice," can be represented as a multiplicative function, we propose that the ability and willingness mechanisms interact multiplicatively to shape the strategic decisions of family firms (Jiang & Min, 2023; Pan et al., 2023). In other words, family firms are likely to achieve greater levels of ERI only if they can acquire external knowledge, resources, and capabilities and simultaneously demonstrate the willingness to commit to long-term, riskier investments. This interactive, multiplicative function suggests a curvilinear relationship between FO and ERI (Haans et al., 2016).

Integrating the mechanisms of ability and willingness, we posit that FO exhibits an inverted U-shaped relationship with ERI. Specifically, family firms with a moderate level of FO achieve an optimal blend of ability and willingness, culminating in superior ERI performance. Conversely, imbalanced combinations yield suboptimal results, placing firms at extremes: those with the ability to acquire new knowledge and resources but lacking a long-term orientation or those willing to engage in ERI but deficient in the ability for distant search. Both scenarios result in subpar ERI performance, thus rendering the relationship between FO and ERI as an inverted U-shape. Accordingly, we put forth the following hypothesis:

> **Hypothesis 1**: The relationship between FO and ERI follows an inverted U-shaped curve.

The moderating role of GS

GS indicates the life cycle stage of family firms and the generation of the family owners involved (Kraiczy et al., 2015). Predominantly, two types of GS are observed: the founder generation and the successor generation (Gu et al., 2019). According to the generational perspective, "the emphasis on preserving the family's SEW lessens as the firm movers through generations and financial considerations become more important as a frame of reference" (Gomez-Mejia et al., 2011). Founder-generation family firms often demonstrate strong identification and emotional attachment to their businesses (Cruz & Nordqvist, 2012; Sciascia et al., 2014), thereby orienting their strategic decisions towards the preservation of SEW (Schierstedt et al., 2020). In contrast, successor-generation family firms tend to leverage the wealth and status they have inherited (Gu et al., 2019), placing higher importance on economic objectives (Gómez-Mejía et al., 2007). This generational shift affects the prioritization of SEW in strategic decision-making, introducing heterogeneity in the choices made by family firms (Gomez-Mejia et al., 2011). Consequently, we propose that the emphasis on preserving both restricted and extended SEW wanes in the latter GS.

On the one hand, we argue that GS moderates the impact of restricted SEW on the ability to engage in ERI. Successor-generation family firms are generally more inclined to relax family control in favor of improved financial performance (Gómez-Mejía et al., 2007). This openness often leads to the inclusion of professional external investors who bring diverse resources and expertise (De Massis et al., 2015b) and contribute to the effective management of innovation processes within the firm (Ardito & Capolupo, 2022). Further, successor-generation family members often possess superior educational backgrounds and professional expertise compared to their founder-generation counterparts (Brun De Pontet et al., 2007; McConaughy & Phillips, 1999), which makes them more adept at navigating the complexities of ERI. Additionally, the latter GS family members show less inclination to be actively involved in the management and governance of the family firms (Gu et al., 2019; Handler, 1990). This tendency promotes the adoption of formal human resource policies that foster transparency and democratic governance (Ansari et al., 2014), thus mitigating the effects of family nepotism and increasing the proportion of external professional managers (Jaffe & Lane, 2004; Wang et al., 2022). Such heterogeneous management teams counterbalance the firm's rigid mental models and cognitive convergence. This diversity enhances the firm's capacity for external exploration (Pan et al., 2023), facilitates the pioneering resource bundling processes (Carnes & Ireland, 2013), and consequently strengthens its ability to implement ERI effectively.

On the other hand, we contend that GS also shapes the influence of extended SEW on the willingness to engage in ERI. Successor-generation family firms are often less focused on preserving extended SEW (Kraiczy et al., 2015). These latter GS family owners are less likely to envision passing the business on to future generations (Miller & Le Breton–Miller, 2014), thereby shortening their investment horizons and reducing their risk tolerance. This shift in focus manifests in a heightened emphasis on immediate economic returns (Gómez-Mejía et al., 2007; Schierstedt et al., 2020; Sciascia et al., 2014), consequently diminishing the firm's willingness to pursue ERI activities that are characterized by high uncertainty and slow returns.

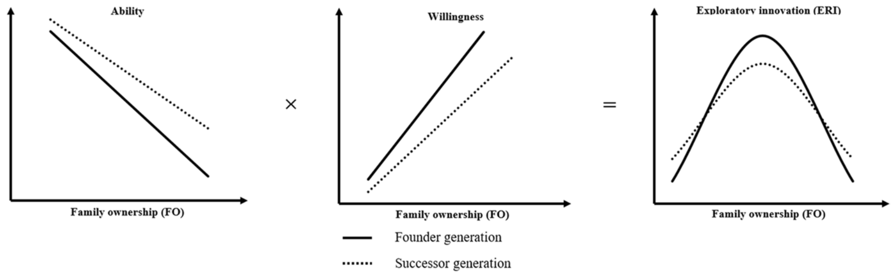

Fig. 3 Theoretical framework for the moderating effect

As Fig. 3 shows, the negative impact of restricted SEW and the positive effects of extended SEW are more pronounced when family firms have become successor-generation family firms. Drawing on the work of Haans et al. (2016), we posit that GS flattens the previously hypothesized inverted U-shaped relationship between FO and ERI. Therefore, we propose the following hypothesis:

Hypothesis 2: The inverted U-shaped relationship between FO and ERI is flattened if the GS is the successor generation.

Method

We examine a dataset comprising Chinese-listed family firms in manufacturing industries to validate our hypotheses. Our focus on the Chinese context is informed by the prevalence of family firms in the country (Pan et al., 2023). Significantly, existing research on ERI predominantly concentrates on developed countries (Ardito & Capolupo, 2022; Arzubiaga et al., 2019; Kammerlander et al., 2020), mainly overlooking the unique conditions and challenges presented by developing economies. As the world's largest emerging economy, China offers an especially compelling case, given its burgeoning innovation capacity. The credibility of our sample is underscored by extensive prior research that has similarly focused on Chinese-listed family firms (Banalieva et al., 2015; Guo et al., 2022; Huang et al., 2020). Additionally, the manufacturing sector is particularly pertinent to our inquiry for two key reasons: it constitutes a significant proportion of family firms (Dolz et al., 2019) and is characterized by a heightened need for technological innovation (Peters et al., 2022). Hence, the choice of manufacturing as our research setting is highly germane.

Sample and data collection

The sample for this study encompasses Chinese-listed family firms in the manufacturing sector, spanning the years 2011–2021. The number of listed family businesses in China has increased significantly since 2011, so we chose 2011 as the starting year of the sample. Consistent with established academic literature (Anderson et al., 2003; Chrisman & Patel, 2012; Feldman et al., 2019), we employ a threefold criterion to delineate family firms: first, the actual controlling entity must be an individual or a family unit connected through blood or matrimonial ties. Second, said individual or family must either directly or indirectly constitute the largest shareholding

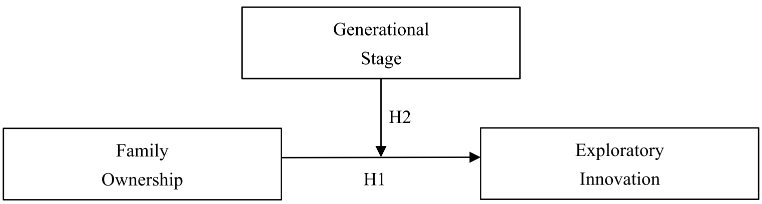

Fig. 4 Conceptual framework and hypotheses

entity of the listed firm. Third, at least two family members should hold shares or occupy positions within the listed firm or its affiliates.

Data for this study is sourced from two prominent databases: the China Stock Market and Accounting Research (CSMAR) database, frequently cited in family firm research (Banalieva et al., 2015; Wang & Ye, 2015; Wang et al., 2023), and the Chinese Research Data Services (CNRDS) database, which offers comprehensive IPC data for all patents (Fan et al., 2022; Lai et al., 2023). We screen the sample as follows: 1) exclude firms labeled as "ST" and "*ST" because of their abnormal business conditions; 2) eliminate firms with missing data. Finally, we obtain an unbalanced panel of 4480 firm-year observations. To minimize the skewing effects of outliers on the study's findings, we employ a 1% winsorization on all continuous variables (Im & Shon, 2019; Li et al., 2021). Given the time lag between patent applications and grants, patent applications serve as more immediate and accurate indicators of a firm's innovative capacities (Lu et al., 2022).

Measures

Dependent variable

Prior studies have frequently employed invention patent IPC data as a metric for evaluating ERI (Ahuja & Morris Lampert, 2001; Gao et al., 2023; Phelps, 2010). In this context, a patent is classified as an ERI if its initial four IPC classification codes are distinct from any observed in the firm's patent applications over the prior five-year period (Lu et al., 2022; Wang et al., 2014).

Independent variable

While prior research has primarily categorized FO as a category variable—differentiating between family-owned and non-family-owned firms for analytical purposes (Acquaah, 2012; Gómez-Mejía et al., 2007; Miller et al., 2008)—our study adopts a more nuanced approach. We treat FO as a continuous variable to capture the varying degrees of family influence within firms. Precisely, we measure FO by the percentage of shares held by the controlling family (Bertschi-Michel et al., 2023; Dou et al., 2019; Matzler et al., 2015; Sciascia et al., 2015).

Moderating variable

In line with Gu et al. (2019), GS is operationalized as a binary variable: it takes on a value of 0 when the controlling owner is the founder of the family firm and one otherwise, indicating the successor generation. Building upon existing literature, appointing a successor as chief executive officer (CEO) or board chairman is considered a hallmark of transgenerational succession (Amore et al., 2021; Li et al., 2022). Accordingly, the GS variable is set to 1 if a member of the successor generation has assumed either of these leadership roles; otherwise, it remains at 0 (Yang et al., 2022).

Control variables

This study incorporates a set of control variables to account for factors that may influence a firm's ERI. Precisely, we control for firm age (FirmAge) and firm size (FirmSize), given their potential impact on accumulated resources and, consequently, innovation performance (Akcigit & Kerr, 2018; Tschang & Ertug, 2016). FirmAge is quantified as the number of years since the firm's establishment (Saldanha et al., 2020), while FirmSize is calculated as the natural logarithm of total assets (Li et al., 2021). Organizational slack (OS) can directly influence firms' ERI (Tabesh et al., 2019). We operationalize OS as the ratio of current assets to current liabilities (Fu et al., 2020). Additionally, R&D intensity (RDI) is controlled, given its direct relevance to innovation output. RDI is gauged as the ratio of R&D expenditures to revenues (Chen & Miller, 2007). Operational status can significantly affect a firm's innovation activities; thus, we include return on assets (ROA) and firm leverage (FirmLev) as control variables. ROA is computed as net profit over total assets (Li et al., 2021), and FirmLev is determined as the ratio of total liabilities to total assets (Xia et al., 2023). Governance structures also bear on innovation decisions, necessitating controls for duality (Dual), independent director ratio (IDR), institutional ownership (IO), and board size (BOS). Dual is a binary variable, set to 1 if the same individual holds the CEO and board chairman roles and 0 otherwise (Wang et al., 2019). IDR is the proportion of independent directors to the total number of board members (Li et al., 2022), while IO is represented by the shareholding percentage held by institutional investors (Döring et al., 2021). Lastly, following Helmers et al. (2017), we quantify BOS as the total number of board directors. Table 1 presents a comprehensive list of each variable and its respective description.

Table 1 Information summary of variables used in this study

Variables	Description
ERI	The number of ERI patent applications
FO	The ratio of shareholding held by the control family
GS	Whether the successor generation occupies the CEO position or board chair position
FirmAge	The period since the firm was founded
FirmSize	Total assets of a firm (Log transformed)
FirmLev	The ratio of total liabilities divided by total assets
OS	The ratio of current assets divided by current liabilities
RDI	The ratio of R&D expenditure divided by revenues
ROA	The ratio of net profit divided by total assets
Dual	Whether the same person occupies the CEO position and board chair position
IDR	The ratio of independent directors divided by the number of total directors
IO	The ratio of shareholding held by institutional investors
BOS	The number of directors on board

Model specification

Given that our dependent variable is a non-negative count variable, we initially considered both the Poisson and the negative binomial regression models (Cohn et al., 2022). We select the negative binomial regression model, as the variance of the dependent variable substantially exceeds its mean (Gómez et al., 2017). To ensure robustness, we also conduct analyses using the Poisson model. We account for how FO influences innovation inputs before affecting innovation outputs. Acknowledging the prolonged investment horizon for ERI, we introduce a 2-year lag for the key explanatory variables (Jiang & Liu, 2022). For robustness, a 3-year lag is also tested. To mitigate potential endogeneity arising from omitted variables, we employ a fixed-effects model that includes industry, province, and year fixed effects (Xia et al., 2023).

We first denote "X" as a vector of control variables, including FirmAge, FirmSize, FirmLev, OS, RDI, ROA, Dual, IDR, IO, and BOS. To test the H1, we estimate the following equation:

$$ERI_{i,t+2} = \beta_0 + \beta_1 FO_{i,t} + \beta_2 FO_{i,t}^2 + \alpha_i X_{i,t} + \text{Fixed Effects} + \varepsilon_{i,t} \tag{1}$$

If β_2 is significant negative, and the turning point (i.e., $-\frac{\beta_1}{2\beta_2}$) is within the range of FO, then H1 is supported. We add the interaction terms between the independent and moderator variables into Eq. (1) to analyze GS's moderating effect. We then estimate the following equation to test H2.

$$\begin{aligned} ERI_{i,t+2} = \beta_0 + \beta_1 FO_{i,t} + \beta_2 FO_{i,t}^2 + \beta_3 GS_{i,t} + \beta_4 FO_{i,t} * GS_{i,t} \\ + \beta_5 FO_{i,t}^2 * GS_{i,t} + \alpha_i X_{i,t} + \text{Fixed Effects} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

Here, we focus on the coefficient β_5, which verifies the moderating effects. If the β_5 is significantly positive, then the inverted U-shape is flattened; otherwise, it is steepened.

Results

Baseline results

Table 2 displays the descriptive statistics and correlations among the dependent, independent, moderating, and control variables. Table 2 shows that all correlation coefficients fall below 0.7, suggesting an absence of severe multicollinearity issues (Zelner, 2009). In addition, the variance inflation factor (VIF) value is 4.5, which is less than 10, so we believe no serious multicollinearity problem exists. Table 3 outlines the effects of FO on ERI as well as the moderating role of GS. Table 4 provides the findings of tests examining the inverted U-shaped relationship. Tables 5–8 present the results of our robustness checks.

Table 3 shows the primary hypothesis tests. Model 1 serves as the baseline, excluding the quadratic term for FO from Eq. (1). Model 2 in Table 3 captures the

Table 2 Descriptive statistics and correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. ERI	1												
2. FO	-0.05*	1											
3. GS	-0.06*	0.07*	1										
4. FirmAge	-0.02	-0.07*	0.09*	1									
5. FirmSize	0.37*	-0.05*	0.04*	0.04*	1								
6. FirmLev	0.17*	-0.10*	-0.06*	0.01	0.41*	1							
7. OS	-0.11*	0.10*	0.02	-0.01	-0.28*	-0.69*	1						
8. RDI	0.08*	0.03*	-0.06*	-0.06*	-0.16*	-0.22*	0.23*	1					
9. ROA	0.06*	0.10*	0.04*	-0.01	0.16*	-0.27*	0.18*	-0.14*	1				
10. Dual	0.01	0.08*	-0.15*	0.02	-0.08*	0.02	0.03*	0.11*	-0.06*	1			
11. IDR	-0.00	0.09*	-0.05*	-0.00	-0.09*	-0.01	-0.02	0.08*	-0.07*	0.18*	1		
12. IO	0.09*	0.06*	0.02*	0.07*	0.33*	0.12*	-0.07*	-0.16*	0.17*	-0.11*	-0.08*	1	
13. BOS	0.01	-0.17*	0.02	0.01	0.17*	0.07*	-0.07*	-0.11*	0.10*	-0.19*	-0.65*	0.11*	1
Mean	6.340	0.333	0.291	18.397	22.183	0.395	0.023	0.045	0.033	0.372	0.377	0.352	8.148
S.D	9.685	0.149	0.454	5.218	0.971	0.173	0.020	0.033	0.073	0.483	0.053	0.240	1.407
Min	0	0.053	0	6	20.064	0.057	0.005	0.001	-0.362	0	0.333	0.001	5
Max	59	0.732	1	41	24.939	0.830	0.140	0.199	0.191	1	0.571	0.873	12

Notes: N = 4480; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3 Model estimation results

	Model 1	Model 2	Model 3
	ERI_{t+2}	ERI_{t+2}	ERI_{t+2}
FO	-0.491***	2.122***	3.242***
	(0.179)	(0.717)	(0.942)
GS	-0.080	-0.062	0.416*
	(0.056)	(0.057)	(0.247)
FO^2		-3.595***	-5.165***
		(0.970)	(1.312)
FO × GS			-3.133**
			(1.489)
FO^2 × GS			4.194**
			(2.005)
FirmAge	-0.013**	-0.011**	-0.011*
	(0.006)	(0.006)	(0.006)
FirmSize	0.473***	0.476***	0.476***
	(0.034)	(0.034)	(0.034)
FirmLev	-0.218	-0.267	-0.257
	(0.242)	(0.245)	(0.245)
OS	-4.188**	-4.528**	-4.195**
	(1.835)	(1.829)	(1.839)
RDI	4.474***	4.687***	4.436***
	(1.171)	(1.163)	(1.162)
ROA	1.719***	1.704***	1.714***
	(0.641)	(0.640)	(0.637)
Dual	0.041	0.032	0.031
	(0.058)	(0.058)	(0.059)
IDR	-0.038	0.113	0.090
	(0.754)	(0.756)	(0.754)
IO	-0.129	-0.089	-0.095
	(0.129)	(0.130)	(0.130)
BOS	-0.017	-0.009	-0.012
	(0.026)	(0.027)	(0.027)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Log pseudolikelihood	-7648.1783	-7640.9342	-7638.5135
Wald chi2	1199.83***	1225.61***	1230.71***
Obs	2754	2754	2754

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4 Formal tests for establishing the existence of a quadratic relationship

Lind and Mehlum test for an inverted-U-shaped relationship		
	Lower bound X_L	Upper bound X_H
Interval	0.053	0.732
Slope (S)	1.743	-3.139
t Value	2.820	-4.205
P> |t|	0.002	0.000
Estimated turning point: 0.295		
95% confidence interval, Fieller method: [0.198, 0.344]		

estimated results delineating the inverted U-shaped relationship between FO and ERI. The estimated coefficient of FO^2 ($p < 0.01$) is both significant and negative ($\beta_{FO^2} = -3.595$). The turning point is estimated at 0.295, calculated as [$FO_{maxERI} = -\frac{\beta_{FO}}{2\beta_{FO^2}}$], where FO_{maxERI} represents the value of the turning point. Consequently, an increase in FO enhances ERI until FO reaches 0.295; beyond this point, ERI decreases with further increases in FO. These results affirm H1, indicating that moderate levels of FO are beneficial for enhancing ERI in family firms.

Table 4 details the results of the Lind and Mehlum (2010) test for identifying an inverted U-shaped relationship. While a significant negative sign for the coefficient β_2 in Eq. (1) is a necessary condition for an inverted U-shaped relationship, it is not a sufficient condition by itself. Accordingly, we follow the methodology of Lind and Mehlum (2010) to test for a positive slope in the initial part of the curvature and a negative slope after that. Our results confirm that both slopes are statistically significant (with p-values of 0.002 for the lower bound simple slope and below 0.001 for the upper determined simple slope) and exhibit the expected signs (positive followed by negative). The 95% confidence interval for the turning point ranges from 0.198 to 0.344. This interval falls within the data range for FO, which spans from 0.053 to 0.732, thereby indicating an inverted U-shaped relationship within the sample. Consequently, H1 is substantiated.

To investigate the moderating effect of GS, we estimate Eq. (2), with the results displayed in Table 3. Model 3 reveals a statistically significant positive coefficient for the interaction term FO^2×GS ($\beta_{FO^2 \times GS} = 4.194, p < 0.05$). Given that the coefficient for FO^2×GS is positive, while the coefficient for FO^2 is negative, GS serves to moderate the inverted U-shaped relationship by flattening the curve. These findings suggest that GS can attenuate the impact mechanisms of FO on ERI. Figure 5 graphically demonstrates this moderating effect, highlighting that the curve is flattened when GS corresponds to the successor generation. Accordingly, H2 is supported.

Robustness checks

Firstly, in addition to employing the count of exploratory patents as a metric for ERI, we also use the natural logarithm of one added to the number of exploratory patents as

Table 5 Results of alternate measures of the dependent variable

	Model 1	Model 2	Model 3
	ERI_{t+2}	ERI_{t+2}	ERI_{t+2}
FO	-0.364***	1.516***	2.701***
	(0.130)	(0.506)	(0.612)
GS	-0.038	-0.025	0.502***
	(0.042)	(0.042)	(0.173)
FO^2		-2.554***	-4.226***
		(0.665)	(0.823)
FO × GS			-3.476***
			(1.021)
FO^2 × GS			4.677***
			(1.347)
FirmAge	-0.004	-0.004	-0.003
	(0.004)	(0.004)	(0.004)
FirmSize	0.424***	0.424***	0.424***
	(0.026)	(0.026)	(0.025)
FirmLev	-0.157	-0.181	-0.159
	(0.175)	(0.175)	(0.175)
OS	-3.105***	-3.225***	-2.985**
	(1.170)	(1.166)	(1.178)
RDI	3.569***	3.666***	3.430***
	(0.770)	(0.769)	(0.773)
ROA	1.643***	1.637***	1.639***
	(0.351)	(0.349)	(0.348)
Dual	0.015	0.008	0.010
	(0.042)	(0.042)	(0.042)
IDR	-0.593	-0.472	-0.485
	(0.478)	(0.478)	(0.477)
IO	-0.103	-0.059	-0.055
	(0.087)	(0.087)	(0.087)
BOS	-0.007	-0.001	-0.005
	(0.018)	(0.018)	(0.018)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R^2	0.2985	0.3019	0.3047
Obs	2754	2754	2754

Notes: Standard errors in parentheses; $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

an alternative measure for ERI. This approach is consistent with extant literature (Jiang & Liu, 2022). The regression results in Table 5 reiterate the support for our hypotheses (i.e., H1 and H2).

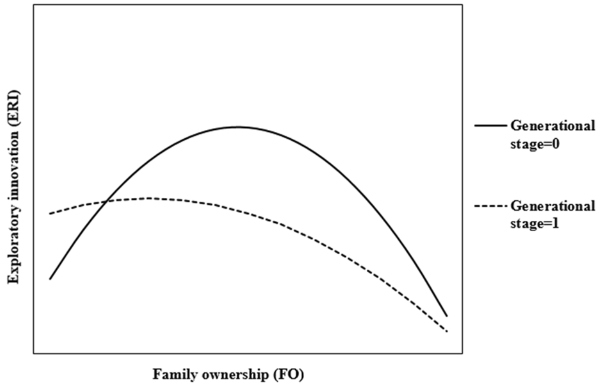

Fig. 5 Graphic presentations of the moderating effect of GS

Secondly, we extend the lag period for FO's influence to 3 years to assess robustness. The empirical findings, presented in Table 6, corroborate the robustness of the results previously outlined in Table 3.

Thirdly, as a robustness check, we substitute the Poisson model for the negative binomial model, consistent with earlier discussions (Cohn et al., 2022). The regression outcomes, displayed in Table 7, confirm the inverted U-shaped relationship between FO and ERI and suggest that this relationship is attenuated in the latter GS of family firms.

Finally, to address endogeneity concerns, we employ the system Generalized Method of Moments (GMM) test to enhance the reliability of our primary findings by references (Meier et al., 2021; Pindado et al., 2014; Wintoki et al., 2012). The regression outcomes are delineated in Table 8. Results from the under-identification test, weak identification test, and endogeneity test corroborate the instruments' validity. The findings in Table 8 align with those presented in Table 3, reconfirming H1 and H2.

Conclusion

The relationship between FO and ERI is the subject of considerable debate. While some studies argue that FO reduces ERI, others contend that FO fosters a long-term orientation, thereby potentially enhancing ERI. This study addresses this controversy by employing both restricted and extended SEW. We propose that restricted SEW hampers family firms' ability for ERI due to rigid mental models and cognitive convergence. Conversely, extended SEW enhances family firms' willingness towards ERI, driven by a long-term focus. Adopting the ability-willingness framework, we examine FO's influence on ERI and GS's moderating role. Empirical evidence from panel data of Chinese-listed family firms corroborates our hypotheses. Specifically, we identify an inverted U-shaped relationship between FO and ERI. Further, in the latter GS of family firms, the salience of SEW diminishes, weakening both the restrictive and extended impacts of SEW. Consequently, the latter GS flatten the inverted U-shaped relationship between FO and ERI.

Table 6 Result of 3-year lag of explanatory variables

	Model 1	Model 2	Model 3
	ERI_{t+3}	ERI_{t+3}	ERI_{t+3}
FO	-0.490***	2.377***	4.150***
	(0.189)	(0.752)	(0.979)
GS	-0.105*	-0.074	0.499**
	(0.063)	(0.064)	(0.254)
FO^2		-3.975***	-6.640***
		(1.011)	(1.342)
FO × GS			-4.138***
			(1.531)
FO^2 × GS			5.942***
			(2.051)
FirmAge	-0.011*	-0.009	-0.009
	(0.006)	(0.006)	(0.006)
FirmSize	0.455***	0.457***	0.453***
	(0.038)	(0.038)	(0.038)
FirmLev	-0.005	-0.076	-0.031
	(0.273)	(0.272)	(0.272)
OS	-1.652	-2.293	-1.738
	(2.119)	(2.101)	(2.110)
RDI	3.849***	4.108***	3.768***
	(1.473)	(1.454)	(1.447)
ROA	2.804***	2.814***	2.900***
	(0.634)	(0.636)	(0.629)
Dual	-0.022	-0.034	-0.036
	(0.060)	(0.060)	(0.060)
IDR	-0.541	-0.340	-0.384
	(0.718)	(0.724)	(0.722)
IO	-0.108	-0.070	-0.069
	(0.140)	(0.140)	(0.140)
BOS	-0.043	-0.033	-0.038
	(0.027)	(0.028)	(0.028)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Log pseudolikelihood	-5980.7627	-5974.2138	-5970.3867
Wald chi2	1113.13***	1062.42***	1015.32***
Obs	2129	2129	2129

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Results of the Poisson model

	Model 1	Model 2	Model 3
Variables	ERI	ERI	ERI
FO	-0.258	1.583**	2.438***
	(0.169)	(0.718)	(0.916)
GS	-0.101*	-0.094*	0.281
	(0.055)	(0.055)	(0.253)
FO^2		-2.564***	-3.787***
		(0.964)	(1.271)
$FO \times GS$			-2.475*
			(1.434)
$FO^2 \times GS$			3.385*
			(1.879)
FirmAge	-0.006	-0.005	-0.004
	(0.005)	(0.005)	(0.005)
FirmSize	0.501***	0.499***	0.500***
	(0.034)	(0.034)	(0.034)
FirmLev	-0.180	-0.223	-0.217
	(0.241)	(0.243)	(0.243)
OS	-3.743**	-3.952**	-3.771**
	(1.897)	(1.888)	(1.884)
RDI	2.856***	2.963***	2.774***
	(0.814)	(0.818)	(0.817)
ROA	2.571***	2.559***	2.552***
	(0.740)	(0.741)	(0.739)
Dual	-0.008	-0.014	-0.015
	(0.055)	(0.055)	(0.055)
IDR	0.386	0.466	0.452
	(0.696)	(0.692)	(0.693)
IO	-0.143	-0.105	-0.107
	(0.120)	(0.123)	(0.122)
BOS	-0.016	-0.012	-0.015
	(0.023)	(0.023)	(0.023)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Log pseudolikelihood	-13,300.262	-13,267.738	-13,254.823
Wale chi2	1234.00***	1250.78***	1257.70***
Obs	2754	2754	2754

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8 Results of system GMM

	Model 1	Model 2	Model 3
	ERI_{t+2}	ERI_{t+2}	ERI_{t+2}
ERI_{t+1}	0.270***	0.242***	0.216***
	(0.068)	(0.068)	(0.064)
FO	-1.918	11.072*	16.357**
	(1.805)	(6.287)	(8.150)
GS	-1.212**	-1.076**	1.427
	(0.496)	(0.497)	(2.133)
FO^2		-17.130**	-27.737***
		(7.837)	(10.479)
FO × GS			-19.347*
			(11.490)
FO^2 × GS			29.679**
			(14.388)
FirmAge	0.050	0.044	0.024
	(0.072)	(0.072)	(0.069)
FirmSize	2.567***	2.736***	2.465***
	(0.566)	(0.580)	(0.526)
FirmLev	0.272	-0.932	0.989
	(2.506)	(2.522)	(2.255)
OS	-3.574	-8.608	1.699
	(12.489)	(12.618)	(11.732)
RDI	34.072***	35.396***	32.866***
	(9.559)	(9.489)	(9.399)
ROA	3.081	2.991	3.682
	(3.272)	(3.279)	(3.226)
Dual	0.199	0.312	0.637
	(0.485)	(0.485)	(0.465)
IDR	-7.761	-8.332	-7.886
	(5.749)	(5.738)	(5.631)
IO	-1.304	-1.068	-0.678
	(1.393)	(1.415)	(1.289)
BOS	-0.368	-0.389*	-0.353
	(0.235)	(0.234)	(0.217)
AR(1)	0.000	0.000	0.000
AR(2)	0.895	0.910	0.895
Hansen test	0.303	0.246	0.303
Obs	2156	2156	2156

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Theoretical implications

This study offers several noteworthy theoretical contributions. Firstly, this study contributes to ERI research in family firms by incorporating an ability-willingness framework and amalgamating restricted and extended SEW concepts. While extant research offers limited and divergent findings—suggesting that FO could both inhibit and promote ERI (Ardito & Capolupo, 2022; Cennamo et al., 2012; Dou et al., 2019)—our study posits that these perspectives are not mutually exclusive. Instead, they provide a one-dimensional understanding of family-oriented particularistic behavior (De Massis et al., 2014). Specifically, the opposing viewpoint underscores how restricted SEW hampers the ability to engage in ERI (Ardito & Capolupo, 2022), while the optimistic viewpoint emphasizes that extended SEW augments the willingness to pursue ERI (Cennamo et al., 2012; Dou et al., 2019). We argue that ability and willingness are essential for unraveling the intricate relationship between FO and ERI (Chrisman et al., 2015; Veider & Matzler, 2016). By synthesizing these dual mechanisms, our research proposes and empirically validates an inverted U-shaped relationship, thereby furnishing a comprehensive understanding of how FO influences ERI.

Secondly, this research augments the literature on FO by introducing a unique lens—the moderating effect of GS within family firms. While previous studies have acknowledged the role of various contingencies affecting FO's impact (Islam et al., 2022; Liu et al., 2017), there is a paucity of understanding regarding how different GS modulate FO's influence on ERI. In this study, we empirically establish that the effects of FO on ERI are contingent upon the GS of the family firms and that GS acts through restricted and extended mechanisms. Consequently, our findings offer novel insights into the FO-ERI relationship by crafting a theoretical linkage between FO and GS.

Third, this study bridges the gap between family firm life cycle stages and innovation management. Whereas previous research has primarily focused on the direct relationship between transgenerational succession and innovation (Beck et al., 2011; Carney et al., 2019; Li et al., 2022), this study employs the concept of GS to elucidate the relationship between FO and innovation. Specifically, we emphasize the moderating role of GS in innovation activities within family firms. Consequently, this study enriches the existing literature by extending discussions on GS and their impact on innovation management.

Practical implications

These findings yield practical implications for managers and policymakers. Firstly, FO does not invariably impede ERI; instead, a moderate level of FO can enhance ERI in family firms. We identify an inverted U-shaped relationship between FO and ERI. Furthermore, our analysis shows that the turning point of this curve consistently falls on the left side of the FO spectrum, indicating that excessive FO is more detrimental than insufficient FO (Li et al., 2021). Consequently, we recommend that family firms actively seek external investors, such as institutional, private equity, and government investors, to maintain FO optimally.

Secondly, for family firms in the latter GS, the inverted U-shaped relationship between FO and ERI tends to flatten, reducing the potential for optimal ERI performance. This flattening can be attributed to the successor generation's diminished sense of family identification and affective attachment (Sciascia et al., 2014), resulting in a reduced emphasis on SEW (Schierstedt et al., 2020) and a heightened focus on financial gains (Kraiczy et al., 2015). Family firm leaders must formulate a comprehensive and transparent transgenerational succession plan to improve ERI performance as early as possible. Additionally, appointing successors to managerial roles earlier can be beneficial (Li et al., 2022).

Thirdly, governments should take proactive measures to preserve essential aspects of clan culture. Such efforts can strengthen family identification and emotional attachment among leaders of family firms in the latter GS. Doing so can maintain a moderate level of family governance, benefiting the firms and the broader business ecosystem.

Limitations and future research directions

This study has several limitations that should be acknowledged. First, the data is sourced exclusively from Chinese-listed family firms, which raises questions about the generalizability of the findings. Future research could extend the scope by including different types of firms, such as small and medium-sized enterprises, to test the robustness of our results.

Second, while this paper investigates the direct effects of FO on ERI, it does not empirically validate the underlying mechanisms at play. Future work could focus on identifying and testing these mediating variables to provide a more comprehensive view (Li et al., 2021).

Third, we recognize the limitations of using patent data as a proxy for ERI. While patent data has been commonly used in prior research (Gao et al., 2021; Lu et al., 2022), it does not capture all forms of innovation, as some firms may choose not to patent their technologies. Future studies could employ a multi-method approach that combines patent data, surveys, and other empirical methods to measure ERI more comprehensively.

Data availability The data that support the findings of this study are available on request from the corresponding author.

References

Acquaah, M. (2012). Social networking relationships, firm-specific managerial experience and firm performance in a transition economy: A comparative analysis of family owned and nonfamily firms. *Strategic Management Journal, 33*(10), 1215–1228. https://doi.org/10.1002/smj.1973

Adams, R., Bessant, J., & Phelps, R. (2006). Innovation management measurement: A review. *International Journal of Management Reviews, 8*(1), 21–47. https://doi.org/10.1111/j.1468-2370.2006.00119.x

Agnihotri, A., & Bhattacharya, S. (2022). Family firms and innovation: A revisit to SEW perspective. *Technology Analysis & Strategic Management*, 1–13. https://doi.org/10.1080/09537325.2022.2117024

Ahuja, G., & Morris Lampert, C. (2001). Entrepreneurship in the large corporation: A longitudinal study of how established firms create breakthrough inventions. *Strategic Management Journal, 22*(6–7), 521–543. https://doi.org/10.1002/smj.176

Akcigit, U., & Kerr, W. R. (2018). Growth through Heterogeneous Innovations. *Journal of Political Economy, 126*(4), 1374–1443. https://doi.org/10.1086/697901

Al-Tabbaa, O., Nasr, A., Zahoor, N., & De Silva, M. (2023). Socio-emotional wealth preservation and alliance success in family firms: The role of political instability and alliance management capability. *British Journal of Management, 34*(2), 915–941. https://doi.org/10.1111/1467-8551.12626

Amore, M. D., Bennedsen, M., Le Breton-Miller, I., & Miller, D. (2021). Back to the future: The effect of returning family successions on firm performance. *Strategic Management Journal, 42*(8), 1432–1458. https://doi.org/10.1002/smj.3273

Anderson, R. C., & Reeb, D. M. (2003). Founding-Family Ownership and Firm Performance: Evidence from the S&P 500. *The Journal of Finance, 58*(3), 1301–1328. https://doi.org/10.1111/1540-6261.00567

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2003). Founding family ownership and the agency cost of debt. *Journal of Financial Economics, 68*(2), 263–285. https://doi.org/10.1016/S0304-405X(03)00067-9

Ansari, I. F., Goergen, M., & Mira, S. (2014). The determinants of the CEO successor choice in family firms. *Journal of Corporate Finance, 28*, 6–25. https://doi.org/10.1016/j.jcorpfin.2013.12.006

Ardito, L., & Capolupo, P. (2022). Exploratory Innovation in Family-Owned Firms: The Moderating Role of Digital Search. *IEEE Transactions on Engineering Management*, 1–11. https://doi.org/10.1109/TEM.2022.3231468

Arzubiaga, U., Maseda, A., & Iturralde, T. (2019). Exploratory and exploitative innovation in family businesses: The moderating role of the family firm image and family involvement in top management. *Review of Managerial Science, 13*(1), 1–31. https://doi.org/10.1007/s11846-017-0239-y

Ashwin, A. S., Krishnan, R. T., & George, R. (2015). Family firms in India: Family involvement, innovation and agency and stewardship behaviors. *Asia Pacific Journal of Management, 32*(4), 869–900. https://doi.org/10.1007/s10490-015-9440-1

Banalieva, E. R., Eddleston, K. A., & Zellweger, T. M. (2015). When do family firms have an advantage in transitioning economies? Toward a dynamic institution-based view. *Strategic Management Journal, 36*(9), 1358–1377. https://doi.org/10.1002/smj.2288

Beck, L., Janssens, W., Debruyne, M., & Lommelen, T. (2011). A Study of the Relationships Between Generation, Market Orientation, and Innovation in Family Firms. *Family Business Review, 24*(3), 252–272. https://doi.org/10.1177/0894486511409210

Bennedsen, M., Nielsen, K. M., Perez-Gonzalez, F., & Wolfenzon, D. (2007). Inside the Family Firm: The Role of Families in Succession Decisions and Performance*. *The Quarterly Journal of Economics, 122*(2), 647–691. https://doi.org/10.1162/qjec.122.2.647

Benner, M. J., & Tushman, M. L. (2003). Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisited. *Academy of Management Review, 28*(2), 238–256. https://doi.org/10.5465/amr.2003.9416096

Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. (2010). Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? *Administrative Science Quarterly, 55*(1), 82–113. https://doi.org/10.2189/asqu.2010.55.1.82

Berrone, P., Cruz, C., & Gomez-Mejia, L. R. (2012). Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research. *Family Business Review, 25*(3), 258–279. https://doi.org/10.1177/0894486511435355

Bertschi-Michel, A., Sieger, P., Wittig, T., & Hack, A. (2023). Sacrifice, Protect, and Hope for the Best: Family Ownership, Turnaround Moves, and Crisis Survival. *Entrepreneurship Theory and Practice, 47*(4), 1132–1168. https://doi.org/10.1177/10422587221118062

Block, J. H. (2012). R&D investments in family and founder firms: An agency perspective. *Journal of Business Venturing, 27*(2), 248–265. https://doi.org/10.1016/j.jbusvent.2010.09.003

Brinkerink, J. (2018). Broad search, deep search, and the absorptive capacity performance of family and nonfamily firm R&D. *Family Business Review, 31*(3), 295–317. https://doi.org/10.1177/0894486518775187

Brun De Pontet, S., Wrosch, C., & Gagne, M. (2007). An Exploration of the Generational Differences in Levels of Control Held Among Family Businesses Approaching Succession. *Family Business Review, 20*(4), 337–354. https://doi.org/10.1111/j.1741-6248.2007.00103.x

Carnes, C. M., & Ireland, R. D. (2013). Familiness and Innovation: Resource Bundling as the Missing Link. *Entrepreneurship Theory and Practice, 37*(6), 1399–1419. https://doi.org/10.1111/etap.12073

Carney, M., Zhao, J., & Zhu, L. (2019). Lean innovation: Family firm succession and patenting strategy in a dynamic institutional landscape. *Journal of Family Business Strategy, 10*(4), 100247. https://doi.org/10.1016/j.jfbs.2018.03.002

Cennamo, C., Berrone, P., Cruz, C., & Gomez-Mejia, L. R. (2012). Socioemotional Wealth and Proactive Stakeholder Engagement: Why Family-Controlled Firms Care More about their Stakeholders. *Entrepreneurship Theory and Practice, 36*(6), 1153–1173. https://doi.org/10.1111/j.1540-6520.2012.00543.x

Chen, H.-L., & Hsu, W.-T. (2009). Family Ownership, Board Independence, and R&D Investment. *Family Business Review, 22*(4), 347–362. https://doi.org/10.1177/0894486509341062

Chen, W.-R., & Miller, K. D. (2007). Situational and institutional determinants of firms' R&D search intensity. *Strategic Management Journal, 28*(4), 369–381. https://doi.org/10.1002/smj.594

Chen, S., Ying, S. X., Wu, H., & You, J. (2021). Carrying on the family's legacy: Male heirs and firm innovation. *Journal of Corporate Finance, 69*, 101976. https://doi.org/10.1016/j.jcorpfin.2021.101976

Chen, X., Pan, X., & Sinha, P. (2022). What to green: Family involvement and different types of eco-innovation. *Business Strategy and the Environment, 31*(5), 2588–2602. https://doi.org/10.1002/bse.3045

Chi, Y.-L. (2023). The agency costs of family ownership: Evidence from innovation performance. *Journal of Banking & Finance, 148*, 106737. https://doi.org/10.1016/j.jbankfin.2022.106737

Choi, Y. R., Zahra, S. A., Yoshikawa, T., & Han, B. H. (2015). Family ownership and R&D investment: The role of growth opportunities and business group membership. *Journal of Business Research, 68*(5), 1053–1061. https://doi.org/10.1016/j.jbusres.2014.10.007

Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D Investments of Family and Nonfamily Firms: Behavioral Agency and Myopic Loss Aversion Perspectives. *Academy of Management Journal, 55*(4), 976–997. https://doi.org/10.5465/amj.2011.0211

Chrisman, J. J., Chua, J. H., De Massis, A., Frattini, F., & Wright, M. (2015). The Ability and Willingness Paradox in Family Firm Innovation: Family Firm Innovation Future Agenda. *Journal of Product Innovation Management, 32*(3), 310–318. https://doi.org/10.1111/jpim.12207

Cirillo, A., Ossorio, M., & Pennacchio, L. (2018). Family ownership and R&D investment: The moderating role of banks and private equity. *Management Decision, 57*(7), 1675–1694. https://doi.org/10.1108/MD-07-2016-0454

Cohn, J. B., Liu, Z., & Wardlaw, M. I. (2022). Count (and count-like) data in finance. *Journal of Financial Economics, 146*(2), 529–551. https://doi.org/10.1016/j.jfineco.2022.08.004

Cruz, C., & Nordqvist, M. (2012). Entrepreneurial orientation in family firms: A generational perspective. *Small Business Economics, 38*(1), 33–49. https://doi.org/10.1007/s11187-010-9265-8

De Massis, A., Kotlar, J., Chua, J. H., & Chrisman, J. J. (2014). Ability and Willingness as Sufficiency Conditions for Family-Oriented Particularistic Behavior: Implications for Theory and Empirical Studies. *Journal of Small Business Management, 52*(2), 344–364. https://doi.org/10.1111/jsbm.12102

De Massis, A., Di Minin, A., & Frattini, F. (2015a). Family-driven innovation: Resolving the paradox in family firms. *California Management Review, 58*(1), 5–19. https://doi.org/10.1525/cmr.2015.58.1.5

De Massis, A., Kotlar, J., Campopiano, G., & Cassia, L. (2015b). The impact of family involvement on SMEs' performance: Theory and evidence. *Journal of Small Business Management, 53*(4), 924–948. https://doi.org/10.1111/jsbm.12093

Decker, C., & Günther, C. (2017). The impact of family ownership on innovation: Evidence from the German machine tool industry. *Small Business Economics, 48*(1), 199–212. https://doi.org/10.1007/s11187-016-9775-0

Ding, S., & Wu, Z. (2014). Family Ownership and Corporate Misconduct in U.S. Small Firms. *Journal of Business Ethics, 123*(2), 183–195. https://doi.org/10.1007/s10551-013-1812-1

Dolz, C., Iborra, M., & Safón, V. (2019). Improving the Likelihood of SME Survival during Financial and Economic Crises: The Importance of TMTs and Family Ownership for Ambidexterity. *BRQ Business Research Quarterly, 22*(2), 119–136. https://doi.org/10.1016/j.brq.2018.09.004

Döring, S., Drobetz, W., El Ghoul, S., Guedhami, O., & Schröder, H. (2021). Institutional investment horizons and firm valuation around the world. *Journal of International Business Studies, 52*(2), 212–244. https://doi.org/10.1057/s41267-020-00351-9

Dou, J., Su, E., & Wang, S. (2019). When Does Family Ownership Promote Proactive Environmental Strategy? The Role of the Firm's Long-Term Orientation. *Journal of Business Ethics, 158*(1), 81–95. https://doi.org/10.1007/s10551-017-3642-z

Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing More with Less: Innovation Input and Output in Family Firms. *Academy of Management Journal, 59*(4), 1224–1264.

Fan, J., Liu, Y., Zhang, Q., & Zhao, P. (2022). Does government debt impede firm innovation? Evidence from the rise of LGFVs in China. *Journal of Banking & Finance, 138*, 106475. https://doi.org/10.1016/j.jbankfin.2022.106475

Feldman, E. R., Amit, R., & Villalonga, B. (2019). Family firms and the stock market performance of acquisitions and divestitures. *Strategic Management Journal, 40*(5), 757–780. https://doi.org/10.1002/smj.2999

Fu, L., Boehe, D., & Orlitzky, M. (2020). Are R&D-Intensive firms also corporate social responsibility specialists? *A Multicountry Study. Research Policy, 49*(8), 104082. https://doi.org/10.1016/j.respol.2020.104082

Gagné, M., Marwick, C., Brun de Pontet, S., & Wrosch, C. (2021). Family Business Succession: What's Motivation Got to Do With It? *Family Business Review, 34*(2), 154–167. https://doi.org/10.1177/0894486519894759

Gao, Y., Hu, Y., Liu, X., & Zhang, H. (2021). Can public R&D subsidy facilitate firms' exploratory innovation? The heterogeneous effects between central and local subsidy programs. *Research Policy, 50*(4), 104221. https://doi.org/10.1016/j.respol.2021.104221

Gao, Y., Zhang, S., & Liu, X. (2023). Too Much of a Good Thing: The Dual Effect of R&D Subsidy on Firms' Exploratory Innovation. *IEEE Transactions on Engineering Management, 70*(4), 1639–1651. https://doi.org/10.1109/TEM.2021.3100340

García-García, L., Gonzalo Alonso-Buenaposada, M., Romero-Merino, M. E., & Santamaria-Mariscal, M. (2020). Ownership structure and R&D investment: The role of identity and contestability in Spanish listed firms. *Academia Revista Latinoamericana De Administración, 33*(3/4), 405–426. https://doi.org/10.1108/ARLA-01-2019-0013

Gómez, J., Salazar, I., & Vargas, P. (2017). Does Information Technology Improve Open Innovation Performance? An Examination of Manufacturers in Spain. *Information Systems Research, 28*(3), 661–675. https://doi.org/10.1287/isre.2017.0705

Gomez-Mejia, L. R., Nuñez-Nickel, M., & Gutierrez, I. (2001). The Role of Family Ties in Agency Contracts. *Academy of Management Journal, 44*(1), 81–95. https://doi.org/10.5465/3069338

Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. (2011). The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *The Academy of Management Annals, 5*(1), 653–707. https://doi.org/10.1080/19416520.2011.593320

Gómez-Mejía, L. R., Haynes, K. T., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional Wealth and Business Risks in Family-controlled Firms: Evidence from Spanish Olive Oil Mills. *Administrative Science Quarterly, 52*(1), 106–137. https://doi.org/10.2189/asqu.52.1.106

Gu, Q., Lu, J. W., & Chung, C.-N. (2019). Incentive or Disincentive? A Socioemotional Wealth Explanation of New Industry Entry in Family Business Groups. *Journal of Management, 45*(2), 645–672. https://doi.org/10.1177/0149206316678450

Guo, Y., Luo, X. R., & Li, D. (2022). Hierarchical Inconsistency: A Monitoring Mechanism to Reduce Securities Fraud in Emerging Markets. *Organization Science, 33*(6), 2187–2208. https://doi.org/10.1287/orsc.2021.1541

Haans, R. F. J., Pieters, C., & He, Z.-L. (2016). Thinking about U: Theorizing and testing U- and inverted U-shaped relationships in strategy research. *Strategic Management Journal, 37*(7), 1177–1195. https://doi.org/10.1002/smj.2399

Handler, W. C. (1990). Succession in Family Firms: A Mutual Role Adjustment between Entrepreneur and Next-generation Family Members. *Entrepreneurship Theory and Practice, 15*(1), 37–52. https://doi.org/10.1177/104225879001500105

Helmers, C., Patnam, M., & Rau, P. R. (2017). Do board interlocks increase innovation? Evidence from a corporate governance reform in India. *Journal of Banking & Finance, 80*, 51–70. https://doi.org/10.1016/j.jbankfin.2017.04.001

Hsu, L.-C., & Chang, H.-C. (2011). The Role of Behavioral Strategic Controls in Family Firm Innovation. *Industry and Innovation, 18*(7), 709–727. https://doi.org/10.1080/13662716.2011.604474

Huang, X., Chen, L., Xu, E., Lu, F., & Tam, K.-C. (2020). Shadow of the Prince: Parent-incumbents' Coercive Control over Child-successors in Family Organizations. *Administrative Science Quarterly, 65*(3), 710–750. https://doi.org/10.1177/0001839219870449

Im, H. J., & Shon, J. (2019). The effect of technological imitation on corporate innovation: Evidence from US patent data. *Research Policy, 48*(9), 103802. https://doi.org/10.1016/j.respol.2019.05.011

Islam, N., Wang, Q., Marinakis, Y., & Walsh, S. (2022). Family enterprise and technological innovation. *Journal of Business Research, 147*, 208–221. https://doi.org/10.1016/j.jbusres.2022.04.004

Jaffe, D. T., & Lane, S. H. (2004). Sustaining a Family Dynasty: Key Issues Facing Complex Multigenerational Business- and Investment-Owning Families. *Family Business Review, 17*(1), 81–98. https://doi.org/10.1111/j.1741-6248.2004.00006.x

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *Management Science, 52*(11), 1661–1674. https://doi.org/10.1287/mnsc.1060.0576

Jiang, Z., & Liu, Z. (2022). Policies and exploitative and exploratory innovations of the wind power industry in China: The role of technological path dependence. *Technological Forecasting and Social Change, 177*, 121519. https://doi.org/10.1016/j.techfore.2022.121519

Jiang, S., & Min, Y. (2023). The Ability and Willingness of Family Firms to Bribe: A Socioemotional Wealth Perspective. *Journal of Business Ethics, 184*(1), 237–254. https://doi.org/10.1007/s10551-022-05086-1

Kammerlander, N., Patzelt, H., Behrens, J., & Röhm, C. (2020). Organizational Ambidexterity in Family-Managed Firms: The Role of Family Involvement in Top Management. *Family Business Review, 33*(4), 393–423. https://doi.org/10.1177/0894486520961645

König, A., Kammerlander, N., & Enders, A. (2013). The Family Innovator's Dilemma: How Family Influence Affects the Adoption of Discontinuous Technologies by Incumbent Firms. *Academy of Management Review, 38*(3), 418–441. https://doi.org/10.5465/amr.2011.0162

Kraiczy, N. D., Hack, A., & Kellermanns, F. W. (2015). What Makes a Family Firm Innovative? CEO Risk-Taking Propensity and the Organizational Context of Family Firms: What Makes a Family Firm Innovative? *Journal of Product Innovation Management, 32*(3), 334–348. https://doi.org/10.1111/jpim.12203

Laffranchini, G., Hadjimarcou, J. S., & Kim, S. H. (2020). The Impact of Socioemotional Wealth on Decline-Stemming Strategies of Family Firms. *Entrepreneurship Theory and Practice, 44*(2), 185–210. https://doi.org/10.1177/1042258718784755

Lai, S., Yang, L., Wang, Q., & Anderson, H. D. (2023). Judicial independence and corporate innovation: Evidence from the establishment of circuit courts. *Journal of Corporate Finance, 80*, 102424. https://doi.org/10.1016/j.jcorpfin.2023.102424

Li, H., & Ryan, H. E., Jr. (2022). Founding family ownership and firm performance: Evidence from the evolution of family ownership and firm policies. *Journal of Business Finance & Accounting, 49*(7–8), 1391–1424. https://doi.org/10.1111/jbfa.12593

Li, G., Li, N., & Sethi, S. P. (2021). Does CSR Reduce Idiosyncratic Risk? Roles of Operational Efficiency and AI Innovation. *Production and Operations Management, 30*(7), 2027–2045. https://doi.org/10.1111/poms.13483

Li, W., Bruton, G. D., Li, X., & Wang, S. (2022). Transgenerational Succession and R&D Investment: A Myopic Loss Aversion Perspective. *Entrepreneurship Theory and Practice, 46*(1), 193–222. https://doi.org/10.1177/10422587211038479

Liang, Q., Li, X., Yang, X., Lin, D., & Zheng, D. (2013). How does family involvement affect innovation in China? *Asia Pacific Journal of Management, 30*(3), 677–695. https://doi.org/10.1007/s10490-012-9320-x

Lind, J. T., & Mehlum, H. (2010). With or Without U? The Appropriate Test for a U-Shaped Relationship*. *Oxford Bulletin of Economics and Statistics, 72*(1), 109–118. https://doi.org/10.1111/j.1468-0084.2009.00569.x

Liu, Y., Chen, Y.-J., & Wang, L. C. (2017). Family business, innovation and organizational slack in Taiwan. *Asia Pacific Journal of Management, 34*(1), 193–213. https://doi.org/10.1007/s10490-016-9496-6

Lu, C., Liu, Z., Liao, S., Xu, Y., & Fu, L. (2022). Is an Imitation Strategy an Enabler or a Hindrance for Exploitative or Exploratory Innovation?—The Moderating Effect of Embeddedness in Knowledge Networks. *IEEE Transactions on Engineering Management*, 1–13. https://doi.org/10.1109/TEM.2022.3208750

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87. https://doi.org/10.1287/orsc.2.1.71

Matzler, K., Veider, V., Hautz, J., & Stadler, C. (2015). The Impact of Family Ownership, Management, and Governance on Innovation. *Journal of Product Innovation Management, 32*(3), 319–333. https://doi.org/10.1111/jpim.12202

McConaughy, D. L., & Phillips, G. M. (1999). Founders versus Descendants: The Profitability, Efficiency, Growth Characteristics and Financing in Large, Public. *Founding-Family-Controlled Firms. Family Business Review, 12*(2), 123–131. https://doi.org/10.1111/j.1741-6248.1999.00123.x

Meier, O., Naccache, P., & Schier, G. (2021). Exploring the Curvature of the Relationship Between HRM–CSR and Corporate Financial Performance. *Journal of Business Ethics, 170*(4), 857–873. https://doi.org/10.1007/s10551-019-04332-3

Miller, D., & Le Breton-Miller, I. (2014). Deconstructing socioemotional wealth. *Entrepreneurship Theory and Practice, 38*(4), 713–720. https://doi.org/10.1111/etap.12111

Miller, D., Breton-Miller, I. L., & Lester, R. H. (2013). Family Firm Governance, Strategic Conformity, and Performance: Institutional vs. *Strategic Perspectives. Organization Science, 24*(1), 189–209. https://doi.org/10.1287/orsc.1110.0728

Miller, D., Le Breton-Miller, I., & Scholnick, B. (2008). Stewardship vs. Stagnation: An Empirical Comparison of Small Family and Non-Family Businesses*. *Journal of Management Studies*, *45*(1), 51–78. https://doi.org/10.1111/j.1467-6486.2007.00718.x

Munari, F., Oriani, R., & Sobrero, M. (2010). The effects of owner identity and external governance systems on R&D investments: A study of Western European firms. *Research Policy, 39*(8), 1093–1104. https://doi.org/10.1016/j.respol.2010.05.004

Pan, X., Chen, X., & Qiu, S. (2023). The Janus-Faced Family SMEs: Family Management and Digitalization. *IEEE Transactions on Engineering Management*, 1–12. https://doi.org/10.1109/TEM.2023.3282990

Pearson, A. W., Carr, J. C., & Shaw, J. C. (2008). Toward a Theory of Familiness: A Social Capital Perspective. *Entrepreneurship Theory and Practice, 32*(6), 949–969. https://doi.org/10.1111/j.1540-6520.2008.00265.x

Peters, B., Roberts, M. J., & Vuong, V. A. (2022). Firm R&D investment and export market exposure. *Research Policy, 51*(10), 104601. https://doi.org/10.1016/j.respol.2022.104601

Phelps, C. C. (2010). A Longitudinal Study of the Influence of Alliance Network Structure and Composition on Firm Exploratory Innovation. *Academy of Management Journal, 53*(4), 890–913. https://doi.org/10.5465/amj.2010.52814627

Pindado, J., Requejo, I., & de la Torre, C. (2014). Family control, expropriation, and investor protection: A panel data analysis of Western European corporations. *Journal of Empirical Finance, 27*, 58–74. https://doi.org/10.1016/j.jempfin.2013.10.006

Pitcher, P., & Smith, A. D. (2001). Top Management Team Heterogeneity: Personality, Power, and Proxies. *Organization Science, 12*(1), 1–18. https://doi.org/10.1287/orsc.12.1.1.10120

Ray, S., Mondal, A., & Ramachandran, K. (2018). How does family involvement affect a firm's internationalization? An investigation of Indian family firms. *Global Strategy Journal, 8*(1), 73–105. https://doi.org/10.1002/gsj.1196

Romano, C. A., Tanewski, G. A., & Smyrnios, K. X. (2001). Capital structure decision making: A model for family business. *Journal of Business Venturing, 16*(3), 285–310. https://doi.org/10.1016/S0883-9026(99)00053-1

Saldanha, T. J. V., Sahaym, A., Mithas, S., Andrade-Rojas, M. G., Kathuria, A., & Lee, H.-H. (2020). Turning Liabilities of Global Operations into Assets: IT-Enabled Social Integration Capacity and Exploratory Innovation. *Information Systems Research, 31*(2), 361–382. https://doi.org/10.1287/isre.2019.0890

Salvato, C., Chirico, F., Melin, L., & Seidl, D. (2019). Coupling Family Business Research with Organization Studies: Interpretations. *Issues and Insights. Organization Studies, 40*(6), 775–791. https://doi.org/10.1177/0170840619841402

Schierstedt, B., Henn, M., & Lutz, E. (2020). Diversified acquisitions in family firms: Restricted vs. extended family priorities. *Journal of Family Business Strategy, 11*(2), 100357. https://doi.org/10.1016/j.jfbs.2020.100357

Sciascia, S., Mazzola, P., & Kellermanns, F. W. (2014). Family management and profitability in private family-owned firms: Introducing generational stage and the socioemotional wealth perspective. *Journal of Family Business Strategy, 5*(2), 131–137. https://doi.org/10.1016/j.jfbs.2014.03.001

Sciascia, S., Nordqvist, M., Mazzola, P., & De Massis, A. (2015). Family Ownership and R&D Intensity in Small- and Medium-Sized Firms. *Journal of Product Innovation Management, 32*(3), 349–360. https://doi.org/10.1111/jpim.12204

Singh, D. A., & Gaur, A. S. (2013). Governance Structure, Innovation and Internationalization: Evidence From India. *Journal of International Management, 19*(3), 300–309. https://doi.org/10.1016/j.intman.2013.03.006

Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing Firm Resources in Dynamic Environments to Create Value: Looking Inside the Black Box. *Academy of Management Review, 32*(1), 273–292. https://doi.org/10.5465/amr.2007.23466005

Slavova, K., & Jong, S. (2021). University alliances and firm exploratory innovation: Evidence from therapeutic product development. *Technovation, 107*, 102310. https://doi.org/10.1016/j.technovation.2021.102310

Su, Z., & Yang, H. (2018). Managerial ties and exploratory innovation: An opportunity-motivation-ability perspective. *IEEE Transactions on Engineering Management, 65*(2), 227–238. https://doi.org/10.1109/TEM.2017.2782730

Sydow, J., Schreyögg, G., & Koch, J. (2009). Organizational Path Dependence: Opening the Black Box. *Academy of Management Review, 34*(4), 689–709. https://doi.org/10.5465/amr.34.4.zok689

Tabesh, P., Vera, D., & Keller, R. T. (2019). Unabsorbed slack resource deployment and exploratory and exploitative innovation: How much does CEO expertise matter? *Journal of Business Research, 94*, 65–80. https://doi.org/10.1016/j.jbusres.2018.08.023

Tokarczyk, J., Hansen, E., Green, M., & Down, J. (2007). A Resource-Based View and Market Orientation Theory Examination of the Role of "Familiness" in Family Business Success. *Family Business Review, 20*(1), 17–31. https://doi.org/10.1111/j.1741-6248.2007.00081.x

Tsao, C.-W., Le Breton-Miller, I., Miller, D., & Chen, S.-J. (2021). Firing managers: The benefits of family ownership and costs of family management. *Journal of Family Business Strategy, 12*(3), 100411. https://doi.org/10.1016/j.jfbs.2020.100411

Tschang, F. T., & Ertug, G. (2016). New Blood as an Elixir of Youth: Effects of Human Capital Tenure on the Explorative Capability of Aging Firms. *Organization Science, 27*(4), 873–892. https://doi.org/10.1287/orsc.2016.1067

Veider, V., & Matzler, K. (2016). The ability and willingness of family-controlled firms to arrive at organizational ambidexterity. *Journal of Family Business Strategy, 7*(2), 105–116. https://doi.org/10.1016/j.jfbs.2015.10.001

Villalonga, B., & Amit, R. (2006). How do family ownership, control and management affect firm value? *Journal of Financial Economics, 80*(2), 385–417. https://doi.org/10.1016/j.jfineco.2004.12.005

Wang, J., & Ye, K. (2015). Media Coverage and Firm Valuation: Evidence from China. *Journal of Business Ethics, 127*(3), 501–511. https://doi.org/10.1007/s10551-014-2055-5

Wang, C., Rodan, S., Fruin, M., & Xu, X. (2014). Knowledge Networks, Collaboration Networks, and Exploratory Innovation. *Academy of Management Journal, 57*(2), 484–514. https://doi.org/10.5465/amj.2011.0917

Wang, G., DeGhetto, K., Ellen, B. P., & Lamont, B. T. (2019). Board Antecedents of CEO Duality and the Moderating Role of Country-level Managerial Discretion: A Meta-analytic Investigation. *Journal of Management Studies, 56*(1), 172–202. https://doi.org/10.1111/joms.12408

Wang, L., Gao, Q., & Wu, C. (2022). The effect of succession on corporate governance reform under the Chinese clan culture context. *Cross Cultural & Strategic Management, 29*(4), 761–797. https://doi.org/10.1108/CCSM-06-2021-0106

Wang, R., Heugens, P. P. M. A. R., & Wijen, F. (2023). Green by Affiliation? Ownership Identity and Environmental Management System Adoption in Chinese Business Groups. *Journal of Management*, 01492063221143721. https://doi.org/10.1177/01492063221143721

Wintoki, M. B., Linck, J. S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics, 105*(3), 581–606. https://doi.org/10.1016/j.jfineco.2012.03.005

Wu, Z., Chua, J. H., & Chrisman, J. J. (2007). Effects of family ownership and management on small business equity financing. *Journal of Business Venturing, 22*(6), 875–895. https://doi.org/10.1016/j.jbusvent.2006.07.002

Xia, L., Gao, S., Wei, J., & Ding, Q. (2022). Government subsidy and corporate green innovation—Does board governance play a role? *Energy Policy, 161*, 112720. https://doi.org/10.1016/j.enpol.2021.112720

Xia, L., Gao, S., Shao, Q., Wei, J., & Li, Z. (2023). Board Interlock Networks and Corporate Low-Carbon Innovation in China: Does Position Matter? *IEEE Transactions on Engineering Management*, 1–18. https://doi.org/10.1109/TEM.2023.3276999

Xu, N., Yuan, Q., Jiang, X., & Chan, K. C. (2015). Founder's political connections, second generation involvement, and family firm performance: Evidence from China. *Journal of Corporate Finance, 33*, 243–259. https://doi.org/10.1016/j.jcorpfin.2015.01.004

Xu, D., Chen, C., & Wu, X. (2019). Ownership structure and the use of non-family executives in family-dominated Chinese listed firms: An institutional logics perspective. *Asia Pacific Journal of Management, 36*(3), 797–820. https://doi.org/10.1007/s10490-017-9550-z

Yang, X., Li, J., Stanley, L. J., Kellermanns, F. W., & Li, X. (2020). How family firm characteristics affect internationalization of Chinese family SMEs. *Asia Pacific Journal of Management, 37*(2), 417–448. https://doi.org/10.1007/s10490-018-9579-7

Yang, B., Nahm, A., & Song, Z. (2022). Succession, political resources, and innovation investments of family businesses: Evidence from China. *Managerial and Decision Economics, 43*(2), 321–338. https://doi.org/10.1002/mde.3385

Zellweger, T. M., Kellermanns, F. W., Chrisman, J. J., & Chua, J. H. (2012). Family Control and Family Firm Valuation by Family CEOs: The Importance of Intentions for Transgenerational Control. *Organization Science, 23*(3), 851–868. https://doi.org/10.1287/orsc.1110.0665

Zelner, B. A. (2009). Using simulation to interpret results from logit, probit, and other nonlinear models. *Strategic Management Journal, 30*(12), 1335–1348. https://doi.org/10.1002/smj.783

Zhao, J., Carney, M., Zhang, S., & Zhu, L. (2020). How does an intra-family succession effect strategic change and performance in China's family firms? *Asia Pacific Journal of Management, 37*(2), 363–389. https://doi.org/10.1007/s10490-018-9568-x

Zhu, D. H., Jia, L., & Li, F. (2022). Too Much on the Plate? How Executive Job Demands Harm Firm Innovation and Reduce Share of Exploratory Innovations. *Academy of Management Journal, 65*(2), 606–633. https://doi.org/10.5465/amj.2019.0334

Junjie Guang is currently working toward a Ph.D. degree in business administration with the School of Management, University of Science and Technology of China, Hefei, China. His research interests include family firms, succession, and ambidextrous innovation.

Yang (Eric) Zhou is currently working toward a Ph.D. degree in business administration with the School of Management, University of Science and Technology of China, Hefei, China. His research interests include digital transformation, technology adoption, innovation strategy, and sustainability. He has papers published in the IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, Technology Analysis & Strategic Management, among others.

Lei Gong received a Ph.D. degree in business administration from the School of Management, University of Science and Technology of China, Hefei, China, in 2023. His research interests include innovation management and leadership organizational innovation.

Li Xia is currently working toward a Ph.D. degree in the School of Management, University of Science and Technology of China, Hefei, China. He centers on the intersection of corporate environmentalism and strategic management. His research interests include potential drivers as well as consequences of corporate environmental actions including but not limited to green (low-carbon) innovation.

Zhiying Liu received a Ph.D. degree in economics from the School of Economics and Management, Nanjing Agricultural University, Nanjing, China, in 2006. He is currently a Full Professor at the Department of Business Administration, School of Management, University of Science and Technology of China, Hefei, China. His research has been published in top academic journals such as Technovation, Journal of Business Research, and Technology Analysis & Strategic Management. His research interests include innovation management, industrial economy, internet finance, and crowdfunding.

Authors and Affiliations

Junjie Guang[1] · **Yang (Eric) Zhou**[1] · **Lei Gong**[2] · **Li Xia**[1,3] · **Zhiying Liu**[1]

✉ Zhiying Liu
liuzhiyustc@163.com

Junjie Guang
1031836303@qq.com

Yang (Eric) Zhou
yangzhou0908@mail.ustc.edu.cn

Lei Gong
949803242@qq.com

Li Xia
lixia.nov18@gmail.com

1 International Institute of Finance, School of Management, University of Science and Technology of China, Hefei, China

2 Alibaba Business School, Hangzhou Normal University, Hangzhou, China

3 Centre for Governance and Sustainability, NUS Business School, National University of Singapore, Singapore, Singapore