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State Employment, Entrepreneurship, and the Role of Family Insurance

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Abstract

This paper examines the family unit as a form of insurance that promotes entrepreneurship in underdeveloped markets. Focusing on China's post-1993 economic transition, we study how a spouse's state employment—offering job stability and social benefits—facilitates the other's entrepreneurial risk-taking. Using nationwide longitudinal household survey data from the market reform period and a difference-in-difference-in-differences identification strategy, we find that spouses of state-sector employees are 9.8 percentage points more likely to become entrepreneurs post-reform. Drawing on administrative firm data in addition to the survey data, we provide robust evidence that this effect is not primarily driven by political connections linked to state employment. Further

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analysis shows that family-backed entrepreneurs are more likely to innovate, engage in riskier industries, and achieve better firm performance.

Keywords: Entrepreneurship; State Employment; Family Insurance; Market Reforms; Economic Transitions

JEL codes: L26; P23; D13; O12; J24

1 Introduction

A burgeoning literature examines the role of insurance in mitigating income and career risks for entrepreneurs to foster entrepreneurship. The types of insurance include unemployment protection, healthcare access, and flexible work opportunities (e.g., Li and Wu 2018; Hombert et al. 2020; Barrios et al. 2022; Gottlieb et al. 2022; Wang et al. 2024). In this paper, we propose that the family unit can also act as a form of insurance, wherein the economic stability provided by one spouse’s state employment enables the other to pursue high-growth entrepreneurship and innovation.

Our focus on within-family insurance is both plausible and relevant. An influential line of research, originating with Becker’s seminal work (1973, 1974), highlights the risk-sharing benefits of marriage and family. This literature extends to individual and household decisions such as consumption, labor supply, and portfolio choice (e.g., Rosenzweig 1988; Rosenzweig and Stark 1989; Dercon and Krishnan 2000; Shore 2010; Fang and Shephard 2019; Wu and Zhao 2020; Fadlon and Nielsen 2021; Lam 2024).¹ While extensive work explores family-based insurance and the role of insurance in entrepreneurship, separately, their interaction remains unexplored.

The relevance of our study lies in providing a novel and complementary explanation for the link between family members’ state employment and entrepreneurship. A large body of work highlights the advantages—often viewed as undue—associated with political connections via government jobs, which imply sources of inefficiency, particularly in transition countries (e.g., Li et al. 2006, 2008).² However, if entrepreneurial risks are mitigated within families through state employment, this mechanism could offer new insights into the broader implications of state ownership, beyond the prevailing narrative of inefficiencies.

¹ For a comprehensive overview, see Browning et al. (2014).

² For studies emphasizing the advantages of political connections, see also Fisman (2001). Relatedly, for studies on the costs of corruption that often accompany state involvement, see Shleifer and Vishny (1993).

Identifying family insurance provided by a state-employed spouse presents two key challenges. First, disentangling the insurance channel from the potential advantages of connections tied to state employment requires detailed data on the insurance levels associated with employment sectors or the risk levels related to entrepreneurial activities. Second, selection may arise if individuals predisposed to entrepreneurship are more likely to marry state employees.

To address these challenges, we combine a unique context of China's transition toward a market-oriented economy in the 1990s, with large-scale longitudinal household surveys and administrative firm data. The comprehensive nature of these datasets allows us to explore variation in insurance and risks, and to examine various entrepreneurial outcomes. During this period, private businesses were unexpectedly granted legal recognition, making it unlikely that individuals married state employees to mitigate risks associated with then largely unforeseen entrepreneurial ventures (we also employ econometric methods to deal with selection, as discussed later). While state employees—particularly in state-owned enterprises (SOEs) and government sectors—enjoyed stable jobs, secure wages, and extensive social benefits, entrepreneurship and the private sector rose and provided remarkable growth (Song et al. 2011; Li et al. 2012). This setting is relevant not only because of the scale and speed of the transition but also due to its parallels with many emerging economies today, which share similar levels of development, high business risks, and underdeveloped insurance markets.

We focus on China's post-1993 reform as a shock to market opportunities and leverage differential exposure to the reform between coastal and inland regions. The reform aimed to establish regulated, stable market institutions favorable to entrepreneurship, with key measures including the new Company Law, a new foreign trade system, and a new taxation framework, all implemented on January 1, 1994 (Naughton 2007). As shown in Figure 1, the reform spurred rapid business growth. Coastal regions, with stronger government support, adequate infrastructure, and better trade routes, experienced greater exposure to these changes. Figure 2 shows a significant post-reform increase in entrepreneurship among spouses of state employees

in coastal provinces, while the increase is much smaller in inland regions. For those with no state-employed spouses, the rise is minimal across both coastal and inland regions.

Motivated by these patterns, we estimate the differential impact of the reform by the spouse's state employment on entrepreneurial entries. Our identification strategy is akin to a difference-in-difference-in-differences approach: one dimension involves before versus after the reform; one involves coastal regions which were more exposed to the reform, versus inland regions; and one involves spouses of state employees versus other individuals.

In order to enhance the credibility of causal interpretation, our preferred specification rules out several concerns: i) by including individual fixed effects, we account for unobserved, time-invariant characteristics across individuals (e.g., talents, preferences) that may affect both marriage and entrepreneurial decisions; ii) we address concerns about individual characteristics affecting outcomes differently before and after the reform, and across regions (e.g., an individual's own initial state employment, which could confound the effect of the spouse's) by conditioning on these characteristics interacted with time and region dummies; iii) by incorporating province-survey year fixed effects, we control for province-year specific factors (e.g., macroeconomic fluctuations within a province during a given year), representing a more flexible approach than accounting for province smooth trends and thus better addressing concerns about the province-level parallel trends assumption.

Our preferred estimate indicates that the reform increased the likelihood of spouses of state employees starting a business by 9.8 percentage points, more than doubling the baseline mean. This estimate suggests that approximately 1.6 percent—or 180,128—private firms would not have been created during this period without state sector employment.³

The findings are not driven by economic changes in China's state sector during the 1990s,

³ The number of private firms grew from 17.91 million in 1993 to 29.47 million in 1997, an increase of 11.56 million firms. Around 15.9 percent of individuals in our sample have state-employed spouses (see footnote 12 for an illustration). While interpreting reduced-form estimates in aggregate terms may raise concerns about relocation—i.e., that entrepreneurial growth in coastal regions reflects a shift from inland rather than a net increase—strict mobility restrictions during our study period mitigate this concern.

particularly SOE downsizing and layoffs, which one may argue could have pushed state employees or their spouses into self-employment. Our analysis of unemployment outcomes shows no association between the reform and increased unemployment, regardless of the spouse's working sector. In addition, we construct location-specific layoff intensity measures and find that layoffs were minimal during the early reform period, were not more intense in coastal provinces (unlike the market reform), and only became significant during the massive layoff wave starting in 1998. Moreover, even when controlling for layoff intensities during and beyond the study period (as a proxy for anticipated layoffs), we consistently observe positive effects of having a state-employed spouse on entrepreneurship. These effects hold also across variations in the firm size and professional status of the state-employed spouse, reducing concerns about the influence of layoffs or their anticipation.

The key to our study is to provide robust evidence that a spouse's state employment promotes entrepreneurship (partly at least) by mitigating the risks associated with starting and running a business, rather than solely through alternative mechanisms—particularly political connections. We test this hypothesis using the comprehensive household survey data. First, we compare spouses with varying levels of income stability, social benefits, and job security. Employment in large collective enterprises—also known for stability and benefits but lacking political connections—is associated with increased entrepreneurship, whereas employment in small collectives is not. Second, we observe stronger effects of state-employed spouses in families facing higher background risks and in locations with greater financial risks. In contrast, the effects are not more pronounced in less liberal markets, which would be expected if political connections were the primary driver (Li et al. 2008).

To further support the family insurance channel, and also to examine how having a state-employed spouse influences entrepreneurial activities and outcomes, we extend our analysis using data from an administrative survey of private firms. This dataset provides detailed information on firm characteristics, including industries and research and development (R&D) activities. It also includes entrepreneur attributes, allowing us to account for factors including

political connections. Our findings reveal that entrepreneurs with state-employed spouses are more likely to operate in higher-risk industries, even after accounting for education and connections. This is not in line with the political connection hypothesis, as connections are typically linked to preferential access to lower-risk investment opportunities. More importantly, firms led by entrepreneurs with state-employed spouses exhibit 4.7 percent higher R&D expenditures and are 3.3 percentage points more likely to hold patents. These patterns persist after controlling for entrepreneur education, connections, and firm performance, supporting that family insurance enhances risk-taking capacity.

While we have focused on distinguishing between family insurance and connections, we also consider other explanations. Specifically, our findings are not driven by individuals whose spouses hold government jobs having unobservable characteristics that make them better prepared to become entrepreneurs. As noted earlier, the timing of our sample reduces the likelihood that potential entrepreneurs married state employees to manage business risks. We construct a measure of entrepreneurial inclination predicted from individuals' baseline unchangeable traits (like gender and age) using a least absolute shrinkage and selection operator (LASSO) procedure, and find that spouses of state employees are generally *less* inclined toward entrepreneurship. The concern is further addressed by including individual fixed effects, which control for time-invariant factors influencing both marriage patterns and entrepreneurial decisions. And we demonstrate robustness using a matched sample that reduces imbalances between spouses of state employees and others. We also explain that access to opportunities or capital, competitive pressures on SOEs, or work flexibility alone cannot fully account for our findings.

Finally, we examine the quality of family-backed entrepreneurs—those with state-employed spouses—and their enterprises. Heterogeneity analysis shows that having a state-employed spouse encourages higher-educated individuals to pursue entrepreneurship. In terms of inclination toward entrepreneurship, the impact is most pronounced for individuals with a moderate inclination. Based on administrative firm data, entrepreneurs with state-employed

spouses tend to be more educated, have more managerial or official experience, and manage larger firms. Their firms also perform better, with higher value-added, productivity, profitability, and tax payments, even after controlling for education and connections.

The paper is organized as follows. We now discuss the related literature. Section 2 provides background. Section 3 presents data and empirical design. Section 4 reports main results. Section 5 explores mechanisms. Section 6 shows evidence on quality. Section 7 concludes.

1.1 Related literature

Our paper establishes a link between family insurance and the determinants of entrepreneurship, a connection largely overlooked in the existing literature (as reviewed at the beginning of the paper). We are the first to explore how risk-sharing through economic insurance provided by a state-employed spouse affects entrepreneurial activities. In doing so, we identify a novel mechanism that can address gaps in underdeveloped insurance markets (Peng 2004; Allen et al. 2005), whereby couples can manage entrepreneurial risks within the family, compensating for the market deficiencies.

Our paper also adds to the literature on the interaction between the availability of state jobs and entrepreneurship. For instance, Fang et al. (2023) find that China's SOE downsizing boosted entrepreneurship without a loss in the quality, while Bai et al. (2024) show that state sector jobs attract high-ability entrepreneurs. Our contribution is to link one spouse's state job to the other's entrepreneurial activity through a family insurance channel, and to evaluate the performance of firms started by these family-backed entrepreneurs.

More broadly, our study offers insights into the debate on the role of state involvement in the economy (Shleifer 1998; Megginson and Netter 2001). While existing research highlights the inefficiencies that state ownership creates in economic activities and financial markets (La Porta and López-de-Silanes 1999; La Porta et al. 1999, 2002; Bai et al. 2006), our finding that risks are mitigated within families through state employment to spur entrepreneurship suggests that these inefficiencies might be partially offset. Relatedly, important research on economic

transition suggests that a dual-track approach—maintaining state control while gradually introducing market mechanisms—could be more effective for successful transitions (Lin et al. 1998; Lau et al. 2000; Lin 2009). While much of this prior work is theoretical and focuses on productivity, we empirically demonstrate how state involvement may support entrepreneurship and growth through familial ties.

2 Background

Below, we illustrate the stability and welfare associated with China’s state sector jobs. We then introduce the reforms that transitioned the country to a market economy, with a focus on the post-1993 period. We also highlight the high entrepreneurial risks due to underdeveloped social safety net and insurance market. Further details are provided in Online Appendix I.

The “iron rice bowl” in state sector. Under China’s planned economy, state sector employment—including SOEs and government jobs—was sustained by a robust social security framework commonly referred to as the “iron rice bowl.” This system had three key features: i) employment security, with virtually no dismissals, ii) stable wages, and iii) comprehensive non-contributory welfare benefits, including healthcare, childcare, retirement plans, and general welfare services for employees and their families. Financing for this system came indirectly from the state, with costs included in firms’ operational expenses and state subsidies covering any losses (Leung 1994; Fung 2001). The system has been criticized for its inefficiencies in resource allocation, overstaffing, and lack of work incentives. But it persisted, particularly in government jobs and large SOEs, even as many smaller SOEs in specific industries were impacted by marketization from the late 1990s.

Other sectors. Other wage employment sectors include collective and private enterprises. Collective enterprises are publicly owned by local communities, with smaller ones typically owned by townships and larger ones by counties. Private enterprises were less common before the reform. Data from 1989–1997 indicate that state employees enjoyed the most stable wages, the most generous welfare benefits, and the lowest risk of job loss, as summarized in Table 1.

Large collectives also demonstrated certain advantages, whereas small collective and private sector employees typically were less advantaged in these respects.

Post-1993 market institutionalization reform. Since the late 1970s, China has gradually transitioned from a planned to a market economy through a series of reforms. Initially, the government adopted an incremental strategy to decentralize authority and resources while maintaining stability, which achieved limited success.

By 1993, the need for robust market-supporting institutions became imperative. The government announced the establishment of a market economy, promoting the growth of diverse economic sectors including private enterprises and self-employment. This shift marked a significant milestone in China's market transition (Brandt and Rawski 2008). Characterized by rapid and centralized decision-making, key measures included the new Company Law, which improved corporate governance, and changes in foreign trade and taxation, which fostered a more integrated market and stabilized the tax system. These measures were announced at the end of 1993 and took effect on January 1, 1994 (Naughton 2007), all aimed at establishing regulated, stable market institutions to promote business growth. We refer to this as the post-1993 market institutionalization reform.

While the reform did not explicitly target specific areas, China's more dynamic coastal regions responded most significantly. Prior studies have extensively linked the 1990s reforms to these regions and leveraged the coastal-inland variation to examine the impact of market shifts (e.g., Han et al. 2012). Coastal regions received greater government support and financial investment, which allowed them to lead economic reform efforts and capitalize on new market opportunities (Raiser 1998). They were also more industrialized and had superior infrastructure, enabling them to implement policy changes more efficiently and attract investment. Their skilled workforce was better suited to adapt to new technologies. Finally, their proximity to international trade routes allowed them to benefit more from integration into the global market.

Risks of entrepreneurship in the reform era. By 1988, the government granted private businesses legal status. However, starting a business in the 1990s was perceived as highly risky,

likened to “jumping into the sea” (Wu and Xie 2003). During this period, the social insurance system was predominantly employment-based, mainly benefiting employees of state agencies and SOEs with dependent coverage extending to their families (as symbolized by the “iron rice bowl”). This left much of the population uninsured (Henderson et al. 1995), as the broader social safety net remained underdeveloped. Notably, individuals leaving government or SOE employment for entrepreneurship forfeited their social security benefits. Meanwhile, commercial insurance options for individuals and businesses were insufficient, characterized by unmet demand and inadequate services due to limited market infrastructure and regulatory constraints (Shen 2000).

As a result, entrepreneurs faced significant financial risks from business volatility while lacking access to welfare benefits. As shown in Table 1, they earned the highest average incomes but experienced the greatest fluctuations, likely due to inadequate risk management mechanisms. They also had the lowest health insurance coverage, access to public childcare, and government subsidies compared to wage employees.

3 Empirical design

3.1 Primary data source and sample

Our primary data source is the China Health and Nutrition Survey (CHNS), the only nationally representative longitudinal household survey in China around the reform period. It began in 1989 and spans non-consecutive years. The survey covers nine provinces with diverse geographical and economic characteristics, employing a multistage random cluster sampling design to ensure representativeness.⁴ For each province, counties are stratified by income level (low, middle, and high), and four counties are randomly selected using a weighted sampling technique. Within these counties, community sampling units are randomly chosen, and

⁴ The survey is jointly conducted by the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute for Nutrition and Health at the Chinese Center for Disease Control and Prevention. Provinces included are Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong.

households within these communities are surveyed, with all household members interviewed. Households that relocate outside the sampling unit are not followed, but attrition is minimal in the earlier waves due to mobility restrictions (we address the attrition issue in Section 4.2 using methods such as inverse probability weighting). The survey provides detailed data on labor market status, individual characteristics (e.g., age, gender, education, rural-urban status), and household activities (e.g., business ownership and income).

We construct an unbalanced panel of households from three pre-reform waves (1989, 1991, and 1993) and three post-reform waves (1997, 2000, and 2004), with a focus on household heads and their spouses. Due to higher sample attrition and potential confounding effects from policies such as SOE downsizing starting in 1998, the baseline analysis excludes the final two waves, while results remain robust when these waves are included (see Section 4.2). Using the 1997 wave as the post-reform period in the main analysis mitigates potential policy confounders and ensures a more stable sample. Figure 1 illustrates the timeline of data waves and key events.

Since we analyze labor market outcomes, the sample is restricted to households where both spouses are aged 18 to 60 at the time of the survey, excluding those with a student or retiree. The final sample comprises 2,132 households, representing 4,264 individuals (household heads and their spouses) and yielding a total of 14,864 individual-year observations.

3.2 Variables

State-employed spouses. Our key explanatory variable indicates whether an individual's spouse worked in the state sector in the base year of 1989.⁵ In subsequent waves, concerns about reverse causality may arise—for instance, the spouse could leave the state sector to join their partner's business. By using base-year information, we can potentially reduce this issue. We also test alternative definitions, such as whether the spouse worked in the state sector during

⁵ For individuals active in the labor market but missing sector type information in the baseline wave, we impute their sector types using data from the earliest pre-reform follow-up wave that contains this information.

more than one or all pre-reform waves (see Section 4.2), or the spouse’s concurrent sector (see Section 5.5). We also analyze a subsample of individuals whose spouses did not switch between the state and non-state sectors in pre-reform years (see Section 4.2). These exercises yield consistent findings.

Entrepreneurship. Individuals are classified as entrepreneurs if they report their primary occupation as non-farming and self-employed.^{6,7} While the definition of entrepreneurs and entrepreneurship is widely debated in the literature, particularly in the context of low-income countries (e.g., Desai 2011), our focus on self-employment—as in many applied studies on entrepreneurship in developing economies (e.g., Wang 2012)—is justified for three reasons:

First, self-employment introduces market forces and competition, expanding economic activities and facilitating transitions (McMillan and Woodruff 2002). This applies to micro-businesses and petty trading in developing contexts, reflecting Leibenstein’s (1968) classic definition of entrepreneurship as “gap fillers” and “input completers” in the growth process, which fuel market dynamics essential for development. Second, while large private firms are rare in the early stages of transition, micro-businesses are important due to their flexibility in adapting to changes and pursuing expansion (e.g., introducing new technologies), potentially evolving into larger businesses in later stages.⁸ Third, self-employment inherently involves risk-taking, capturing the essential element of entrepreneurship (Parker 2004). This aspect is particularly pertinent to our study, since we examine the role of family insurance in mitigating such risks.

We also explore alternative definitions of entrepreneurship, including household business

⁶ The survey questions are: “What is your primary occupation?” and “What is your employment position in this occupation?” An individual is classified as an entrepreneur if the response to the first question is a non-farming occupation and the response to the second question is either “self-employed, owner-manager with employees” or “self-employed, independent operator with no employees.”

⁷ In our main analysis, the definition excludes individuals engaged in self-employment as a secondary job, and results are robust when they are included.

⁸ In more developed contexts, scholars sometimes emphasize entrepreneurship as a distinct concept centered on transformative innovations. However, this distinction between transformative entrepreneurship and small businesses is less pertinent in transition economies.

ownership and operating income at the intensive margin (e.g., Yi et al. 2022).⁹ These definitions capture different facets of the entrepreneurial spectrum and arguably emphasize more growth-oriented entrepreneurship. Importantly, they yield results consistent with our primary measure (see Section 4.2). This consistency aligns with Baumol’s (1993) observation that different definitions of entrepreneurship are often complementary rather than competitive, with limited practical implications.

Additionally, in later sections, we analyze a sample of registered private firms from administrative data, the vast majority of which provide employment. This analysis also offers insights into more growth-enhancing forms of entrepreneurship.

Entrepreneurial inclination. We construct a variable to capture individuals’ inclination toward entrepreneurship based on their inherent characteristics. Using a set of base-year variables—age, gender, years of schooling, region of residence, ethnicity, and whether they have children—we generate second- and third-order polynomials and all pairwise interactions. Based on these characteristics and their functions, we apply a LASSO procedure to predict an indicator for having ever engaged in entrepreneurial activities during the pre-reform years. The predicted indicator is a measure of entrepreneurial inclination.¹⁰

Descriptive statistics. Appendix Table A1 presents base-year individual characteristics for our sample, and by coastal and inland provinces—though our identification does not require strict balance between the two groups.¹¹ Individuals in coastal and inland provinces exhibited similarities in age, gender, and schooling years. In terms of occupations, the share of state employees was slightly lower in coastal provinces (11.6 versus 18.5 percent) in the pre-reform

⁹ The survey questions are: “Does any member of your household operate a small handicraft or commercial business?” and “On average, what are the monthly incomes of this?”

¹⁰ To assess the quality of our prediction, we plot the entrepreneurial inclination measure against actual engagement. As in Appendix Figure A1, a robust relationship emerges both in-sample and out-of-sample.

¹¹ Jiangsu, Shandong, and Guangxi are coastal provinces, while Guizhou, Henan, Hubei, and Hunan are inland. Liaoning and Heilongjiang are not included in our analysis: Liaoning was not covered in 1997, the post-reform survey year, and Heilongjiang was not covered in any of the pre-reform years.

period,¹² while the proportion of entrepreneurs was marginally higher (5.6 versus 4.1 percent).

Appendix Table A2 compares state employees with others, as well as spouses of state employees with spouses of non-state employees—again, our identification does not require any balance between the groups. State employees are predominantly male, have higher levels of education, and are more likely to reside in urban areas, consistent with prior studies (e.g., Fang et al. 2023). Their spouses similarly have higher levels of education and are more likely to work in the state sector. Importantly, spouses of state employees are less likely to engage in entrepreneurship before the reform and exhibit a lower inclination toward it, in line with the observation that state employees tend to marry within their occupational group.

3.3 Identification strategy

We begin by identifying the causal impact of the reform on individuals' decisions to enter entrepreneurship. We then explore how this impact varies depending on whether one's spouse works in the state sector.

Impact of the reform. We leverage variation in the reform's influence across provinces in a difference-in-differences estimation strategy. This approach compares the changes in individuals' entrepreneurial decisions before and after the reform between coastal provinces where the reform was most influential, and inland provinces which were less affected. This strategy of leveraging the coastal-inland variation aligns with prior studies on China's market transitions (e.g., Han et al. 2012).

Specifically, we estimate the following model:

$$Y_{ipt} = \mu_i + \lambda_t + \alpha \times Coastal_p \times Post_t + \mathbf{X}_i \times Post_t \times \Gamma_1 + \epsilon_{ipt}, \quad (1)$$

where Y_{ipt} is an indicator for whether individual i living in province p was an entrepreneur in survey year t ; μ_i denotes individual fixed effects (so province fixed effects are absorbed); λ_t denotes survey year fixed effects (so $Post_t$ is absorbed); $Coastal_p$ is an indicator for

¹² Song et al. (2011) document a significantly higher share of state sector employment pre-reform, focusing on the manufacturing sector. In contrast, our analysis covers all sectors of the Chinese economy.

province p being coastal; $Post_t$ is an indicator for year t being after the reform; \mathbf{X}_i represents a vector of baseline individual characteristics: age, gender, years of schooling, urban residence, ethnicity, having children, initial state employment, and spousal age. These characteristics are interacted with the $Post$ indicator.

To the extent that, in the absence of the reform, the entrepreneurial decisions of individuals living in coastal and inland provinces would have trended in parallel, α in equation 1 can identify the average treatment effect on the treated of the reform on entrepreneurship. We will discuss the validity of this assumption below. We note that our estimates should be interpreted as conservative lower-bound estimates of the reform's impact on entrepreneurship, if inland provinces could also experience certain effects.

Recent research suggests that difference-in-differences estimators can be misleading when policy effects vary between groups or over time, in designs with multiple groups and periods, varied treatment timing, treatments switching on and off, and/or nonbinary treatments.¹³ However, our setting is essentially a two-group, two-period design, avoiding these concerns.

Differential impact by spouse's state employment. We estimate equation 1 separately for individuals with a spouse employed in the state sector and those without, in order to examine the potentially differential impact of the reform. To bolster the plausibility of the parallel trends assumption, we estimate a dynamic version of equation 1—for the entire sample and its two subsamples categorized by spousal state employment—and examine potential pre-trends. We explore this later, and results suggest that the plausibility of parallel trends is less of a concern.

Notably, the separate estimation of equation 1 for the two subsamples is equivalent to the estimation of a fully interacted version of this equation using the entire sample, with all controls (including fixed effects) interacted with $SpouseState_i$, an indicator for whether individual i 's spouse works in the state sector.

The above estimation strategy may suffer from bias if entrepreneurial decisions were

¹³ For an overview, see De Chaisemartin and D'Haultfoeuille (2023).

influenced by certain unobservable province-year specific factors. To address this concern, we employ a specification akin to a triple-difference strategy:

$$Y_{ipt} = \mu_i + \lambda_{pt} + \beta_1 \times Coastal_p \times Post_t \times SpouseState_i + \beta_2 \times Post_t \times SpouseState_i + \mathbf{X}_i \times Post_t \times \Gamma_1 + \mathbf{X}_i \times Post_t \times Coastal_p \times \Gamma_2 + \epsilon_{ipt}, \quad (2)$$

where λ_{pt} indicates province-survey year fixed effects.

The estimation strategy based on equation 2 enables us to address several concerns that could otherwise hinder our ability to interpret the estimates causally. First, we can rule out that results are driven by unobserved, time-invariant characteristics across individuals influencing their entrepreneurial decisions. For instance, one could worry that more capable individuals are more likely to be married to state employees and also more likely to start businesses. Other factors may include personality traits and preferences. Through the inclusion of individual fixed effects, we can account for such concerns.

Second, we can rule out that results are influenced by individual characteristics (e.g., initial state employment, education) affecting entrepreneurial decisions differently before and after the reform, and across coastal and inland provinces. For instance, since a substantial fraction of state employees married other state employees, concerns may arise that results are due to one's own (rather than the spouse's) initial working sector, whose prospects may change post-reform in certain provinces. Also, the significance of education in shaping entrepreneurial decisions may increase post-reform, especially in coastal provinces. By conditioning on all these characteristics interacted with the *Post* and *Coastal* indicators, we address such concerns. In robustness checks, we additionally control for individual and spousal characteristics interacted with *Post* and *SpouseState*, further allowing the effects to vary by the spouse's working sector.

Third, we can rule out that results are driven by specific province-year factors. For instance, certain macroeconomic fluctuations or policies within a province in a particular year might impact individuals' entrepreneurial decisions in a similar manner. With province-survey year fixed effects, we can mitigate such concerns by leveraging variation within a province-year

unit. This approach is more flexible than accounting for province-level smooth (e.g., linear or quadratic) time trends, thereby better addressing concerns about the plausibility of the province-level parallel trends assumption.

As such, equation 2 stands as our preferred specification. The coefficient of interest, β_1 , measures how the impact of the reform varies depending on whether the spouse works in the state sector, and holds a plausible causal interpretation. Later, we will explore alternative interpretations in more detail—e.g., specific characteristics of state employees’ spouses, or changes in state job prospects (see Section 4.3 and Section 5.5).

4 Results

4.1 Baseline results

Table 2 presents baseline estimation results. We use the ordinary least squares method,¹⁴ with standard errors clustered at the household level. Column 1 estimates equation 1 using the entire sample. The estimated coefficient on *Coastal* \times *Post* is 0.027, statistically significant at the five percent level. This indicates that, overall, individuals residing in coastal provinces are 2.7 percentage points more likely to initiate a private business after the market reform, relative to individuals in inland provinces. That is, the reform leads to a 2.7 percentage point increase in the likelihood of becoming an entrepreneur.

In columns 2 and 3, we estimate equation 1 using subsamples of individuals whose spouses work in the state sector and those whose spouses do not do so. For the first subsample, the estimated coefficient on *Coastal* \times *Post* is 0.147, significant at the five percent level. For the second subsample, the estimate is still positive, but substantially smaller (0.017) and insignificant. Effect sizes in these two columns broadly align with graphical patterns in Figure 2. The estimates suggest a considerably larger impact of the reform on entrepreneurial decisions among spouses of state employees, for whom the reform leads to a 14.7 percentage point

¹⁴ Using fixed-effects logit models gives us similar findings.

increase in the likelihood of becoming an entrepreneur—more than 5.4 times the overall effect.

Event study approach. In order to test for parallel trends required to interpret the above results as causal, we estimate the following regression model:

$$Y_{ipt} = \mu_i + \lambda_t + \sum_{k \neq 0} \alpha_k \times Coastal_p \times D_{k,t} + \text{controls} + \epsilon_{ipt}, \quad (3)$$

where $D_{k,t}$ is a set of indicator variables that take the value one if survey year t was k periods away from/to the time of the reform. We treat the survey year just prior to the reform, i.e. 1993, as the omitted category, with its k set to zero.

Figure 3 illustrates the estimated coefficients α_k 's, for the entire sample (panel A) and the two subsamples based on whether the spouse works in the state sector (panels B and C). The graphical patterns provide evidence consistent with the plausibility of parallel trends. In all panels, the estimated coefficients for indicators representing years prior to the reform are close to zero and exhibit no discernible pre-trends. These patterns also highlight the differential impact of the reform on entrepreneurship depending on whether one's spouse has a state job. In panel B, we observe a positive and significant effect for spouses of state employees, which appears to be much larger than the overall impact shown in panel A. In contrast, patterns in panel C suggest no significant effect for those whose spouses are not state employees.

Differential impact by spouse's state employment. To determine the size of the difference in the impact by the spouse's working sector and its statistical significance, in column 4 of Table 2, we estimate a fully interacted version of equation 1, with all controls (including fixed effects) interacted with *SpouseState*. The estimated coefficient on $Coastal \times Post \times SpouseState$ is 0.131, which equals the difference in effect sizes between columns 2 and 3, and is significant at the five percent level.

Column 5 reports results estimating equation 2, our preferred specification. The coefficient of interest is estimated at 0.098, statistically significant at the five percent level. According to this estimate, the reform makes spouses of state employees 9.8 percentage points more likely to start a business compared to other individuals, conditioning on covariates and individual and province-survey year fixed effects. This increase is more than double the baseline mean (4.6

percentage points).

Heterogeneity. Appendix Figure A2 illustrates the estimated coefficient of interest from our preferred specification, for subgroups based on several baseline individual characteristics. Panel A divides the sample by gender, showing that the significant impact primarily arises for men with state-employed wives, while the effect for women with state-employed husbands is smaller and insignificant. Panel B indicates that the impact does not differ significantly by age. Panels C and D demonstrate that the influence of having a state-employed spouse is stronger among individuals living in urban areas and those with children. In panel E, we observe a larger effect for individuals with more years of schooling (above the median), suggesting that when market opportunities arise, having a state-employed spouse is more likely to drive higher-educated individuals toward entrepreneurship. Similarly, panel F shows that the effect is more pronounced among individuals who themselves worked in the state sector before market opportunities emerged, a group shown to have higher ability (Fang et al. 2023).

4.2 Robustness

Specification. Our preferred specification allows individual characteristics to influence entrepreneurial decisions differently before and after the reform, as well as across coastal and inland provinces. We further allow these characteristics' effects to vary depending on whether the spouse works in the state sector. In Appendix Table A3, results are similar to the baseline (repeated in column 1) when own and spousal characteristics are interacted with *Post* and *SpouseState* (columns 2 and 3), and further when year-specific shocks are interacted with *SpouseState* (column 4).

Measuring state-employed spouses. In our main analysis, we define the *SpouseState* indicator using base year information. While this definition reduces reverse causality, it may introduce measurement error since one's working sector may change over time. In panel A of Appendix Table A4, we define this variable to indicate whether the spouse remains in the state sector in both 1989 and 1991, and in panel B, in all pre-reform waves. Result patterns are

consistent with the baseline, and economic sizes are even larger.

Measuring entrepreneurship. Panel A of Appendix Table A5 defines the entrepreneurship variable based on both primary and secondary occupations. Panel B defines entrepreneurship based on whether the household owns a business. Results are robust, with larger economic magnitudes (12.5 percentage points). Panel C looks at business owners generating positive operating income, while panel D, business owners generating income above the county median. Results remain robust in both cases.

Standard errors. We examine whether our key estimates remain precise using methods other than household-level clustering to compute standard errors, including one-way and multi-way clustering (Cameron et al. 2011). Appendix Table A6 reports standard errors clustered at the household-survey year level, province-survey year level, heteroskedasticity robust, and two-way clustered at the household and province-survey year level. Statistical inference is unaffected by the clustering method.

Sample. Panel A of Appendix Table A7 restricts the sample to individuals whose spouses did not switch between the state and non-state sectors in pre-periods, to reduce concerns regarding sector switching. The effect size appears to be much larger (15.1 percentage points). In panels B and C, we restrict the sample to couples in which one or both spouses have a job in all survey waves, reducing concerns about switching labor participation status. Panel D considers the urban subsample, since the state sector is largely located in urban areas. With a much smaller sample, the effect size increases (16 percentage points). Panel E excludes the youngest and oldest five percent of individuals. In panels F and G, we include later waves of data, i.e. the 2000 and the 2004 wave, and results are similar.

To reduce imbalance between spouses of state employees and other individuals, we use a one-to-one matched sample (Iacus et al. 2012)—each individual whose spouse works in the state sector is matched with one whose spouse does not, based on the most similar pre-reform characteristics. Results are presented in the last panel and convey the same message.

Sample attrition. While attrition in the CHNS data is low in earlier waves, it increases in

later waves. As shown in panel A of Appendix Table A8, approximately ten percent attrite in 1993 and a further 17.5 percent attrite in 1997. In panel B, we exclude from the sample individuals who attrite in the post-period survey. The pattern of results remains.

In panel C, we address potential bias from sample attrition using the inverse probability weighting method. For each wave following 1989, we estimate the probability that an individual remains in the sample conditional on their presence in previous waves. We then calculate the joint probability from the predicted conditional probabilities and use the inverse as weights in our estimation. This approach places more weight on individuals who are likely to attrite, better reflecting the original sample. The corrected estimates imply a similar effect.¹⁵

4.3 Changes in state sector as confounding factors

The 1990s were a time of significant economic changes, during which the Chinese government introduced several policies to reform the state sector. Below, we discuss the changes that occurred in the state sector during this period and provide evidence that our results are unlikely to be driven by confounding factors associated with these changes.

SOE downsizing and layoffs. One of the most prominent changes in the state sector during the 1990s was the downsizing of SOEs and the resulting layoffs. It seems plausible that spouses of state employees—who are themselves likely to be state employees—might lose their jobs and thus turn to self-employment. The CHNS data we use are not ideal for considering this issue since the survey does not explicitly ask about layoffs. We exploit the most related information, unemployment status, using it as the outcome variable in replicating our baseline estimations. As shown in Appendix Table A9, the market reform reduces unemployment (column 1), and the effect does not differ by the spouse’s working sector. If anything, spouses of state employees are less likely to be unemployed following the reform (though the difference

¹⁵ This approach assumes that attrition is driven by observable factors. Addressing sample attrition based on unobservable factors, such as risk preferences, is more challenging. However, if individuals with higher risk preferences are both more likely to become entrepreneurs and to leave the sampling units, this bias would work against finding an effect.

is insignificant), a result that does not support the layoff hypothesis.

Notably, for the layoff shock to produce our results, it would have to occur simultaneously with the market reform, and be more intensive in coastal than inland provinces. Around 1993, the government began to gradually expose SOEs to market competition, signaling the decline of the state sector's prospects. However, the massive SOE downsizing as a policy shock occurred starting in 1998 (e.g., Fang et al. 2023). To check for the influence of layoffs, we follow existing studies on this topic to construct two measures of province-level layoff intensity. The first measure is defined as the percentage change in the state sector employment level:

$$LO_p = -\frac{SSE_{p,t_1} - SSE_{p,t_0}}{SSE_{p,t_0}}, \quad (4)$$

where $SSE_{p,t}$ is the number of state sector employees in province p in year t . The second measure is a Bartik-style variable, which exploits the fact that layoff intensities vary across industries, and provinces differ in their initial industrial structure:

$$LO_Bartik_p = -\sum_k \frac{SSE_{kp,t_0}}{SSE_{p,t_0}} \times \frac{SSE_{k,t_1} - SSE_{k,t_0}}{SSE_{k,t_0}}, \quad (5)$$

where $SSE_{kp,t}$ is the state sector employment in industry k in province p in year t ; $SSE_{k,t}$ is the national-level state employment in industry k in year t .

We construct these measures for two time intervals: i) 1993 to 1997 which overlaps with our study period, and ii) 1997 to 2001 which corresponds to the massive layoff waves.¹⁶ Between 1993 and 1997, layoff intensities are much smaller than those after 1997 for both measures, as shown in Appendix Table A10. This is consistent with evidence provided by existing studies and confirms that our main study period is before the bulk of layoffs. In addition, layoff intensities in coastal provinces do not appear to be more significant, unlike the market reform.

In order to demonstrate the robustness of our conclusion when considering layoffs, we control for province layoff intensities interacted with whether the individual and/or the spouse works in the state sector. Panel A of Table 3 presents results controlling for layoffs in our study

¹⁶ Data are obtained from the China Labor Statistical Yearbooks of 1994, 1998, and 2002.

period, and the key coefficient receives significantly positive estimates as before.

However, a concern may remain if there is anticipation of incoming layoffs in the state sector, which could interact with the effects of the market reform to produce transitions into entrepreneurship that would not otherwise occur. If this anticipation is related to later actual layoffs, we can address the concern by controlling for layoff intensities during the massive layoff period from 1997 to 2001. As shown in panel B of Table 3, the pattern of results remains similar.

To further address the concern about layoff anticipation, we exploit the fact that workers in large SOEs faced less increased risk of layoffs compared to those in small or medium-sized ones (Hsieh and Song 2015). Large SOEs were often restructured into large state-owned conglomerates, while smaller firms were more likely to be shut down or privatized. In the regression specification, we replace *SpouseState* with two indicators representing the size of state firms.¹⁷ As in the first column of Table 4, having a spouse employed in either a large or small state firm positively influences entrepreneurship. In column 2, we categorize state employees into ordinary workers, and professionals or officials who face substantially lower layoff risks (Appleton et al. 2002). This modified specification also shows that having a spouse in either category supports entrepreneurship.

Overall, the effect appears more pronounced for positions with lower layoff risk (and potentially stronger connections) positions. But *p*-values for coefficient equality, reported at the bottom of the table, indicate no statistically significant differences between high- and low-layoff-risk groups, whether measured by firm size or professional status. The positive and significant results for ordinary state employees and those in small firms reduce concerns about layoff anticipation (as well as potential connections, which we will address comprehensively in Section 5).

Privatization of state employer-provided housing. Beginning in 1994, a housing program

¹⁷ We use 800 employees as the cutoff, and results are not sensitive to this choice.

allowed state employees renting state-owned housing provided by their employers, to purchase their homes at subsidized prices. According to Wang (2012), this program promotes entrepreneurship by enhancing labor mobility and enabling households to capitalize on their home's value. Since the program coincided with market reforms, it may confound our results.

To test the robustness of our findings considering potential effects of the housing program, we construct an indicator for households living in state employer-provided homes in the base year (i.e., those likely to benefit from privatization) and include its interaction with *Post* in column 1 of Appendix Table A11. Column 2 further allows the program's effects to differ across coastal and inland provinces. Both cases yield significantly positive estimate for the key coefficient, and the effect size is stable. In column 3, we refine the specification by replacing *SpouseState* with two variables: one indicating having a state-employed spouse and living in employer-provided housing, and another indicating having a state-employed spouse but not living in such housing. The null hypothesis that the two effects are identical cannot be rejected. Therefore, even after accounting for potential effects of housing privatization, we find evidence supporting the role of state-employed spouses.

Dwindling in-kind benefits. Other concurrent changes in the state sector during the transition to a market-oriented economy included reductions in in-kind benefits such as health insurance. But two facts suggest these changes do not explain our findings. First, these reductions were gradual and relatively small throughout our study period (Appendix Figure A3). Second, if the reduction or removal of in-kind benefits made state jobs more comparable to non-state jobs, our conclusion about the positive role of spousal state employment in promoting entrepreneurship is conservative. The actual impact of a state-employed spouse, if enjoying more benefits, would likely be greater than our point estimates indicate.

5 Mechanism

State-employed spouses differ from others in the insurance they provide for the family but may also differ in other respects. Thus, the key to our study is to demonstrate that a spouse's state

employment influences entrepreneurial decisions, at least partially, through family-backed economic insurance rather than solely through alternative mechanisms. Among these alternatives, political connections are perhaps the most prominent, as widely documented in the literature. We do find some evidence consistent with this channel—Table 4 shows stronger effects for state professionals and officials. However, the significant effects observed among ordinary state employees and those from smaller firms suggest that connections alone may not fully explain the results.

To further substantiate the role of the family insurance channel, we conduct a series of tests using both household survey data and administrative firm data. While each test has its limitations, as discussed below, they collectively provide robust evidence supporting the importance of family insurance.

5.1 Varying intensity of family insurance

A direct way to identify our proposed mechanism is to compare spouses with varying levels of income stability, social benefits, and job security, which lead to differences in the intensity of family insurance. To capture such more nuanced variation, we exploit sectoral differences in these attributes, as outlined in Table 1. Specifically, large collective enterprises share certain similarities with the state sector in terms of job stability and benefits for employees and their families, while their employees often lack the political connections typically associated with state jobs.

We replace *SpouseState* in our regressions with an indicator for spouses employed in large collective enterprises (without considering the state sector). Results are presented in panel A, Table 5. Column 1 indicates that having a spouse employed in large collective is associated with higher rates of entrepreneurship. The triple-difference specification in column 2 corroborates this conclusion. These findings align with the interpretation that employees in large collective enterprises provide a degree of risk hedging, thereby supporting the family insurance channel. In contrast, spouses of small collective employees do not exhibit increased

entrepreneurship, as in panel B, further highlighting the role of income stability and benefits.

The final column of Table 5 includes triple interaction terms involving both *SpouseState* and the indicator for collective employment of the spouse. We find a strong and statistically significant effect for the interaction involving *SpouseState*, with effect sizes consistent with the baseline. This finding aligns with the observation that state employees generally enjoy the most stable wages, the most generous social benefits, and the lowest chance of job loss. The coefficient estimate for large collective enterprises remains positive, meaningful in size, and significant, whereas the estimate for small collectives is negative and not statistically different from zero.

5.2 Familial and regional risk exposure

We investigate whether state-employed spouses play a larger role in fostering entrepreneurship among families with greater exposure to background risks, or in regions with higher financial risk levels. Families facing varying risk levels have different insurance needs when pursuing entrepreneurial activities, whereas these differences are not necessarily linked to the importance of political connections.

Panel A of Figure 4 plots estimates of the key coefficient (i.e., $Coastal \times Post \times SpouseState$) using our preferred specification, for subgroups of families categorized by their potential risk levels. We use four proxies to capture family risk: volatile income (measured as income standard deviation above the community median), the presence of a family member in poor health, weak insurance coverage (indicated by the absence of health insurance for family members), and the absence of a son (which may signal a risk of lacking old-age support in a patriarchal society like China). In addition, we create an aggregate index based on these variables (Anderson 2008), categorizing families with an index above the community median as high-risk. Consistent with the family insurance mechanism, the role of having a state-employed spouse is more pronounced among families with higher background risk.¹⁸

¹⁸ These family subgroups might differ for reasons beyond risks, but using risk proxies from various

Panel B divides the sample according to location-specific financial risk levels. We use pre-reform volatility measures for individual income and income growth and then calculate county-level standard deviations,¹⁹ considering counties above the province median as high risk. For these proxies, as well as an index summarizing them, we find a stronger effect of having a state-employed spouse on entrepreneurship in higher-risk locations. These findings help differentiate our proposed insurance hypothesis from political connections.

5.3 Entrepreneurial industry risk profiles in administrative firm data

One prediction of our proposed channel is that spouses of state employees are more likely to engage in riskier entrepreneurial ventures, supported by the security of family-backed insurance. That is, if family insurance is the primary mechanism behind our findings, its value should be particularly pronounced for higher-risk businesses. In contrast, political connections would imply preferential access to investment opportunities, directing those with a state-employed spouse toward lower-risk industries. We test these distinct predictions using administrative firm data.

The data are drawn from the National Survey of China’s Private Enterprises, a series of surveys across 31 provinces since the 1990s. Organized by several governmental and research institutions,²⁰ the survey employs a multistage stratified random sampling method to ensure broad coverage across regions and industries, yielding a nationally representative sample of private firms. Direct interviews are conducted with firm owners (entrepreneurs), capturing

dimensions mitigates this concern. In particular, we explicitly rule out that results are driven by differences in baseline entrepreneurial inclination. Appendix Figure A4 shows a version of panel A of Figure 4 with additional controls for the LASSO-predicted measure of inclination, interacted with *Post* and *Coastal*. The pattern remains consistent.

¹⁹ We first obtain income and income growth for each working individual in the pre-periods and calculate the standard deviations of demeaned values at the individual level. By averaging these standard deviations across individuals in sector k , we compute the sector-level volatility σ_k . The county-level volatility is then computed as $\sigma_c = \sum_k w_{ck} \times \sigma_k$, where w_{ck} is the base-year employment share of sector k in county c .

²⁰ These include the All-China Federation of Industry and Commerce (a semi-official organization of private firms operating at national, provincial, city, and county levels), the China Society of Private Economy at the Chinese Academy of Social Sciences, and the United Front Work Department of the Central Committee of the Communist Party of China.

extensive information on entrepreneur characteristics, including occupational histories, plus firms' industry information, R&D activities, various attributes, and operations (Appendix Table A12 shows the key variables, which we will explore more extensively in later sections). This ongoing national project aims to collect information on China's private sector to inform the central government in formulating and adjusting business policies.

We use a pooled cross-sectional sample from the 1995, 1997, 2004, and 2006 survey waves, since these provide detailed information on the employment sectors of the owners' spouses.²¹ A key advantage of this dataset is its rich detail on entrepreneurs, allowing us to construct a political connections index that captures their managerial experience in SOEs, former government positions, and party membership (Li et al. 2008). We are thus able to account for the role of political connections in our analysis.

We construct seven measures of industry risk and also aggregate them into an index. For each measure, an industry is classified as high-risk if its respective value exceeds the median across all industries. First, we calculate the standard deviation of log revenue over time for each firm and obtain industry-level averages.²² Second, we use a similar measure based on profit instead of revenue. Third, we compute the standard deviation of return on assets (ROA) for each industry. Fourth, a similar variable is computed for return on equity (ROE). Fifth, we measure firms' exposure to systematic risk by assessing the sensitivity of their revenues to overall industry movements (e.g., Langenmayr and Lester 2018) and aggregate this exposure at the industry level.²³ Sixth, we use profit to measure exposure to systematic risk. Finally, we

²¹ The sample consists of over 9,000 private firms across 31 provinces and 15 industries. These industries are categorized according to China's Industrial Classification (CSIC Rev. 1994), and presented in Appendix Table A13. In the sample, around 15 percent of firm owners have a state-employed spouse, a proportion broadly consistent with the household survey sample but smaller than that reported by Song et al. (2011), as they focus exclusively on the manufacturing sector (see footnote 12).

²² The data record each firm's annual revenues and profits over the past three years.

²³ For each firm i in industry j in year t , we calculate its exposure to systematic risk as follows:

$$\beta_{ij} = \frac{\text{COV}(\text{Revenue}_{it}, \text{AveRevenue}_{jt})}{\text{VAR}(\text{AveRevenue}_{jt})}$$

We then compute industry-level exposure value as $\beta_j = \sum_i \beta_{ij} / N_j$, where N_j is the number of firms in industry j .

include the industry-level variance risk premium from Zhu et al. (2023) as a risk measure.²⁴

As reported in Table 6, entrepreneurs with a state-employed spouse are more likely to operate in higher-risk industries, with all estimates statistically significant except for the ROE measure. This holds even after controlling for the entrepreneur's education and connections. As expected, connections are negatively associated with industry risk. These results suggest that family-backed insurance plays a role in entrepreneurs pursuing their business ventures.

5.4 R&D engagement

In a similar vein, our proposed channel suggests that having a state-employed spouse incentivizes engagement in R&D activities, which are inherently high-risk. The firm data allow us to test this hypothesis while controlling for firm owners' education, connections, and various firm attributes. The analysis is important in its own right, as R&D is a key driver of innovation and economic growth.

Table 7 explores how the R&D engagement of firms led by entrepreneurs with a state-employed spouse differs, using data from the 2004 and 2006 waves which provide data on R&D activities. In panel A, we regress variables measuring R&D on *SpouseState*, controlling for entrepreneur gender, age, firm attributes, and fixed effects for county, industry, and survey wave. These firms exhibit 4.7 percent higher R&D expenditures and a 3.3 percentage point increase in the likelihood of holding patents. On an aggregate index summarizing R&D expenditures, their ratio to assets, patent holding, and the log number of patents, these firms score 0.09 standard deviations higher.

In panel B, the findings remain robust after controlling for entrepreneur education. Panel C shows robustness when accounting for connections. Panel D incorporates firm performance, measured using an index summarizing value added, productivity, revenue, profit, and tax payments. Panel E includes all the controls from the previous panels. We find that entrepreneurs'

²⁴ Zhu et al. (2023) calculate these values for nine sectors in the S&P 500 index, which we match to the industries in the administrative firm data. See Appendix Table A13 for the industries' correspondence.

education and firm performance are positively correlated with R&D activities, while political connections show either no significant correlation or a negative correlation. Even after controlling for these factors, firms led by entrepreneurs whose spouses are state employees consistently exhibit higher R&D activities. This suggests that the increased R&D engagement is, at least in part, driven by a greater capacity for risk-taking enabled by family insurance.

Though largely correlational, the evidence using the firm data supports the family insurance mechanism by demonstrating the role of state-employed spouses in enabling entrepreneurs to engage in higher-risk ventures and activities.

5.5 Characteristics and opportunities of state employees' spouses as alternative explanations

Individuals whose spouses hold government jobs may possess certain unobservable characteristics, or have preferential opportunities, that make them more likely to become entrepreneurs. Below we discuss these alternative explanations.

Entrepreneurial inclination. Those inclined toward entrepreneurship might marry state employees. However, this concern is less relevant in our context for four reasons. First, as discussed earlier, private businesses only gained legal status in 1988, and our data includes couples who married no later than this year, meaning that market opportunities and potential ventures were largely unforeseen at the time of marriage. Second, based on our measure of entrepreneurial inclination, which is predicted from individuals' baseline unchangeable traits using LASSO, spouses of state employees were, on average, *less* inclined toward entrepreneurship (Appendix Table A2). Third, our specification controls for individual fixed effects, which account for time-invariant characteristics that could influence both marriage and entrepreneurial decisions. Fourth, in a robustness check we use a matched sample to reduce imbalance between spouses of state employees and other individuals, and obtain similar results (the last panel of Appendix Table A7).

Opportunities. Spouses of state employees may have preferential access to entrepreneurial

opportunities, which aligns with the connections hypothesis. In addition to our efforts to isolate family insurance from the effects of connections in earlier sections, we conduct another test based on the prediction that connections would be more valuable in less liberal markets. Following Li et al. (2008), we calculate the province-level proportion of employment in the private sector and the proportion of total fixed investment from private enterprises. These measures indicate market liberalization, as smaller private sectors and larger state sectors typically result in private firms having more interaction with the state and facing greater regulatory constraints. Appendix Figure A5 shows that having a state-employed spouse plays a positive role in both less and more liberal markets (respective median for coastal and inland provinces as cutoffs), with no substantial differences in effect size. Therefore, while having a state-employed spouse exerts a larger effect on entrepreneurship in contexts with greater risk exposure, it does not appear more important in regions with weaker markets and a greater need to engage with the state. These findings support that family insurance is a significant channel.

Access to capital. Spouses of state employees may also have better access to external capital through connections or housing benefits (Wang 2012), or they may provide capital through family resources. However, we have sought to isolate family insurance from the effects of connections in prior sections, and shown consistent results even when accounting for state-provided home. Furthermore, our data reveal that while state employees enjoy the most stable incomes, on average, income levels tend to be low (Table 1), which implies limited access to capital through family resources for this group.

5.6 Other possibilities

Household-level entrepreneurial decisions. During the 1990s, regions more exposed to economic reforms experienced increased market opportunities but also greater competitive pressure for SOE jobs. This raises the possibility that reduced job prospects and benefits following the reform motivated state employees and their spouses to jointly pursue entrepreneurship, questioning the use of pre-reform state employment as a source of variation.

Although we have extensively addressed issues related to SOE layoffs and their anticipation in Section 4.3, our estimations cannot directly disentangle whether one spouse’s entrepreneurial decision occurs while the other remains state-employed—or arises from a joint decision by the couple. To deal with this possibility, we conduct two tests.

First, we use the state employment status of spouses in the same year as the entrepreneurial decision (rather than pre-reform measures) as the explanatory variable, instrumented by the spouse’s base-year status. As in Appendix Table A14, we find a significant local average treatment effect for “compliers”—those whose spouses are currently employed in the state sector if and only if they were employed there in the base year.

Second, we compare the post-reform entrepreneurial status of *households* in coastal versus inland regions, as well as between *households* with and without a state-employed spouse before the reform. The sample includes all households in the post-reform wave. A multinomial logit model is employed, with the dependent variable having three categories: i) no spouse becomes an entrepreneur after the reform—the reference category; ii) only one spouse becomes an entrepreneur; and iii) both spouses become entrepreneurs. Results in Table 8 show that households with a state worker are more likely to transition to a combination of state worker and entrepreneur, rather than both spouses becoming entrepreneurs. These results indicate that it is less likely for a state-employed spouse to leave their job and pursue entrepreneurship jointly with their partner due to reduced job prospects or benefits. Instead, it is the state employment of one spouse that influences the other’s decision to become an entrepreneur.

Work flexibility. State positions may offer flexible hours, enabling employees to manage household responsibilities (such as childcare) and give their spouses more time for entrepreneurial activities. But since small collective employees with similar flexible hours show no effect (Table 5), this factor alone cannot explain our findings.

6 Quality of family-backed entrepreneurs and enterprises

Which individuals are the family-backed entrepreneurs, and do their enterprises perform better?

Our heterogeneity analysis in Section 4.1 shows that, when market opportunities arise, having a state-employed spouse encourages higher-educated individuals to become entrepreneurs. This suggests that family-backed entrepreneurs and their enterprises may be of higher quality, as education is widely recognized as a strong predictor of entrepreneurial ability and firm performance (Queiró 2022). In addition, Section 5.3 shows greater engagement in R&D by family-backed entrepreneurs. This section further examines these questions using both household survey data and administrative firm data.

Comparisons by spouse's state employment using household survey data. Appendix Table A15 presents the comparisons during the pre-reform (panel A) and post-reform periods (panel B). The first two columns examine years of schooling and high school degree. We find no differences in the pre-reform period, but after the reform, entrepreneurs who are spouses of state employees have higher educational levels. This aligns with our heterogeneity finding that having a state-employed spouse is more likely to encourage higher-educated individuals (and those who were themselves state employees) to pursue entrepreneurship. In column 3, entrepreneurs who are spouses of state employees do not exhibit significant differences in income, likely because new businesses require time to achieve profitability, highlighting the risky nature of entrepreneurship.²⁵ Column 4 reveals that post-reform entrepreneurs who are spouses of state employees are more likely to hire employees, though this effect is statistically insignificant.

Heterogeneity by inclination toward entrepreneurship. We estimate the effects of spouse working in the state sector across terciles of our LASSO-predicted measure of entrepreneurial inclination. We find positive effects across the inclination spectrum, with the effect being most pronounced for individuals in the second tercile (Appendix Figure A6).²⁶ The point estimate

²⁵ The post-reform analysis employs the 1997 household survey wave, aligned with our baseline estimation, which covers a relatively short period after the reform for entrepreneurs to realize income gains. In subsequent analyses, firm-level data reveal improved profitability and overall performance over the long term. Thus, the lack of immediate effects does not necessarily indicate lower entrepreneurial quality but instead reflects the inherent risks associated with new ventures.

²⁶ Specifically, we estimate a modified version of equation 2:

for this group is four times as large as that for the first tercile and 1.8 times as large as that for the third. Therefore, the influence of having a state-employed spouse is strongest for individuals with a moderate baseline inclination toward entrepreneurship. The smaller effect for those most inclined (the third tercile) means that these individuals are already highly motivated, regardless of spousal influences. For those least inclined (the first tercile), having a state-employed spouse shows no meaningful influence.

Comparisons by spouse's state employment using firm data. To provide long-term evidence, we use the extended administrative firm sample covering the 1995, 1997, 2004, and 2006 waves. As in columns 1–4 of Appendix Table A16, entrepreneurs with a state-employed spouse generally have higher levels of schooling, are more likely to have prior experience as SOE managers or government officials, and are more likely to be party members. Column 5 analyzes the connections index, which summarizes managerial and official experience and party membership (Li et al. 2008), showing that these entrepreneurs score about 0.4 standard deviations higher on this index. Furthermore, their firms are more likely to have been registered after the reform and tend to be larger in terms of assets, equity, or employment (though some differences are not statistically significant), as in columns 6–9. These findings broadly align with the post-reform patterns observed in our household survey data.

Firm performance. As in Appendix Table A17, firms owned by entrepreneurs with state-employed spouses exhibit higher value added, productivity (i.e., value added per worker), revenue, profit, and tax payments. These firms also display higher returns on assets and equity, although these differences are statistically insignificant. In the final column, entrepreneurs with state-employed spouses score 0.105 standard deviations higher on the firm performance index, which aggregates the aforementioned variables. Panel B further conditions on entrepreneurs' education and connections. The pattern persists, with slightly smaller effect sizes.

$Y_{ipt} = \mu_i + \lambda_{pt} + \sum_{\tau=1}^3 \eta_{\tau} \times Coastal_p \times Post_t \times SpouseState_i \times 1[Tercile = \tau]_i + \text{controls} + \epsilon_{ipt}$, where $1[Tercile = \tau]_i$ is an indicator for whether individual i 's predicted inclination falls within tercile τ . All lower-order terms are included as controls. Appendix Figure A6 plots the estimates of η_{τ} 's.

Entrepreneurs with state-employed spouses score 0.087 standard deviations higher on the performance index. This suggests that their superior performance is only partly attributable to higher ability or connections.²⁷

Summary and remark. Overall, evidence suggests that as market opportunities arise, spouses of state employees are more likely to start new firms, and their firms generally exhibit higher quality. The family-based insurance provided by state employment enables capable—but moderately inclined—individuals to succeed in entrepreneurship, likely by allowing them to experiment and develop their skills. We note again that, family-backed entrepreneurs tend to have higher entrepreneurial ability and a moderate inclination, but reconciling these factors with all the findings we have presented is challenging, while all the findings align with the role of family insurance.

7 Conclusion

Entrepreneurship drives growth, innovation, and economic efficiency, whereas SOEs are often seen as counterproductive. This study provides a unique perspective on how state ownership interacts with entrepreneurship through familial risk insurance. We show that during China’s market reform period, individuals with state-employed spouses are 9.8 percentage points more likely to become entrepreneurs. Their firms exhibit a higher likelihood of innovation and better performance, indicating enhanced entrepreneurial qualities. This may reflect improved labor allocative efficiency between wage employment and high-growth entrepreneurship.

In particular, both family insurance and political connections imply higher revenue and overall firm performance for firms led by state-spouse entrepreneurs. However, family

²⁷ We assess the robustness of all findings from the firm data. Appendix Table A18 examines the use of log-transformed variables, showing that results remain robust when applying the inverse hyperbolic transformation or the Poisson pseudo-maximum likelihood method. Table A19 follows Anderson (2008) to apply inference procedures that account for multiple hypothesis testing. Columns 1–3 show baseline results and p -values. Column 4 presents the sharpened false discovery rate q -values for each outcome category, and the final column reports q -values for all outcomes combined. Despite stricter adjustments with more outcomes, results remain broadly robust.

insurance suggests greater involvement in R&D, which is inherently risky, whereas political connections do not necessarily suggest such engagement. Our findings align with both the consistent and distinct predictions of these two mechanisms. Given that R&D is a key driver of innovation and economic growth, our identification of the family insurance channel provides new insights into the role of state ownership.

We acknowledge the limitations of our study and propose areas for future research. First, while our analysis is set during a period of economic transitions, it remains an open question if these mechanisms are applicable to more recent contexts with significant state or public sectors, such as the resurgence of SOEs in China since 2013 (Fang et al. 2022). Second, our study does not compare the insurance effects to the inefficiencies associated with state ownership. Future research could integrate familial contexts with state employment to quantify the equilibrium effects of state participation in the economy.

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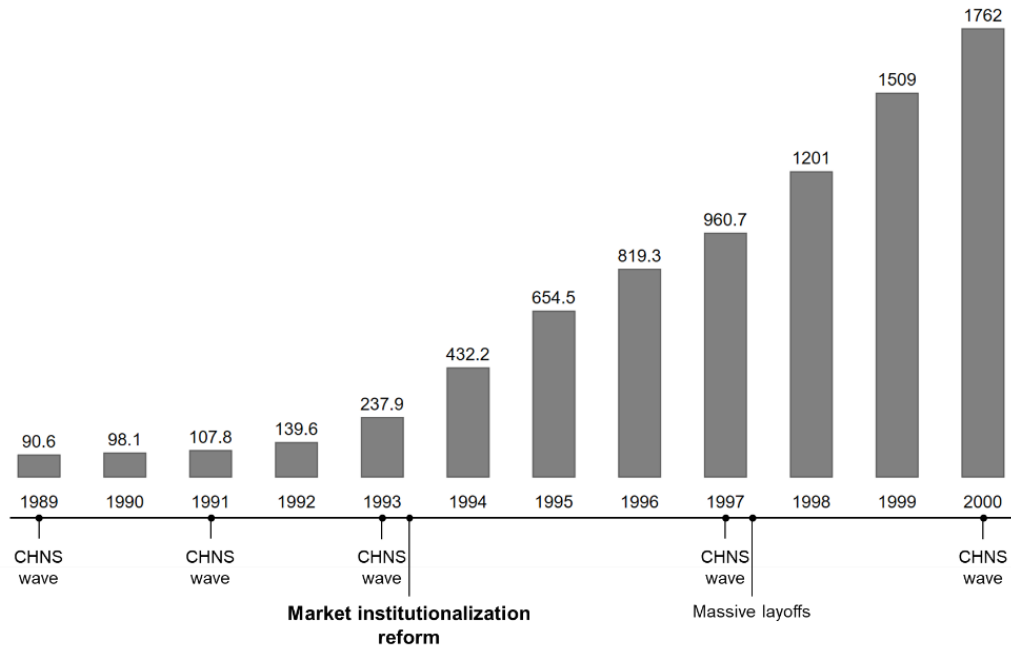
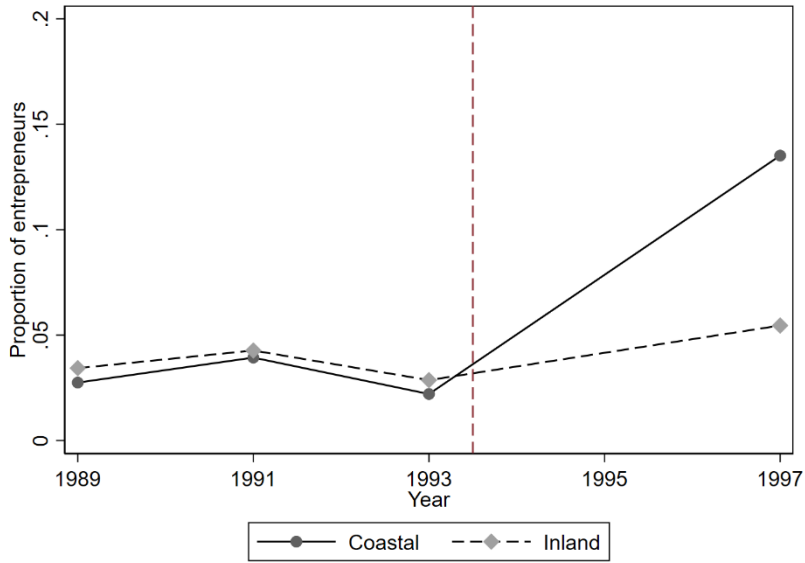


Figure 1 Timeline of data waves and events, with count of private enterprises by year

Notes: This figure illustrates the timing of the China Health and Nutrition Survey (CHNS), our primary data source. Note that the 1993 data collection took place in the middle of the year, while the market institutionalization reform began at the end of the year. Similarly, the 1997 data collection occurred in the middle of the year, while the massive layoffs started at the end of the year. The bar graph above shows the number of private enterprises registered each year, with exact counts (in thousands) provided.

Panel A. Spouses of state employees



Panel B. Other individuals

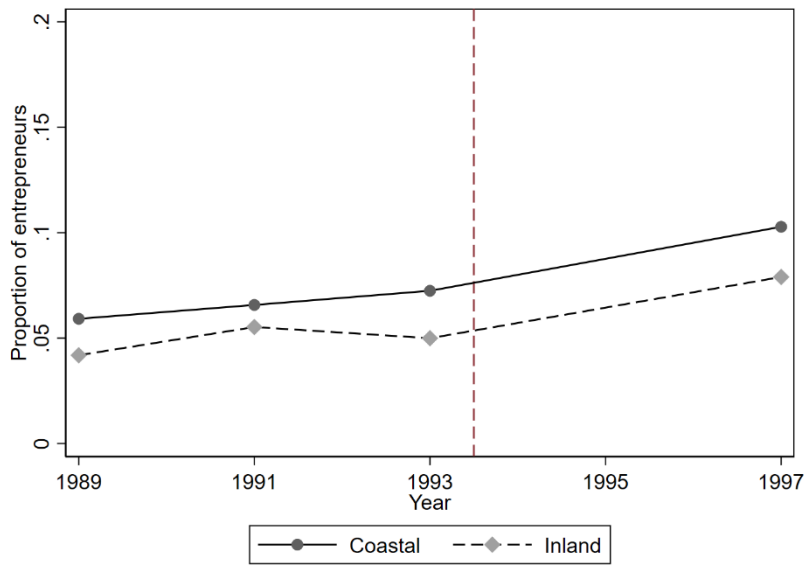
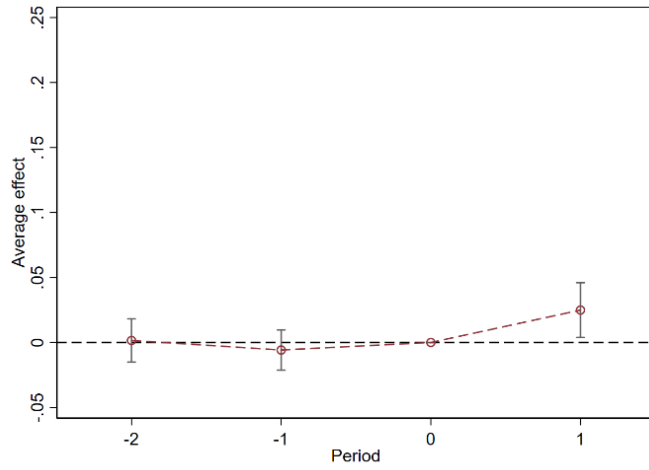


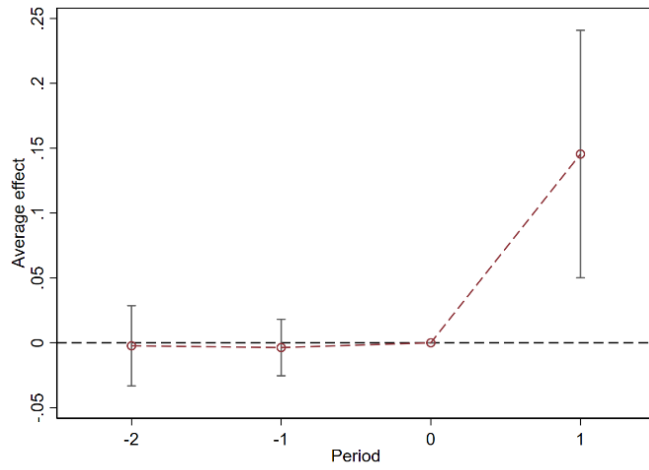
Figure 2 Trend in proportion of entrepreneurs by spouse's state employment

Notes: This figure illustrates the trend in the proportion of entrepreneurs by the spouse's working sector. Data are from the CHNS. For each survey wave, panel A (B) plots the proportion of entrepreneurs among individuals whose spouses were (not) employed in the state sector in 1989. The proportions are shown separately for employees in coastal provinces (solid line) and inland provinces (dashed line).

Panel A. All individuals



Panel B. Spouses of state employees



Panel C. Other individuals

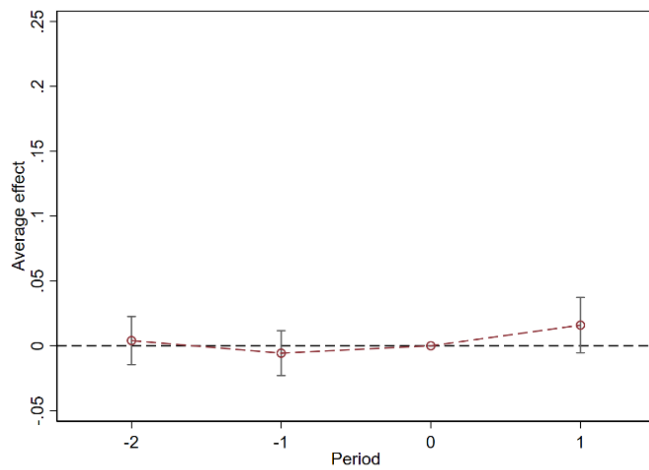


Figure 3 Event-study plots

Notes: This figure presents event-study plots for the entire sample in panel A, for the subsample of spouses of state employees in panel B, and the subsample of other individuals in panel C. The horizontal axis is the survey year with varying periods away from/to the reform. The bars denote 90 percent confidence intervals, with standard errors clustered at the household level.

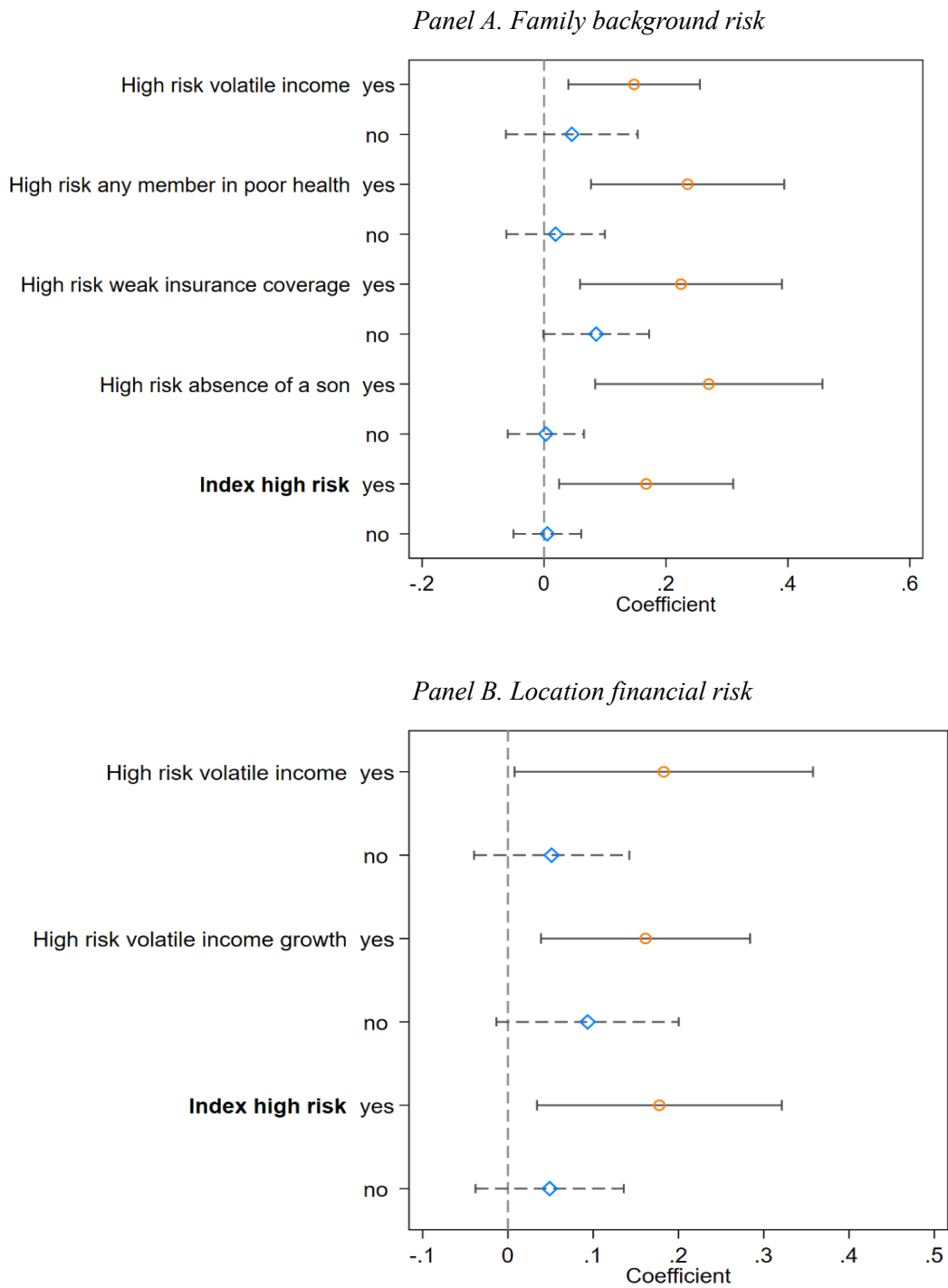


Figure 4 Heterogeneous effects by risk exposure as evidence of insurance channel

Notes: This figure plots estimates of the key coefficient (i.e. $Coastal \times Post \times SpouseState$) using equation 2 for subsamples. Panel A divides the sample using four proxies to indicate family background risk: volatile income (measured as income standard deviation above the community median), the presence of a family member in poor health, weak insurance coverage (indicated by the absence of health insurance for family members), and the absence of a son. Panel B divides the sample using pre-reform volatility measures at the county level for individual income and income growth. In both panels, we generate an aggregate index based on the group of proxies, with the index's median as the cutoff. The bars denote 90 percent confidence intervals, with standard errors clustered at the household level.

Table 1 Income, income volatility, welfare benefits, and job loss likelihood across sectors

	Wage employee				Entrepreneur
	State	Large coll.	Small coll.	Private	
	(1)	(2)	(3)	(4)	(5)
Mean income (thousand yuan)	4.550	4.810	5.951	7.962	9.038
Aggregate income volatility	0.556	0.702	0.721	0.778	0.936
Within-individual inc. volatility	0.397	0.468	0.489	0.505	0.661
Prop. w/ health insurance	0.856	0.751	0.499	0.253	0.073
Prop. w/ children in pub. childcare	0.380	0.333	0.258	0.142	0.200
Mean subsidies per month (yuan)	37.40	32.51	28.90	22.26	5.615
Prop. losing job	0.037	0.063	0.095	0.120	0.107
# Individuals	1,583	533	998	194	376

Notes: This table compares wage employees across different sectors—including the state sector, large collectives, small collectives, and private sector—and entrepreneurs in terms of income, income volatility, welfare benefits, and the likelihood of joblessness. Data are from the CHNS. Income is reported on an annual basis. Income volatility is calculated both at the sector level and within individuals (by first regressing log income on individual fixed effects within group and then calculating the standard deviation of the residualized income). Subsidies per month include meat/grocery, health, haircut, book and newspaper, and housing subsidies provided by the government.

Table 2 Impact of the reform on entrepreneurship, by spouse's state employment

Dependent variable	Entrepreneur=1				
	Subsample			(4)	(5)
	(1)	Spouse in state sec. (2)	Spouse not in state sec. (3)		
Coastal × Post	0.027** (0.012)	0.147** (0.057)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
Observations	14,864	2,140	12,724	14,864	14,864
R-squared	0.565	0.657	0.555	0.566	0.567
Dependent var. mean in base yr.	0.046	0.032	0.049	0.046	0.046
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: Data are from the CHNS. Columns 1–3 are estimated based on equation 1; column 4 is estimated based on a fully interacted version of equation 1; column 5 is estimated based on equation 2. Entrepreneur is an indicator for whether the individual's primary occupation is non-farming and self-employed. Coastal is an indicator for whether the province where the individual resides is coastal. Post is an indicator for the survey year being after the reform. SpouseState is an indicator for the spouse working in the state sector in the base year. Controls include age, gender, years of schooling, urban residence, ethnicity, having children, initial state employment, and spousal age, interacted with the Post indicator (all columns) and further with the Coastal indicator (column 5). Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 3 Accounting for layoff intensities

Dependent variable	Entrepreneur=1					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. 1993–97 Layoff intensities</i>						
Coastal × Post × SpouseState	0.096** (0.049)	0.098** (0.049)	0.095** (0.048)	0.097** (0.048)	0.113** (0.051)	0.110** (0.052)
LO × Post × Slf.State	0.659 (1.205)		0.728 (1.035)			
LO × Post × Sp.State		0.040 (1.219)	-0.204 (1.052)			
LO_Bartik × Post × Slf.State				3.214 (2.849)		1.074 (4.606)
LO_Bartik × Post × Sp.State					3.865 (3.524)	3.133 (5.410)
<i>Panel B. 1997–01 Layoff intensities</i>						
Coastal × Post × SpouseState	0.098** (0.048)	0.091* (0.051)	0.087* (0.048)	0.098** (0.049)	0.088* (0.048)	0.086* (0.048)
LO × Post × Slf.State	0.006 (0.383)		0.162 (0.372)			
LO × Post × Sp.State		-0.200 (0.409)	-0.287 (0.407)			
LO_Bartik × Post × Slf.State				0.118 (1.898)		-0.686 (1.884)
LO_Bartik × Post × Sp.State					1.546 (1.651)	1.844 (1.613)
Observations	14,864	14,864	14,864	14,864	14,864	14,864
R-squared	0.567	0.567	0.567	0.567	0.567	0.567
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-survey year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: See notes to Table 2 for data source, variable definitions, and additional controls. SelfState is an indicator for the individual working in the state sector in the base year. Panel A uses province-level layoff intensity measures for the period 1993–1997. Panel B uses intensity measures for the period 1997–2001. In columns 1–3, the measures are the percentage change in the state employment level; in columns 4–6, the measures are Bartik-style. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4 Impact by state-employed spouses' firm size and professional status

Dependent variable	Entrepreneur=1	
	(1)	(2)
Coastal × Post × SpouseState (Small size)	0.104* (0.061)	
Coastal × Post × SpouseState (Large size)	0.143* (0.083)	
Coastal × Post × SpouseState (Ordinary employee)		0.095* (0.053)
Coastal × Post × SpouseState (Professionals/officials)		0.138* (0.076)
Observations	14,788	14,864
R-squared	0.568	0.567
<i>p</i> -value for coefficient equality	0.698	0.585
Individual FE	Yes	Yes
Province-survey year FE	Yes	Yes
Controls	Yes	Yes

Notes: See notes to Table 2 for data source, variable definitions, and additional controls. Small and large state firms are divided based on a cutoff of 800 employees. Professionals/officials include senior professionals (technical workers such as doctors, professors, lawyers, architects, and engineers), junior professionals (technical workers such as midwives, nurses, teachers, editors, and photographers), and officials (administrators, executives, and managers, including working proprietors, government officials, section chiefs, department or bureau directors, administrative cadres, and village leaders). Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 5 Impact by spouse's employment in collective enterprises

Dependent variable	Entrepreneur=1		
	Subsample: spouse in coll. sec. (1)	(2)	(3)
<i>Panel A. Large collectives</i>			
Coastal × Post	0.113** (0.057)		
Coastal × Post × SpouseLargeColl.		0.104* (0.062)	0.099* (0.059)
Coastal × Post × SpouseState			0.118** (0.054)
Observations	711	12,724	14,864
R-squared	0.632	0.558	0.567
<i>Panel B. Small collectives</i>			
Coastal × Post	-0.015 (0.031)		
Coastal × Post × SpouseSmallColl.		-0.029 (0.035)	-0.032 (0.035)
Coastal × Post × SpouseState			0.094* (0.050)
Observations	2,050	12,724	14,864
R-squared	0.533	0.558	0.568
Individual FE	Yes	Yes	Yes
Survey year FE	Yes		
Controls	Yes	Yes	Yes
Province-survey year FE		Yes	Yes

Notes: See notes to Table 2 for data source, variable definitions, and additional controls. SpouseLargeColl. is an indicator for the spouse working in a large collective enterprise in the base year. SpouseSmallColl. is an indicator for the spouse working in a small collective enterprise. In column 2, the sample excludes spouses of state employees. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 6 Entrepreneurial industry risk profiles by spouse's state employment

Dependent variable	High revenue volatility (1)	High profit volatility (2)	High ROA volatility (3)	High ROE volatility	High revenue sensitivity (4)	High profit sensitivity (5)	High variance risk premium (6)	Industry risk index (7)
<i>Panel A. Baseline controls only</i>								
SpouseState	0.055*** (0.016)	0.044*** (0.015)	0.037** (0.015)	0.008 (0.012)	0.034** (0.014)	0.023* (0.014)	0.065*** (0.015)	0.097*** (0.029)
Observations	8,730	8,730	8,730	8,730	8,730	8,730	7,984	5,518
R-squared	0.226	0.210	0.224	0.113	0.229	0.226	0.261	0.267
Dependent variable mean	0.447	0.431	0.395	0.205	0.408	0.475	0.379	0.000
<i>Panel B. Conditioning on entrepreneur education and political connections</i>								
SpouseState	0.056*** (0.015)	0.047*** (0.016)	0.039*** (0.015)	0.007 (0.012)	0.036*** (0.014)	0.030** (0.014)	0.064*** (0.015)	0.103*** (0.029)
Has high school degree	-0.001 (0.015)	0.024* (0.014)	0.005 (0.014)	0.027*** (0.010)	0.006 (0.012)	0.003 (0.014)	0.029** (0.014)	0.019 (0.027)
Connections index	-0.014** (0.006)	-0.019*** (0.007)	-0.018*** (0.005)	-0.002 (0.006)	-0.022*** (0.006)	-0.024*** (0.006)	-0.019*** (0.006)	-0.043*** (0.013)
Observations	8,605	8,605	8,605	8,605	8,605	8,605	7,862	8,605
R-squared	0.226	0.212	0.225	0.115	0.231	0.227	0.264	0.257
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: See notes to Table 7 for data source, variable definitions, and additional controls. Standard errors given in parentheses are clustered at the county level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 7 R&D engagement by spouse's state employment

Dependent variable	Expenditure, log	Expenditure/ asset	Holds patent=1	# Patents, log	R&D index
	(1)	(2)	(3)	(4)	(5)
<i>Panel A. Baseline controls only</i>					
SpouseState	0.047*** (0.017)	0.013 (0.008)	0.033*** (0.012)	0.047* (0.024)	0.091** (0.035)
Observations	5,459	5,459	5,350	5,350	5,518
R-squared	0.309	0.195	0.217	0.226	0.267
Dependent variable mean	0.190	0.064	0.158	0.227	0.000
<i>Panel B. Conditioning on entrepreneur education</i>					
SpouseState	0.046*** (0.017)	0.012 (0.008)	0.030** (0.013)	0.044* (0.024)	0.083** (0.036)
Has high school degree	0.021 (0.015)	0.015** (0.007)	0.046*** (0.014)	0.053* (0.028)	0.115*** (0.034)
Observations	5,435	5,435	5,327	5,327	5,494
R-squared	0.307	0.195	0.220	0.227	0.268
<i>Panel C. Conditioning on political connections</i>					
SpouseState	0.047*** (0.017)	0.012 (0.008)	0.032*** (0.012)	0.051** (0.024)	0.089** (0.035)
Connections index	-0.001 (0.005)	0.002 (0.002)	0.004 (0.005)	-0.008 (0.009)	0.004 (0.013)
Observations	5,356	5,356	5,247	5,247	5,414
R-squared	0.308	0.194	0.214	0.222	0.265
<i>Panel D. Conditioning on firm performance</i>					
SpouseState	0.041** (0.018)	0.008 (0.008)	0.036*** (0.014)	0.048* (0.027)	0.082** (0.036)
Firm performance index	0.067*** (0.009)	0.029*** (0.005)	0.029*** (0.006)	0.048*** (0.010)	0.146*** (0.020)
Observations	4,891	4,891	4,795	4,795	4,936
R-squared	0.333	0.208	0.223	0.232	0.280
<i>Panel E. Conditioning on all factors above</i>					
SpouseState	0.043** (0.017)	0.007 (0.008)	0.032** (0.014)	0.049* (0.026)	0.078** (0.036)
Has high school degree	0.016 (0.016)	0.013* (0.008)	0.044*** (0.015)	0.055* (0.029)	0.107*** (0.035)
Connections index	-0.010* (0.006)	-0.002 (0.003)	-0.001 (0.006)	-0.016* (0.009)	-0.018 (0.013)

Continued on next page

Firm performance index	0.069*** (0.009)	0.029*** (0.005)	0.028*** (0.006)	0.049*** (0.010)	0.149*** (0.020)
Observations	4,783	4,783	4,688	4,688	4,827
R-squared	0.332	0.210	0.222	0.229	0.280
County FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: Data are from the National Survey of China's Private Enterprises. SpouseState is an indicator for the spouse working in the state sector during the survey year. The connections index is constructed based on entrepreneurs' managerial experience, former official positions, and party membership. Firm performance index is constructed based on value-added, productivity, revenue, profit, and tax payments. Controls include entrepreneur age, gender, whether the firm was registered after the reform, as well as (log) assets, equity, and employee numbers. Standard errors given in parentheses are clustered at the county level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 8 Households' post-reform entrepreneurial status

Dependent variable	Multinomial logit model	
	Only one entrepreneur post-reform (1)	Both entrepreneurs post-reform (2)
HasStateSpouse	0.379*** (0.143)	0.248 (0.216)
Coastal × HasStateSpouse	2.324** (1.000)	1.303 (1.568)
Observations		869
Pseudo R-squared		0.034
Log-Likelihood		-321.6
Community FE		Yes
Controls		Yes

Notes: See notes to Table 2 for data source and variable definitions. The sample includes all *households* in the post-reform wave, covering 81 communities. HasStateSpouse is an indicator for whether the household has a state-employed spouse before the reform. A multinomial logit model is employed, with the dependent variable having three categories: i) no spouse becomes an entrepreneur—the reference category; ii) only one spouse becomes an entrepreneur; and iii) both spouses become entrepreneurs. Controls include the education level of the household head and whether the household has children, interacted with the Coastal indicator. Standard errors given in parentheses are clustered at the province level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

ONLINE APPENDIX

I Institutional contexts

Below, we first describe the “iron rice bowl” system that characterizes China’s state sector. We then introduce the economic reforms that transitioned China from a planned to a market economy, with a special focus on the post-1993 market institutionalization reform. Next, we illustrate the high risks associated with entrepreneurship during this reform era, especially given the underdeveloped social safety net and insurance market. We also discuss how the marketization process impacted the public ownership sector.

I.1 The “iron rice bowl” system since China’s planned economy

Shortly after the founding of the People’s Republic of China, the Labor Insurance Law was promulgated in 1951, marking an unprecedented statutory commitment to social security benefits. From then onwards, China operated as a planned economy, with state-owned enterprises (SOEs) playing a dominant role. These SOEs provided job security, stable wages, and welfare benefits, popularly known as the “iron rice bowl.” This system was rooted in socialist ideology, serving as a national industrial manpower policy. It reflected the government’s intention to secure workers’ support for the communist regime and its nationalization program during a period of nation-building and economic recovery.

Specifically, the “iron rice bowl” had several fundamental features. First, state employees (those of SOEs, government agencies, and public institutions) enjoyed employment security. The state removed the power of dismissal from employers, considering them too focused on short-term profitability at the enterprise level rather than the entire society (Fung 2001). This protection shielded workers from dismissal and layoffs, making unemployment and labor mobility uncommon. It was legally and practically impossible for SOEs to fire workers, and resignations were almost unheard of.

Additionally, state employees often had access to comprehensive, non-contribution-based

benefits for themselves and their family members, particularly spouse and children. These benefits included social security programs, various allowances, and general welfare services. Social security encompassed benefits for sickness, maternity, work injury, old age (pensions), and invalidity and death. Allowances covered subsidies for housing, food, fuel, transportation, bathing and haircuts, and sanitation. General welfare services included healthcare centers, hospitals, kindergartens, primary and secondary schools, recreational clubhouses, libraries, cinemas, and canteens (Leung 1994).

The financing of the “iron rice bowl” system was neither based on individual contributions nor direct government taxation—it was indirectly financed by the state. Expenditures on labor hiring and welfare were included in the operational costs of each SOE, and enterprises were not held accountable for their profits or losses. The state controlled these enterprises through central planning and provided subsidies to cover any losses. During the planned economy period, these subsidies accounted for approximately 20 percent of state expenditure.* But note that while state employees had guaranteed lifetime tenure and extensive welfare, they were paid subsistence-level wages, often centrally determined.

In addition to SOEs, collective enterprises also represented a form of public ownership, aligning with socialist ideology and the political objective of maintaining social stability. While the state owned SOEs, collective enterprises were owned collectively by employees or local economic entities. SOEs dominated key industries such as energy, telecommunications, education, and transportation, whereas collective enterprises typically operated in smaller-scale sectors like manufacturing, wholesale, restaurants, construction, and financial services. Importantly, collective enterprises were subject to less state control and received less support, resulting in less generous welfare benefits for their workers. Although employees in collective enterprises had better job security and benefits than those in the private sector, they did not enjoy the “iron rice bowl” guaranteed to state employees.

* Data source: China Statistical Information and Consultancy Service Centre (1990).

The market-oriented reforms starting in the late 1970s and early 1980s, which we introduce in the next section, began to challenge the “iron rice bowl” system. However, it persisted despite many small SOEs in certain sectors being affected during the late 1990s.

I.2 From planned to market economy: The economic reforms

Since the late 1970s, the Chinese government has prioritized economic development over political mobilization and ideology, gradually transitioning from a planned economy to a market-oriented one. China has undergone a two-phase framework of economic reforms. As Brandt and Rawski (2008) observed, “economic transition maintained ... a consistent pattern through 1993, after which it changed abruptly.”

During the first phase, China adopted an incremental approach to implementing reform policies. The aim was to decentralize authority and resources from central planners to local actors while ensuring stability and safeguarding government interests. Policies were cautious and gradual, relying on consensual decision-making. This initial approach, following a pattern of “two steps forward, one step back” (Naughton 2007), achieved limited success.

By 1993, however, the expanding market had rendered the existing reform approach inadequate, necessitating a shift toward establishing robust market-supporting institutions for the burgeoning market economy. At the Third Plenum of the Fourteenth Party Congress in November 1993, the Chinese government announced the establishment of a (socialist) market economy system. This new system facilitated the simultaneous development of various economic sectors, including privately-owned enterprises, individual entrepreneurs, and joint ventures with foreign investments, in contrast to the previous dominance of SOEs and collective enterprises. This shift relaxed political constraints and marked a pivotal point in China’s transition to a market economy.

Following the Plenum and the subsequent change in central government leadership, policy measures were characterized by rapid, radical, and centralized decision-making, leading to significant institutional restructuring across key sectors. Three crucial measures—the new

Company Law, a new foreign trade system, and a new taxation framework—were introduced at the end of 1993 and formally implemented on January 1, 1994 (Naughton 2007).

Specifically, the Company Law clarified corporate governance, enhanced market transparency, reduced state dominance, and promoted fair competition, creating a uniform legal and regulatory framework that supported the growth of enterprises across all ownership types. The new foreign trade system unified the foreign exchange regime and established current-account convertibility (ultimately resulting in the World Trade Organization accession). It increased market openness, enabling foreign companies to compete and allowing domestic businesses to benefit from international trade standards. The new taxation framework, which included a uniform 17 percent value-added tax and other business taxes, stabilized central-local fiscal relations, providing a predictable and supportive taxation base for emerging businesses.

Together, these policy changes established a robust institutional framework that enhanced market efficiency and competition while further integrating China into the global economy. As a result, a more regulated and competitive market environment emerged, facilitating the entry and growth of new businesses.

Variation in exposure to post-1993 reform. Several factors made some regions—primarily coastal areas—more exposed to the post-1993 market institutionalization reform compared to the less developed inland regions.

First, coastal regions received greater government support and financial investment, positioning them as leaders in economic reform and development and serving as examples for the rest of the country (Raiser 1998). This support enabled these areas to more effectively capitalize on the regulatory changes and market opportunities introduced by the reform.

Second, coastal areas were more industrialized and had superior infrastructure, including ports, roads, and communication networks, which facilitated more efficient implementation of policy measures. With a stronger industrial and commercial base, these regions could better leverage policy changes in corporate governance and finance to improve operations, attract investment, and expand businesses. They also had a more skilled and educated workforce,

which was better equipped to adapt to new technologies and business practices introduced by the policy measures, enhancing productivity and innovation.

Third, coastal regions' proximity to international trade routes allowed them to benefit more from trade liberalization and integrate more rapidly into the global market. Their attractive locations also attracted more foreign investment, further supporting the implementation of policies related to market openings, corporate governance, and financial improvements.

I.3 Entry into entrepreneurship during China's reform era

In the early stages of economic reforms, the Chinese economy remained dominated by public ownership, primarily through SOEs and collective enterprises. Private enterprises were rare and restricted to hiring no more than eight employees. About a decade into the reforms, in 1988, the government granted legal status to private businesses. Throughout the 1990s, the expanding market sector created new opportunities, leading to a rise in entrepreneurship, which, however, appeared to be highly risky. During this period, starting a private business was often referred to as "jumping into the sea" (Wu and Xie 2003).

Entrepreneurs in the late 1980s and 1990s faced significant business risks, both general and specific to China's context. Ideologically, private ownership was still viewed as inferior, and biases against the private sector persisted. Private businesses often faced discrimination in business dealings, which increased their exposure to risks (e.g., the potential for severe property losses). Managing these risks was particularly challenging due to a lack of risk management mechanisms, limited alternatives (e.g., financial derivatives), along with an underdeveloped commercial insurance market (see the next section). Consequently, entrepreneurs experienced more volatile incomes.

Table 1 summarizes the mean individual incomes and income volatilities (measured by aggregate and within-individual standard deviations of log incomes) for entrepreneurs and wage employees across state, collective, and private enterprises during the period 1989–1997. The data reveal that while entrepreneurs earned the highest average incomes, they also faced

the greatest income fluctuations. In contrast, state employees enjoyed the most stable incomes.

Beyond business risks, starting and running a business often meant losing the benefits associated with previous positions, especially for those transitioning from government or SOE jobs, who forfeited the social security protections of the “iron rice bowl.” Compounding this challenge was the fact that the social safety net outside the state sector, including commercial insurance, was underdeveloped in China (see the next section). Table 1 further indicates that entrepreneurs had the lowest rates of health insurance coverage and access to public childcare services, as well as the smallest amount of government subsidies compared to all categories of wage employees. They also faced a higher likelihood of transitioning into joblessness.

In summary, entrepreneurs during this period bore not only the financial risks associated with income volatility but also a lack of welfare benefits such as health insurance and other critical social protections.

I.4 Chinese insurance system in the reform era

Employment-based social insurance. By the late 1990s, China lacked a comprehensive national insurance system. Instead, insurance coverage was primarily tied to employment, with the main forms being public and worker insurance programs. Public insurance was provided by the government to employees of state agencies, while worker insurance was available to permanent workers in SOEs and some collective enterprises. Dependent insurance was also available to the families of those covered by these programs, as suggested in Appendix Section I.1. Dependents of employees in state-run organizations could also access partial coverage through special programs managed by individual employers.

Notably, social insurance coverage was closely linked to employment in state or collective enterprises, leaving those outside these sectors largely uninsured. For example, 86.3 percent of workers in SOEs were insured, compared to 75.3 percent in large collectives and just 32.8 percent in small collectives. In contrast, insurance coverage in private businesses was significantly lower, ranging from only three to eight percent (Henderson et al. 1995).

Overall, employment-based social insurance, including dependent insurance for state employees, constituted the dominant form of coverage, accounting for over 80 percent of those insured. An additional ten percent of coverage was organized through rural collectives. Other types of insurance including commercial insurance, had a limited reach, covering less than ten percent of the insured population.

Commercial insurance. During this period, China's centralized economic system and state-dominated social insurance framework prevented commercial insurance from playing a significant role as it does in countries with more developed insurance markets. The 1990s saw China's insurance industry characterized by an underserved market, particularly in the life insurance sector, struggling to meet growing demand. Domestic insurers faced significant challenges, including inadequate actuarial services and a weak reinsurance infrastructure, resulting in a substantial gap between capacity and demand. Foreign insurers encountered additional regulatory barriers such as restrictions on the scope of their operations and geographic limitations (Shen 2000).[†]

In particular, amid the rise of the private sector during ongoing reforms, many private companies sought commercial risk management options, including property, liability, and credit insurance. By the late 1990s, 25 property insurance providers operated in China, including eight foreign insurers. Nonetheless, coverage for private companies remained limited, with significant unmet demand and inadequate insurance services.

It was not until the 2000s that commercial insurance began to expand, driven by the substantial growth of private businesses, the decline in state-sector benefits (as discussed below), and China's accession to the World Trade Organization.

I.5 Impact of market reforms on the “iron rice bowl” system

As market institutionalization reforms progressed, the rapid expansion of the private sector

[†] Between 1992 and 1999, only nine foreign companies were granted licenses, and their activities were confined to just two major cities. By the end of 2000, foreign insurers held a market share of only five percent.

intensified competition for SOEs, and the “iron rice bowl” began to be viewed as an impediment. Starting in the early 1990s, the system faced criticism for inefficiencies in resource allocation, overstaffing, and insufficient work incentives. Some changes were implemented, primarily managerial, to improve enterprise performance. However, the government struggled to balance reform efforts with the commitment to maintaining “iron rice bowl” benefits for state employees. Collective employees were particularly affected during these early changes (Henderson et al. 1995).

In 1998, substantial SOE downsizing and layoffs began (Fang et al. 2023). At that time, more than half of the SOEs, mostly small or medium-sized, reported losses. The 1997 Asian financial crisis exacerbated the situation, forcing the Chinese government to act to stem the losses. At the Fifteenth Party Congress in September 1997, initiatives were announced to “grasp the large and let go of the small” SOEs, with size determined by revenue and number of employees. Small and medium-sized SOEs were privatized or closed, leading to large-scale layoffs. Over a five-year period, more than 27 million SOE workers were laid off, representing about 27 percent of total state employment in 1997.[‡] These workers lost their secure lifetime employment and comprehensive welfare benefits, effectively losing their “iron rice bowls.”

Notably, the impact of layoffs varied significantly across industries. Manufacturing, mining, and sales and trade sectors were the most affected, with 62 percent of their employees laid off. In contrast, sectors such as education, entertainment, social organizations, and government agencies were largely unaffected, with employment numbers even seeing a slight increase.[§] Some large SOEs in strategic industries such as electricity, oil, raw materials, and telecommunications, were corporatized but remained under state control. Employees in these sectors continued to benefit from stable employment and welfare benefits, thus retaining their “iron rice bowls.”

[‡] Data source: The 2003 China Labor Statistical Yearbook.

[§] Data source: National Bureau of Statistics (1998, 2002).

II Additional figures and tables

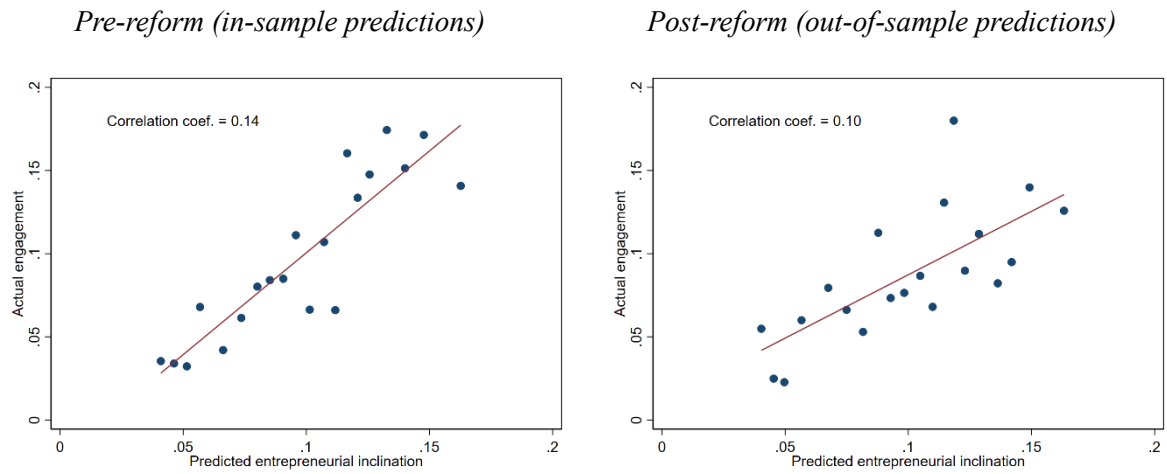
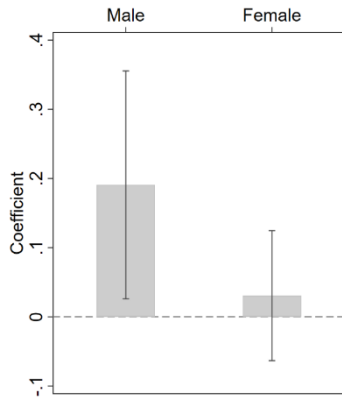


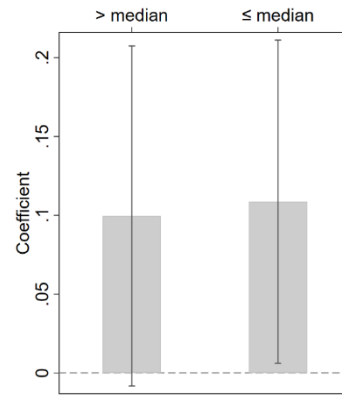
Figure A1 LASSO-predicted entrepreneurial inclination and actual engagement

Notes: This figure plots the mean of the actual entrepreneurial engagement indicator against the mean of our LASSO-predicted measure of entrepreneurial inclination, for each ventile of this measure. The left panel shows data from before the reform, representing in-sample predictions since the LASSO algorithm is trained on pre-reform data. The right panel displays data from after the reform, showing out-of-sample predictions. The figure also includes correlation coefficients of 0.14 pre-reform and 0.10 post-reform, both significant at the one percent level.

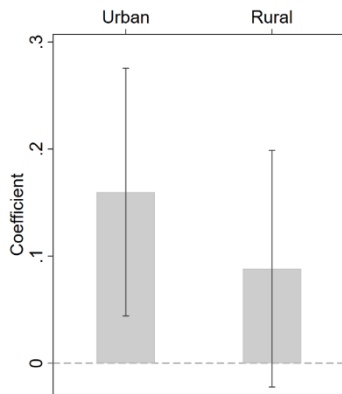
Panel A. Gender



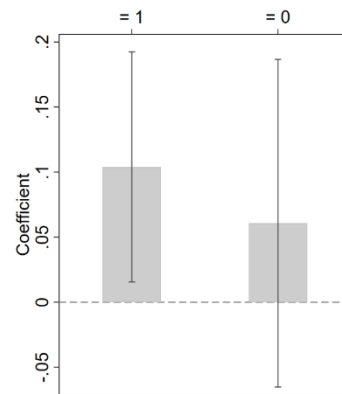
Panel B. Age



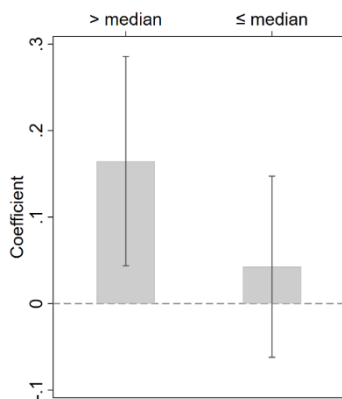
Panel C. Region of residence



Panel D. Has children



Panel E. Schooling years



Panel F. Initial state employment

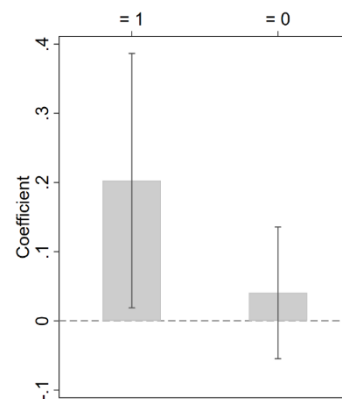


Figure A2 Heterogeneity by baseline individual characteristics

Notes: This figure plots estimates of the key coefficient (i.e. Coastal \times Post \times SpouseState) using equation 2, for subgroups divided by baseline individual characteristics. The bars denote 90 percent confidence intervals, with standard errors clustered at the household level.

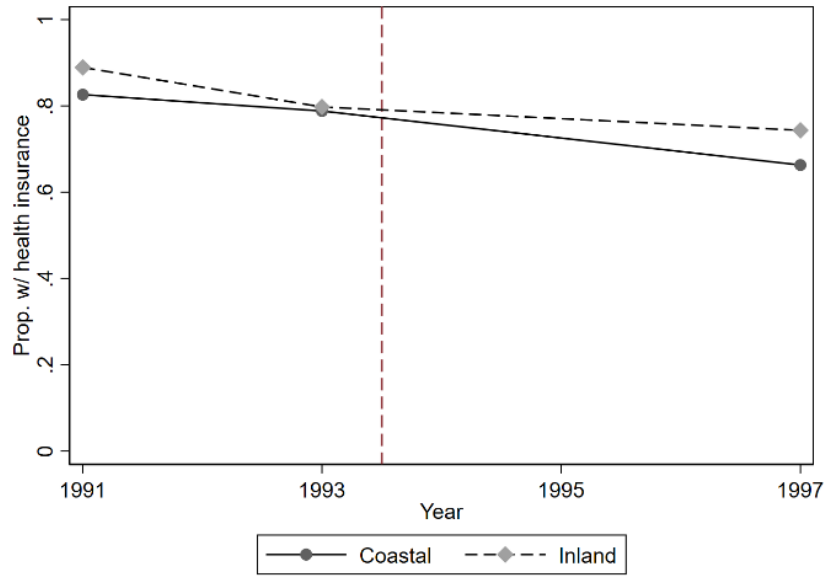


Figure A3 Trend in health insurance coverage among state sector employees

Notes: This figure illustrates the trend in the proportion of state sector employees covered by health insurance. Data are from the CHNS. The proportions are shown separately for employees in coastal provinces (solid line) and inland provinces (dashed line).

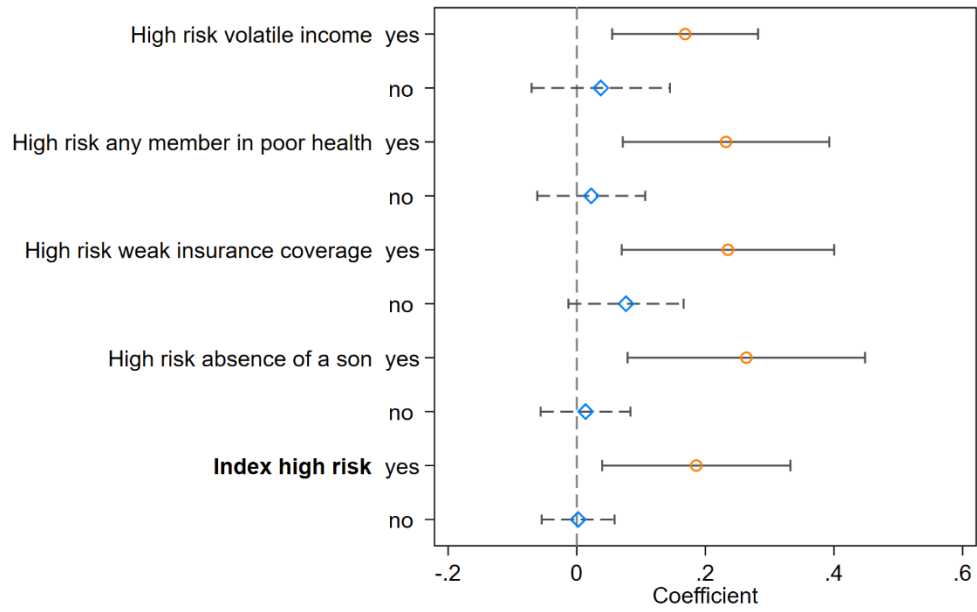


Figure A4 Heterogeneous effects by risk exposure as evidence of insurance channel, conditioning on entrepreneurial inclination

Notes: This figure shows a version of panel A of Figure 4 where the specification additionally controls for the individual-level LASSO-predicted measure of entrepreneurial inclination, interacted with *Post* and *Coastal*. The bars denote 90 percent confidence intervals, with standard errors clustered at the household level.

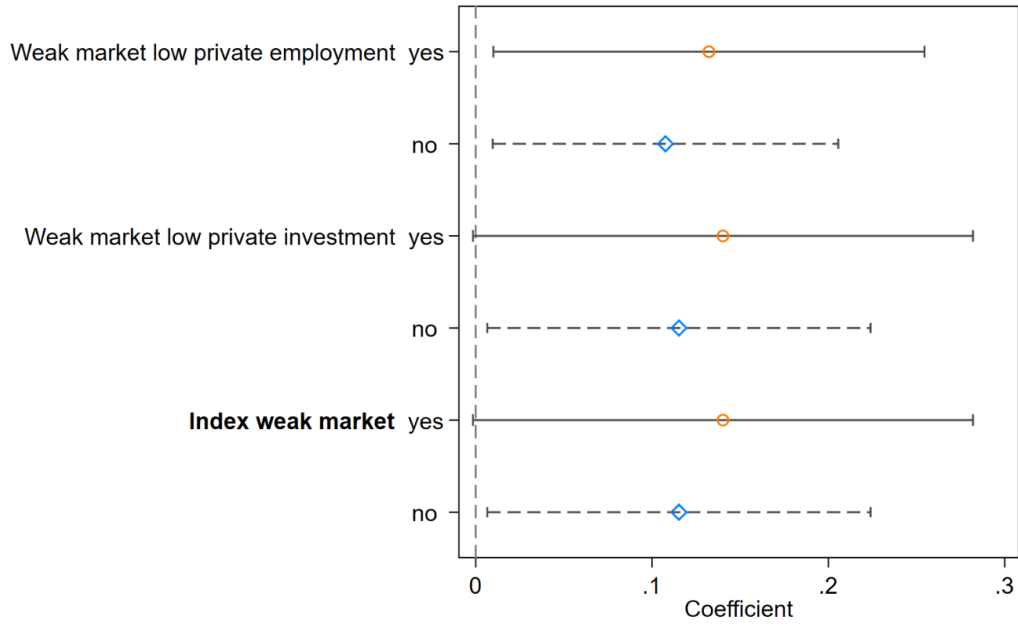


Figure A5 Heterogeneous effects by market liberalization

Notes: This figure plots estimates of the key coefficient (i.e. $Coastal \times Post \times SpouseState$) using equation 2 for subsamples. The analysis divides the sample based on the province-level employment in the private sector and total fixed investment from private enterprises, with the respective median values among coastal and inland provinces as the cutoff. We generate an aggregate index based on the group of proxies, with the index's median as the cutoff. The bars denote 90 percent confidence intervals, with standard errors clustered at the household level.

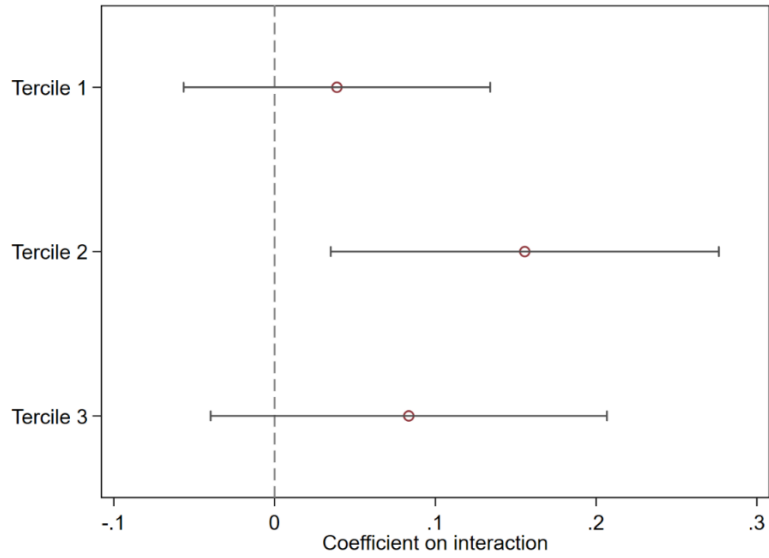


Figure A6 Heterogeneous effects by entrepreneurial inclination

Notes: This figure presents estimated coefficients for the interactions between the key coefficient (i.e. Coastal \times Post \times SpouseState) and the terciles of the individual-level LASSO-predicted measure of entrepreneurial inclination. All lower-order terms are controlled for. The bars denote 90 percent confidence intervals, with standard errors clustered at the household level.

Table A1 Summary statistics of base-year individual characteristics

	All		Coastal		Inland	
	Mean (1)	Std. dev. (2)	Mean (3)	Std. dev. (4)	Mean (5)	Std. dev. (6)
Age	37.49	(8.788)	37.82	(8.523)	37.29	(8.945)
Male=1	0.500	(0.500)	0.500	(0.500)	0.500	(0.500)
Schooling years	5.598	(4.022)	5.559	(3.770)	5.623	(4.172)
Urban region of res.=1	0.285	(0.452)	0.223	(0.417)	0.324	(0.468)
Ethnic minority=1	0.145	(0.352)	0.062	(0.241)	0.197	(0.398)
Has children=1	0.879	(0.327)	0.852	(0.355)	0.895	(0.306)
Lives in a coastal prov.=1	0.384	(0.486)	1	(0)	0	(0)
Works in state sector=1	0.159	(0.365)	0.116	(0.320)	0.185	(0.388)
Entrepreneur=1	0.046	(0.210)	0.056	(0.229)	0.041	(0.197)
Entrepreneurial inclination	0.097	(0.034)	0.101	(0.035)	0.096	(0.034)
# Individuals	4,088		1,568		2,520	

Notes: This table presents summary statistics of individual characteristics in the base year. Data are from the CHNS (the 1989 wave). Columns 1 and 2 report means and standard deviations for the entire sample, columns 3 and 4 for those in coastal provinces, and columns 5 and 6 for those in inland provinces.

Table A2 Comparing state sector employees or their spouses with others

	(1)	(2)	(3)	(4)	(5)	(6)
	State employees		Other individuals			
	Mean	Std. dev.	Mean	Std. dev.	Diff.	<i>p</i> -value
Age	38.14	(8.360)	37.37	(8.863)	0.769	0.265
Male=1	0.654	(0.476)	0.471	(0.499)	0.183	<0.001
Schooling years	8.889	(3.742)	4.978	(3.764)	3.911	<0.001
Urban region of res.=1	0.653	(0.476)	0.216	(0.412)	0.437	<0.001
Ethnic minority=1	0.148	(0.356)	0.144	(0.352)	0.004	0.912
Has children=1	0.866	(0.341)	0.881	(0.324)	-0.015	0.435
Lives in a coastal prov.=1	0.281	(0.450)	0.403	(0.491)	-0.122	0.085
Entrepreneur=1	0	(0)	0.055	(0.228)		
Entrepreneurial inclination	0.101	(0.031)	0.097	(0.035)	0.005	0.147
# Individuals	648		3,440			
	Spouses of state empl.		Other individuals			
	Mean	Std. dev.	Mean	Std. dev.	Diff.	<i>p</i> -value
Age	37.24	(7.814)	37.54	(8.960)	-0.298	0.644
Male=1	0.346	(0.476)	0.529	(0.499)	-0.183	<0.001
Schooling years	8.270	(4.160)	5.095	(3.791)	3.175	<0.001
Urban region of res.=1	0.653	(0.476)	0.216	(0.412)	0.437	<0.001
Ethnic minority=1	0.150	(0.357)	0.144	(0.351)	0.006	0.873
Has children=1	0.866	(0.341)	0.881	(0.324)	-0.015	0.435
Lives in a coastal prov.=1	0.281	(0.450)	0.403	(0.491)	-0.122	0.085
Works in state sector=1	0.605	(0.489)	0.074	(0.262)	0.531	<0.001
Entrepreneur=1	0.032	(0.177)	0.049	(0.216)	-0.016	0.061
Entrepreneurial inclination	0.092	(0.029)	0.099	(0.035)	-0.007	0.009
# Individuals	648		3,440			

Notes: The upper panel of this table presents summary statistics for state sector employees versus other individuals. The lower panel presents statistics for spouses of state employees versus spouses of non-state employees. Columns 1–4 show the unconditional means and standard deviations for the two groups. Column 5 compares the mean difference between columns 1 and 3, with the *p*-value clustered at the county level shown in column 6.

Table A3 Robustness checks: Specification

Dependent variable	Entrepreneur=1			
	(1)	(2)	(3)	(4)
Coastal × Post × SpouseState	0.098** (0.049)	0.114** (0.053)	0.113** (0.053)	0.113** (0.053)
Observations	14,864	14,864	14,864	14,864
R-squared	0.567	0.568	0.568	0.568
Individual FE	Yes	Yes	Yes	Yes
Province-survey year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Own char. × Post × SpouseState		Yes	Yes	Yes
Spl. char. × Post × SpouseState			Yes	Yes
Survey year FE × SpouseState				Yes

Notes: See notes to Table 2 for data source, variable definitions, and additional controls. Column 1 replicates the baseline estimation (the last column of Table 2); column 2 additionally controls for own characteristics (age, gender, years of schooling, urban residence, ethnicity, having children, and initial state employment) interacted with the Post and SpouseState indicator; column 3 additionally controls for spousal characteristics (age and years of schooling) interacted with the Post and SpouseState indicator; column 4 additionally controls for year FEs interacted with the SpouseState indicator. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A4 Robustness checks: Variables measuring state-employed spouses

Dependent variable	Entrepreneur=1				
	Subsample			(4)	(5)
	(1)	Spouse in state sec. (2)	Spouse not in state sec. (3)		
<i>Baseline</i>					
Coastal × Post	0.027** (0.012)	0.147** (0.057)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
<i>Panel A. SpouseState=1 if in state sector in both 1989 and 1991</i>					
Coastal × Post	0.027** (0.012)	0.163** (0.070)	0.019 (0.012)	0.019 (0.012)	
Coastal × Post × SpouseState				0.144** (0.071)	0.110* (0.061)
<i>Panel B. SpouseState=1 if in state sector in all pre-reform waves</i>					
Coastal × Post	0.027** (0.012)	0.185** (0.075)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.168** (0.075)	0.149** (0.063)
Observations	14,864	2,140	12,724	14,864	14,864
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: See notes to Table 2 for data source, specifications, and additional controls. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A5 Robustness checks: Variables measuring entrepreneurship

Dependent variable	Entrepreneur=1				
	Subsample			(4)	(5)
	(1)	Spouse in state sec.	Spouse not in state sec.		
<i>Baseline</i>					
Coastal × Post	0.027** (0.012)	0.147** (0.057)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
<i>Panel A. Entrepreneur = 1 considering both primary and secondary job</i>					
Coastal × Post	0.012 (0.015)	0.139** (0.059)	0.001 (0.015)	0.001 (0.015)	
Coastal × Post × SpouseState				0.138** (0.060)	0.099* (0.053)
Observations	14,864	2,140	12,724	14,864	14,864
Dependent var. mean in base yr.	0.083	0.045	0.090	0.083	0.083
<i>Panel B. Entrepreneur = 1 if household owns a business</i>					
Coastal × Post	0.009 (0.024)	0.119** (0.056)	-0.002 (0.025)	-0.002 (0.025)	
Coastal × Post × SpouseState				0.121** (0.060)	0.125*** (0.048)
Observations	14,864	2,140	12,724	14,864	14,864
Dependent var. mean in base yr.	0.180	0.062	0.202	0.180	0.180
<i>Panel C. Entrepreneur = 1 if household owns a business & has positive business income</i>					
Coastal × Post	0.011 (0.023)	0.104* (0.056)	0.003 (0.025)	0.003 (0.025)	
Coastal × Post × SpouseState				0.101* (0.059)	0.106** (0.048)
Observations	14,796	2,135	12,661	14,796	14,796
Dependent var. mean in base yr.	0.176	0.054	0.198	0.176	0.176
<i>Panel D. Entrepreneur = 1 if household owns a business & has above-median business income</i>					
Coastal × Post	0.006 (0.018)	0.096* (0.054)	-0.001 (0.019)	-0.001 (0.019)	
Coastal × Post × SpouseState				0.097* (0.056)	0.090** (0.042)
Observations	14,796	2,135	12,661	14,796	14,796
Dependent var. mean in base yr.	0.081	0.017	0.093	0.081	0.081
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	

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Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: See notes to Table 2 for data source, specifications, and additional controls. In panels C and D, observations are slightly fewer due to missing information on business operating income. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A6 Robustness checks: Standard errors

Dependent variable	Entrepreneur=1				
	Subsample			(4)	(5)
	(1)	Spouse in state sec. (2)	Spouse not in state sec. (3)		
<i>Baseline (clustered at household level)</i>					
Coastal × Post	0.027** (0.012)	0.147** (0.057)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
<i>Panel A. Clustered at household-survey year level</i>					
Coastal × Post	0.027** (0.012)	0.147*** (0.053)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.053)	0.098** (0.045)
<i>Panel B. Clustered at province-survey year level</i>					
Coastal × Post	0.027* (0.016)	0.147*** (0.031)	0.017 (0.017)	0.017 (0.017)	
Coastal × Post × SpouseState				0.131*** (0.040)	0.098** (0.038)
<i>Panel C. Heteroskedasticity robust</i>					
Coastal × Post	0.027*** (0.010)	0.147*** (0.044)	0.017 (0.010)	0.017 (0.010)	
Coastal × Post × SpouseState				0.131*** (0.045)	0.098** (0.043)
<i>Panel D. Two-way clustered at household and province-survey year level</i>					
Coastal × Post	0.027* (0.015)	0.147*** (0.045)	0.017 (0.016)	0.017 (0.016)	
Coastal × Post × SpouseState				0.131** (0.050)	0.098** (0.045)
Observations	14,864	2,140	12,724	14,864	14,864
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: See notes to Table 2 for data source, specifications, variable definitions, and additional controls.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A7 Robustness checks: Alternative samples

Dependent variable	Entrepreneur=1				
	Subsample			(4)	(5)
	(1)	Spouse in state sec. (2)	Spouse not in state sec. (3)		
<i>Baseline</i>					
Coastal × Post	0.027** (0.012)	0.147** (0.057)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
Observations	14,864	2,140	12,724	14,864	14,864
<i>Panel A. Spouse not switching between state and non-state in pre-periods</i>					
Coastal × Post	0.029** (0.013)	0.185** (0.075)	0.019 (0.013)	0.019 (0.013)	
Coastal × Post × SpouseState				0.166** (0.075)	0.151** (0.065)
Observations	13,871	1,731	12,140	13,871	13,871
<i>Panel B. At least one spouse works in all survey years</i>					
Coastal × Post	0.028** (0.012)	0.149*** (0.057)	0.018 (0.012)	0.018 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
Observations	14,772	2,134	12,638	14,772	14,772
<i>Panel C. Both spouses work in all survey years</i>					
Coastal × Post	0.025* (0.013)	0.138** (0.064)	0.015 (0.013)	0.015 (0.013)	
Coastal × Post × SpouseState				0.123* (0.064)	0.098* (0.053)
Observations	14,032	2,001	12,031	14,032	14,032
<i>Panel D. Urban sample</i>					
Coastal × Post	0.039 (0.030)	0.142** (0.072)	0.011 (0.034)	0.011 (0.034)	
Coastal × Post × SpouseState				0.131* (0.078)	0.160** (0.070)
Observations	3,968	1,385	2,583	3,968	3,968
<i>Panel E. Exclude youngest and oldest 5%</i>					
Coastal × Post	0.019 (0.013)	0.137** (0.060)	0.009 (0.013)	0.009 (0.013)	
Coastal × Post × SpouseState				0.128** (0.060)	0.105** (0.051)

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Observations	12,824	1,932	10,892	12,824	12,824
<i>Panel F. Add 2000 wave</i>					
Coastal × Post	0.016 (0.011)	0.113** (0.049)	0.008 (0.011)	0.008 (0.011)	
Coastal × Post × SpouseState				0.105** (0.049)	0.090** (0.041)
Observations	17,130	2,361	14,769	17,130	17,130
<i>Panel G. Add 2000 and 2004 waves</i>					
Coastal × Post	0.011 (0.010)	0.117*** (0.044)	0.003 (0.010)	0.003 (0.010)	
Coastal × Post × SpouseState				0.115** (0.045)	0.105*** (0.039)
Observations	18,910	2,501	16,409	18,910	18,910
<i>Panel H. Matched sample</i>					
Coastal × Post	0.083** (0.033)	0.147** (0.057)	0.019 (0.031)	0.019 (0.031)	
Coastal × Post × SpouseState				0.128** (0.063)	0.122** (0.059)
Observations	3,261	2,140	1,121	3,261	3,261
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: See notes to Table 2 for data source, specifications, variable definitions, and additional controls. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A8 Robustness checks: Sample attrition

<i>Panel A. Sample in each wave</i>		1989	1991	1993	1997
All		4,088	4,086	3,666	3,024
Spouses of state employees		648	623	520	349
Other individuals		3,440	3,463	3,146	2,675

Dependent variable	Entrepreneur=1				
	(1)	Subsample		(4)	(5)
		Spouse in state sec.	Spouse not in state sec.		
<i>Panel B. Exclude those attrite in post period</i>					
Coastal × Post	0.027** (0.012)	0.147** (0.057)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.131** (0.058)	0.098** (0.049)
Observations	11,640	1,348	10,292	11,640	11,640
<i>Panel C. Inverse probability weighting</i>					
Coastal × Post	0.031** (0.013)	0.154*** (0.058)	0.017 (0.012)	0.017 (0.012)	
Coastal × Post × SpouseState				0.137** (0.059)	0.099** (0.050)
Observations	14,864	2,140	12,724	14,864	14,864
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: Panel A of this table reports attrition across the CHNS survey waves. In panels B and C, see notes to Table 2 for data source, specifications, variable definitions, and additional controls. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A9 Impact of the reform on unemployment, by spouse's state employment

Dependent variable	Unemployed=1				
	Subsample			(4)	(5)
	(1)	Spouse in state sec. (2)	Spouse not in state sec. (3)		
Coastal × Post	-0.003* (0.002)	-0.013 (0.010)	-0.002 (0.002)	-0.002 (0.002)	
Coastal × Post × SpouseState				-0.010 (0.010)	-0.009 (0.010)
Observations	14,864	2,140	12,724	14,864	14,864
R-squared	0.270	0.278	0.269	0.271	0.272
Individual FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes
Province-survey year FE					Yes

Notes: See notes to Table 2 for data source, specifications, variable definitions, and additional controls. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A10 Summary statistics of layoff intensity measures

	All		Coastal		Inland		Diff. (3)–(5) (7)
	Mean (1)	Std. dev. (2)	Mean (3)	Std. dev. (4)	Mean (5)	Std. dev. (6)	
LO 93–97	0.026	(0.024)	0.030	(0.039)	0.023	(0.009)	0.007
LO 97–01	0.435	(0.055)	0.419	(0.071)	0.446	(0.048)	-0.027
LO_Bartik 93–97	0.062	(0.004)	0.059	(0.003)	0.063	(0.005)	-0.003
LO_Bartik 97–01	0.462	(0.013)	0.462	(0.020)	0.462	(0.008)	0.000

Notes: This table presents the summary statistics of province-level layoff intensity measures, focusing on two time intervals: 1993 to 1997 and 1997 to 2001. Columns 1 and 2 report means and standard deviations for the entire sample, columns 3 and 4 for coastal provinces, and columns 5 and 6 for inland provinces. Column 7 compares the mean difference between columns 3 and 5.

Table A11 Accounting for privatization of state employer-provided housing

Dependent variable	Entrepreneur=1		
	(1)	(2)	(3)
Coastal × Post × SpouseState	0.100** (0.049)	0.108** (0.051)	
EmployerHome × Post	-0.012 (0.021)	-0.002 (0.025)	
EmployerHome × Post × Coastal		-0.036 (0.045)	
Coastal × Post × SpouseState (In er.-prov. home)			0.076 (0.079)
Coastal × Post × SpouseState (Not in er.-prov. home)			0.109* (0.064)
Observations	14,840	14,840	14,840
R-squared	0.568	0.568	0.568
<i>p</i> -value for coefficient equality			0.754
Individual FE	Yes	Yes	Yes
Province-survey year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: See notes to Table 2 for data source, variable definitions, and additional controls. EmployerHome is an indicator for households living in state employer-provided homes in the base year (i.e., those likely to benefit from privatization). SpouseState (In er.-prov. home) is an indicator for having a state-employed spouse and living in employer-provided housing. SpouseState (Not in er.-prov. home) is an indicator for having a state-employed spouse but not living in such housing. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A12 Summary statistics for administrative firm data

	Mean	Std. dev.	Min.	Max.	Obs.
	(1)	(2)	(3)	(4)	(5)
<i>Panel A. Firm activities and attributes</i>					
R&D expenditure (million yuan)	0.457	1.691	0.000	12.97	5,459
R&D expenditure/asset	0.065	0.202	0.000	1.453	5,459
Holds patent=1	0.159	0.366	0	1	5,350
# Patents	0.761	2.813	0	20	5,350
R&D index	0	1	-0.529	7.751	5,518
Registered after reform=1	0.544	0.498	0	1	9,290
Assets (million yuan)	11.86	28.57	0.030	198.0	6,077
Equity (million yuan)	8.005	20.13	0.030	139.2	6,327
Employees	128.9	276.5	2	2,000	9,290
Value added (million yuan)	5.144	15.06	0.001	115.0	6,060
Value added per worker (million yuan)	0.048	0.116	0.000	0.836	6,055
Revenue (million yuan)	25.04	68.9	0.010	507.8	7,120
Profit (million yuan)	1.011	3.218	-0.900	24.00	7,549
ROA	0.155	0.319	-0.300	2.065	5,204
ROE	0.266	0.532	-0.333	3.600	5,549
Tax (million yuan)	0.924	2.635	0.000	18.92	7,784
Performance index	0	1	-5.710	5.869	8,315
<i>Panel B. Entrepreneur characteristics</i>					
Age	43.16	8.321	17	80	9,290
Male=1	0.884	0.320	0	1	9,290
Spouse in state sector=1	0.163	0.370	0	1	9,290
Schooling years	12.67	3.116	0	18	9,253
Former SOE manager=1	0.361	0.480	0	1	7,910
Former official=1	0.229	0.420	0	1	6,407
Party member=1	0.303	0.460	0	1	8,782
Connections index	0	1	-1.009	2.374	9,177

Notes: Panel A of this table presents summary statistics for firms' R&D activities, attributes, and operations. Firm performance index is constructed based on value added, productivity, revenue, profit, and tax payments. Panel B presents statistics for firm owner (entrepreneur) characteristics. Connections index is constructed based on entrepreneurs' managerial experience, former official positions, and party membership. Data are from the National Survey of China's Private Enterprises. The pooled cross-sectional sample includes firm data from the 1995, 1997, 2004, and 2006 waves, with information on R&D available only in the latter two waves.

Table A13 Industries in administrative firm data and correspondence with S&P 500 sectors

Industry	S&P 500
1 Agriculture, forestry, animal husbandry, and fishery	Consumer staples
2 Mining	Materials
3 Manufacturing	Industrials
4 Production and supply of electricity, gas, and water	Utilities
5 Construction	Industrials
6 Geological exploration and water conservancy management	Energy
7 Transportation, storage, and postal communication	Industrials
8 Retail and catering	Consumer discretionary
9 Financial and insurance services	Financials
10 Real estate	Real estate
11 Social services	Consumer discretionary
12 Healthcare, sports, and social security	Health care
13 Education, culture, arts, and broadcasting, film, and television	
14 Scientific research and comprehensive technical services	Technology
15 Other	

Notes: This table outlines the industries covered in the National Survey of China's Private Enterprises, categorized according to China's Industrial Classification (CSIC Rev. 1994), and their correspondence with the nine sectors of the S&P 500 index that are analyzed by Zhu et al. (2023).

Table A14 Considering spouse's state employment in same year as entrepreneurial decision

Dependent variable	IV regression	First stage
	Entrepreneur=1	SpouseStateCurrent
	(1)	(2)
SpouseStateCurrent	0.024 (0.282)	
Post × SpouseStateCurrent	-0.037 (0.094)	
Coastal × Post × SpouseStateCurrent	0.155** (0.079)	
Post × SpouseState		-0.238* (0.140)
Coastal × Post × SpouseState		-0.040 (0.069)
Coastal × Post × SpouseAge		0.001 (0.004)
Coastal × Post × Minority		0.101* (0.057)
Observations	14,864	14,864
R-squared	0.013	0.857
First-stage F-statistic		13.52
Individual FE	Yes	Yes
Province-survey year FE	Yes	Yes
Controls	Yes	Yes

Notes: See notes to Table 2 for data source, variable definitions, and additional controls. SpouseStateCurrent is an indicator for the spouse working in the state sector in the same year as the entrepreneurial decision. Column 1 reports instrumental variable (IV) results where SpouseStateCurrent is instrumented by the spouse's base-year status, SpouseState. Column 2 reports first-stage results where the dependent variable is SpouseStateCurrent, and the excluded instruments are Post × SpouseState, Coastal × Post × SpouseState, Coastal × Post × SpouseAge, and Coastal × Post × Minority. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A15 Comparisons by spouse's state employment using household survey data

Dependent variable	Schooling years	Has high school degree	Log individual income	Hiring employees
	(1)	(2)	(3)	(4)
<i>Panel A. Pre-reform</i>				
SpouseState	0.251 (0.679)	-0.001 (0.037)	0.244 (0.156)	-0.001 (0.065)
Observations	621	621	585	621
R-squared	0.197	0.258	0.258	0.148
Dependent variable mean	6.762	0.047	8.660	0.156
<i>Panel B. Post-reform</i>				
SpouseState	1.485* (0.866)	0.151** (0.074)	0.037 (0.190)	0.090 (0.088)
Observations	260	260	241	260
R-squared	0.294	0.199	0.394	0.271
Dependent variable mean	6.863	0.061	8.945	0.221
County FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Notes: See notes to Table 2 for data source and variable definitions. The sample includes entrepreneurs, with panel A focusing on those engaged in entrepreneurial activities in the pre-reform period and panel B on those in the post-reform period. All regressions control for age and gender. The last two columns additionally control for education, ethnicity, having children, initial state employment, and spousal age. Standard errors given in parentheses are clustered at the household level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A16 Comparisons by spouse's state employment using administrative firm data

<i>Entrepreneur characteristics</i>					
Dependent variable	Schooling years (1)	Former SOE manager=1 (2)	Former official=1 (3)	Party member=1 (4)	Connections index (5)
SpouseState	1.267*** (0.099)	0.065*** (0.015)	0.116*** (0.016)	0.087*** (0.016)	0.394*** (0.030)
Observations	9,253	7,910	6,407	8,782	9,177
R-squared	0.349	0.156	0.436	0.198	0.229
Dependent variable mean	12.67	0.361	0.226	0.304	0
County FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
<i>Firm attributes</i>					
	Registered aft. reform=1 (6)	Asset, log (7)	Equity, log (8)	Employees, log (9)	
SpouseState	0.026*** (0.007)	0.165*** (0.063)	0.197*** (0.062)	0.050 (0.044)	
Observations	9,290	6,077	6,327	9,290	
R-squared	0.741	0.377	0.371	0.324	
Dependent variable mean	0.544	0.833	0.472	3.750	
County FE	Yes	Yes	Yes	Yes	
Industry FE	Yes	Yes	Yes	Yes	
Survey year FE	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	

Notes: See notes to Table 7 for data source and variable definitions. Controls include entrepreneur age and gender. Standard errors given in parentheses are clustered at the county level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A17 Firm performance by spouse's state employment using administrative firm data

Dependent variable	Value added, log (1)	Value added per worker, log (2)	Revenue, Log (3)	Profit (4)	ROA (5)	ROE (6)	Tax, log (7)	Performance index (8)
<i>Panel A. Baseline controls only</i>								
SpouseState	0.129*** (0.037)	0.131*** (0.036)	0.201*** (0.048)	0.209** (0.097)	0.019 (0.013)	0.024 (0.020)	0.130*** (0.038)	0.105*** (0.027)
Observations	6,060	6,055	7,120	7,549	5,204	5,549	7,784	8,315
R-squared	0.742	0.414	0.660	0.292	0.250	0.265	0.698	0.349
Dependent variable mean	-0.133	-3.972	1.202	1.012	0.155	0.267	-2.041	0
<i>Panel B. Conditioning on entrepreneur education and connections</i>								
SpouseState	0.111*** (0.037)	0.114*** (0.036)	0.156*** (0.048)	0.203** (0.098)	0.017 (0.013)	0.021 (0.020)	0.101*** (0.038)	0.087*** (0.027)
Has high school degree	0.060* (0.033)	0.054 (0.033)	0.141*** (0.045)	0.029 (0.064)	0.018* (0.010)	0.025 (0.015)	0.106*** (0.036)	0.049** (0.024)
Connections index	0.058*** (0.017)	0.058*** (0.016)	0.110*** (0.017)	0.028 (0.044)	0.005 (0.005)	0.011 (0.009)	0.087*** (0.015)	0.054*** (0.012)
Observations	5,967	5,962	7,002	7,430	5,136	5,472	7,670	8,190
R-squared	0.745	0.420	0.666	0.297	0.252	0.269	0.703	0.356
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: See notes to Table 7 for data source, variable definitions, and additional controls. Standard errors given in parentheses are clustered at the county level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A18 Robustness: Alternative variable transformation and estimation method using administrative firm data

Dependent var.	R&D exp. (1)	# Patents (2)	Value added (3)	VA per worker (4)	Revenue (5)	Tax (6)
<i>Panel A. Log transformation</i>						
SpouseState	0.047*** (0.017)	0.047* (0.024)	0.129*** (0.037)	0.131*** (0.036)	0.201*** (0.048)	0.130*** (0.038)
Observations	5,459	5,350	6,060	6,055	7,120	7,784
R-squared	0.309	0.226	0.742	0.414	0.660	0.698
<i>Panel B. Inverse hyperbolic transformation</i>						
SpouseState	0.057*** (0.022)	0.060** (0.030)	0.100*** (0.029)	0.008* (0.004)	0.148*** (0.039)	0.048** (0.020)
Observations	5,459	5,350	6,060	6,055	7,120	7,784
R-squared	0.316	0.229	0.695	0.224	0.684	0.570
<i>Panel C. Pseudo-Poisson maximum likelihood</i>						
SpouseState	0.418*** (0.143)	0.253 (0.180)	0.321*** (0.109)	0.233*** (0.086)	0.213** (0.103)	0.208** (0.092)
Observations	5,362	4,844	6,060	6,055	7,120	7,784
Pseudo R-squared	0.342	0.32	0.531	0.112	0.532	0.442
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Survey year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: See notes to Table 7 for data source, variable definitions, and additional controls. Panel A presents original results using log-transformed variables (only for outcomes with statistically significant coefficient estimates). Panel B employs the inverse hyperbolic transformation of variables. Panel C applies the Poisson pseudo-maximum likelihood method. Standard errors given in parentheses are clustered at the county level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table A19 Robustness: Inference for multiple hypotheses using administrative firm data

	Coefficient (1)	Std. err. (2)	<i>p</i> -value (3)	<i>q</i> -value (4)	<i>q</i> -value (5)
R&D expenditure, log	0.047	0.017	0.006	0.021	0.026
R&D expenditure/asset	0.013	0.008	0.104		
Holds patent=1	0.033	0.012	0.007	0.021	0.027
# Patents, log	0.047	0.024	0.051	0.094	0.139
Value added, log	0.129	0.037	0.001	0.002	0.003
Value added per worker, log	0.131	0.036	<0.001	0.002	0.003
Revenue, log	0.201	0.048	<0.001	<0.001	0.001
Profit	0.209	0.097	0.032	0.072	0.098
ROA	0.019	0.013	0.154		
ROE	0.024	0.020	0.225		
Tax, log	0.130	0.038	0.001	0.002	0.003

Notes: This table presents results from inference procedures robust to multiple hypothesis testing, following Anderson (2008). Columns 1–3 present conventional results and *p*-values. Column 4 presents sharpened false discovery rate *q*-values for outcomes with statistically significant coefficient estimates within each category. The final column reports the *q*-values for all individual outcomes with significant coefficient estimates combined.