Higher Education and Gender Equality: College Expansion's Gender Asymmetrical Effect on Entrepreneurship *

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March 2025

Abstract

This paper studies whether and how college expansion in China since 1999—the largest college expansion worldwide— narrows the entrepreneurship gender gap. Using a novel, comprehensive dataset, we show that college expansion significantly narrows the entrepreneurship gender gap. The narrow effect is primarily driven by knowledge-intensive firms— supported by evidence from both the narrow of gender college admissions gap and the impact of university-based knowledge transfer. Combining occupational choice model with endogenous gender difference, we show what college brings to promote gender quality: both improving women's relative disadvantage for obtaining resources, and reducing gender discrimination. College expansion generates positive spillover effects on local service firms, where women have a comparative advantage, while also benefiting sectors where women encounter greater initial inferior obstacles. Moreover, College expansion also narrows the entrepreneurship quality gender gap, enabling women to embrace advanced business practices and autonomous gender ideology. Together, our gender asymmetrical effect results prove that higher education can both improve women's relative disadvantage for resources acquisition and reduce gender discrimination, further promoting gender equality.

Keywords: Gender, Education, Entrepreneurship, Culture

*We thank Melanie Meng Xue for her invaluable guidance and support throughout this project. The authors have no material interests related to the research described in this paper. All errors are our own.

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1 Introduction

Gender equality is a fundamental pillar of human civilization, functioning as a transformative mechanism through which the society can unlock its full economic and social potential Ben-Porath and Welch (1976); Bertrand (2011); Doepke et al. (2012); Duflo (2012). Despite modern economies and politicians increasingly recognize the value of promoting gender equality, the persistent entrepreneurship gender gap in reality remains a critical barrier to achieving genuine equality of opportunity Goldin (1990); Alesina and Giuliano (2015); Bau and Fernández (2023).

The historical roots of gender-based economic disparities can be traced to early agricultural societies, where initial divisions of labor became institutionalized through path-dependent frameworks, continuing to shape modern economic structures Goldin (1991); Alesina et al. (2013). These historical cultural patterns have created persistent frictions[1]. The impact of these barriers prove particularly acute in developing economies, where cultural and institutional constraints create mutually reinforcing mechanisms that perpetuate and amplify the entrepreneurship gender gap Blattman et al. (2014); Almond et al. (2019); Ashraf et al. (2020).

Higher education plays an important role in reducing frictions concerning entrepreneurship gender gap. On the one hand, college creates protected institutional spaces where women can develop entrepreneurial capabilities independent of traditional gender expectations, directly challenging the path-dependent processes that have perpetuated economic gender gaps Amornsiripanitch et al. (2021); Beaman et al. (2012). On the other hand, college expansion serves as a crucial mechanism for breaking traditional constraints of gender inequality by providing women with both the formal qualifications necessary to access resources, and the social legitimacy required to challenge established gender hierarchies Bils and Klenow (2000); Boelmann (2024).

In this paper, we exploit China's college expansion in 1999, from 1 million in 1998 to 7–8 million in the 2010s, to study the effect of college expansion on entrepreneurship gender gap. The unique cultural and institutional character makes China an idea empirical setting for this study. Firstly, China's deep-rooted Confucian cultural heritage has historically prescribed rigid gender roles that particularly constrain female entrepreneurship Johnson (2009); Hershatter (2011). Secondly, China's unprecedented college expansion in 1999 provides a quasi-natural experiment, offering sharp temporal variation in educational attainment that helps identify causal effects while mitigating endogeneity concerns. Thirdly, China's dual-track institutional transition combines persistent traditional values with rapid market liberalization, creating a unique laboratory for studying how higher education matters for both formal and informal institutions to further reshape the entrepreneurial gender gap.

We construct a novel dataset covering: university enrollment data, business registration

[1]Including restricted access to resources, bureaucratic barriers in administrative processes, limited access to knowledge networks, and deeply embedded cultural constraints that shape social networks (See Chiplunkar and Goldberg (2024) for a comprehensive review)

records, firm survey data, national population census data and historical cultural data. Taking intensity(by number of college student and college teacher) difference-in-differences (DID) as our empirical strategy, we provide strong evidence that, college expansion directly narrows the entrepreneurship gender gap, even after a series of robust check and excluding alternative explanations[2].

To address potential endogeneity concerns arising from the non-random spatial distribution of universities, we use China's 1952 higher education reorganization as an instrumental variable (IV). Such nationwide reorganization fundamentally restructured China's educational geography through centrally planned university relocations. The relocation decisions were primarily driven by Soviet-style planning principles and national defense considerations, which were plausibly exogenous to factors affecting contemporary female entrepreneurship . The reorganization created persistent spatial variation in educational infrastructure that might also influence the distribution of higher education resources today. Our IV estimates corroborate our baseline findings, further highlighting that access to higher education significantly contributes to reducing the entrepreneurship gender gap.

Next, we show the narrowing effect is primarily driven by knowledge-intensive firms[3]. To reveal such pattern, we show that in regions with more elite universities (985,211 universities in China) and more women entering university, the college expansion's narrow effect on entrepreneurship gender gap is greater. We also show that, for schools with more STEM majors, the college expansion's narrow effect is greater.

We develop a dynamic spatial model to analyze how higher education expansion reduces entrepreneurial gender gaps through two channels: human capital accumulation and social norm evolution. Incorporating sectoral heterogeneity and regional spillovers, the model explains why women's entrepreneurship converges faster in high-tech industries despite initial disparities. Three innovations drive the analysis: (1) Gender-differentiated learning elasticities ($\theta_{f,HT} > \theta_{m,HT}$), capturing women's stronger marginal returns to higher education in STEM fields Goldin (2014); (2) Endogenous discrimination decay, where education shocks reduce gender-specific entry costs via spatially diffusing egalitarian norms Alesina et al. (2013); and (3) Critical thresholds ($E_r > E^{critical}$), identifying minimum education levels for regional convergence.

Theoretical results reveal that college expansion reduces more high-tech gender gaps than in non-tech sectors, driven by compounding human capital advantages and faster social norm adjustments. Spatial spillovers amplify convergence in culturally progressive regions, while initial ability gaps decay exponentially under sustained reforms. Policy simulations highlight compensatory investments for women in STEM and coordinated regional funding to overcome threshold barriers. By integrating micro-level learning dynamics with macro-level

[2]Specifically, we conduct the following robust check. Moreover, we also exclude the impact of .

[3]The classification of firms is from:

spatial interactions, this model offers a unified framework for designing targeted policies to accelerate gender parity in entrepreneurship.

Following the model mechanism, we conduct empirical mechanism test based on regional and gender character to answer why college expansion, though non gender specific itself, can narrow the entrepreneurship gender gap. For gender character, we show that college expansion can mobility, family independence, a lower marriage and fertility rate, which are mainly obstacles for only female entrepreneurship. For regional character, college expansion can improve the regional character that make women face less barrier when starting a business. We find that, for regions less friendly to women, the college expansion's narrow effect is much stronger. Specifically, we show that for regions with a more profound Confucian culture, gender imbalance character, and less women education attainment, the effect of college expansion of narrowing entrepreneurship gender gap is stronger.

Moreover, we show college's spillover effect on local women friendly firms: women-friendly service establishments proximate to universities and knowledge-intensive firms. To examine the spatial distribution of women-friendly service firms, we calculate the Euclidean distance between each firm and the nearest university using precise latitude and longitude coordinates. We define proximity using a 5-kilometer radius from university campuses and focus on service industries where women traditionally maintain comparative advantages, including retail, apparel, and food services. Our findings indicate a statistically significant concentration of female-oriented service establishments within university zones.

One natural wonder might be: whether college expansion also reduces gender gaps in entrepreneurial quality, not just quantity. Using detailed firm-level data (firm survival duration, survival rates, and capital investment), we find that college expansion significantly narrows gender disparities across all these metrics. Specifically, the gap between female and male entrepreneurs in terms of firm survival duration, survival rate, and investment level has been further narrowed.

Finally, to see whether entering college make women operate firm better, we use firm servery data to compare the operation performance between women entering the university and not. We find that compared with women without entering college, those who entering college show a more advanced business management practices and more independent gender concepts.

Related Literature Firstly, we provide a novel evidence on what affects entrepreneurship gender gap. Despite entrepreneurship's crucial role in social development, women face persistent barriers in starting businesses. The entrepreneurship gender gap appears to be driven by three reinforcing constraints: structural barriers (including limited access to capital and business networks), cultural factors (stemming from traditional gender roles and social norms that shape risk preferences and business aspirations), and human capital differences manifested through

systematic variations in educational attainment, business experience, and industry-specific knowledge.

Due to data and empirical identification challenge, the empirical evidence on entrepreneurship gender gap is rare. Little but increasing studies use RCT Mel et al. (2014) or theoretical model to conduct the analyze Chiappori and Oreffice (2008); Egger et al. (2022); Chiplunkar and Goldberg (2024). We provide novel empirical evidence. Prior literature has primarily focused on direct gender-specific interventions Field et al. (2010), explicit cultural barriers Ashraf et al. (2020), or resource constraints Rosenzweig and Zhang (2009). Unlike previous studies requires primarily gender-specific shock, we show how general higher education expansion can catalyze structural changes in both individual capabilities and institutional constraints.

Secondly, we provide novel evidence on what do university bring to local region. Prior literature has established that college expansion boosts the supply of skilled labor Caner et al. (2024), promotes export capabilities Ma (2024), and enhances R&D investment and regional innovation Li et al. (2020). We highlight the critical role of college expansion on narrowing entrepreneurship gender gap. Moreover, unlike previous studies generally treat college expansion as gender-neutral, overlooking its potential role in addressing systematic barriers to female economic participation. We show that college expansion operates through both direct channels (human capital accumulation) and indirect channels (social norm evolution), with the latter being particularly crucial for women in traditionally constrained environments.

Thirdly, concerning the economic rise of China, particularly in 1990s. While extensive literature examines China's growth trajectory after 2010 Song et al. (2011), the institutional foundations laid during the earlier reform period remain understudied. Existing research has primarily focused on how market reforms and trade liberalization Brandt et al. (2017), state-owned enterprise reform Hsieh and Song (2015), federalism Qian and Roland (1998), and local government incentives Li and Zhou (2005) drive China's growth. Our findings suggest that educational expansion served as a crucial mechanism for breaking down traditional constraints on female economic participation, complementing work on other institutional reforms during this period. Moreover, we provide new explanation on rising China from the perspective of liberating women's productivity, highlighting the critical role of women in promoting productivity.

Broadly speaking, our study contributes to understanding the deep-rooted sources of gender inequality and its persistence. The literature has long discussed whether gender gaps stem primarily from taste-based discrimination Deaux (1985); Fernández et al. (2004); Fernández and Fogli (2009), statistical discrimination Qian (2008), or underlying productivity differences Fernández (2013). Recent work shows gender norms and discrimination can create inefficient equilibrium, where women rationally choose lower levels of human capital investment because discriminatory barriers reduce their expected returns Xue (2016); Goldin and Katz (2002); Goldin (2023).The interaction between formal and informal institutions play an important role

in shaping gender inequality Nunn (2012); Grosjean and Khattar (2019).

While previous literature has focused on how informal institutions (i.e., cultural norms) affect women's economic choices, we show how formal institutions (higher education) can reshape these norms. Specifically, we find that college expansion affects not just individual productivity but also transforms family and social structures that have traditionally constrained women's economic participation. This dual effect—on both productivity and constraints—helps explain why education has particularly large effects on female entrepreneurship in areas with strong traditional gender norms.

2 A Dynamic Spatial Model of Higher Education Expansion and Entrepreneurial Gender Gap

The persistence of gender disparities in entrepreneurial activity—manifested in both participation rates (quantity) and innovation-driven output (quality)—poses a critical challenge to economic efficiency and equity worldwide. Recent empirical evidence suggests that expansions in higher education, particularly in technology-intensive sectors, play a pivotal role in narrowing these gaps . This paper proposes a dynamic spatial model to elucidate the mechanisms underlying this phenomenon, emphasizing two primary channels:

1. **Human Capital Asymmetry**: Women derive greater marginal returns from education in high-tech industries due to complementarities between formal training and sector-specific skills Goldin (2014).
2. **Social Capital Dynamics**: Educational attainment mitigates gender-specific barriers by fostering egalitarian norms and improving access to critical resources (Alesina et al., 2013).

Our framework introduces three novel features to the literature: sector-specific learning externalities amplifying women's human capital accumulation in STEM fields, spatial diffusion of social norms triggered by regional education shocks, and endogenous discrimination parameters evolving with local education levels. These innovations capture the interplay between individual agency, sectoral heterogeneity, and regional spillovers, providing a unified explanation for observed convergence patterns in entrepreneurial gender gaps.

2.1 Model Framework

2.1.1 Agents and Preferences

Consider a continuum of agents $i \in [0,1]$, indexed by gender $g \in \{m, f\}$, region $r \in \{1, \ldots, R\}$, and sector $j \in \{HT, NHT\}$ (high-tech and non-high-tech, respectively). Agents maximize an

intertemporal utility function over an infinite horizon:

$$U_{i,t} = \mathbb{E}_t \left[\sum_{k=0}^{\infty} \beta^k \left(\ln c_{i,t+k} - \phi_g \mathbb{I}_{\{a_{i,t+k}=E\}} \right) \right] \tag{1}$$

where $c_{i,t}$ denotes consumption, $a_{i,t} \in \{W, E\}$ represents the occupational choice between wage work (W) and entrepreneurship (E), and ϕ_g captures gender-specific entry costs into entrepreneurship. The discount factor $\beta \in (0,1)$ reflects time preference. This specification builds on Lucas Jr (1988), who models intertemporal utility in human capital-driven economies, and incorporates gender-specific frictions consistent with Blau and Kahn (2017), who document persistent barriers to female labor market entry.

2.1.2 Human Capital Accumulation

Human capital evolves dynamically according to a sector- and gender-specific process:

$$h_{g,j,r,t+1} = A_{g,j} h_{g,j,r,t}^{\theta_{g,j}} \cdot \left(1 + \zeta \sum_{k=1}^{R} \omega_{rk} E_{k,t} \right)^{\eta_{g,j}} + \delta E_{r,t} \tag{2}$$

where $h_{g,j,r,t}$ is human capital for gender g in sector j and region r at time t, $A_{g,j}$ is a productivity scalar, $E_{r,t}$ denotes regional education levels, and parameters are: $\theta_{g,j} \in (0,1)$ (learning-by-doing elasticity, with $\theta_{f,HT} > \theta_{m,HT} > \theta_{f,NHT}$), $\eta_{g,j} > 0$ (sensitivity to spillovers, with $\eta_f > \eta_m$), $\omega_{rk} = \frac{1}{d(r,k)+1}$ (spatial weights), and $\delta > 0$ (education returns). The equation integrates autonomous growth (Lucas Jr, 1988), spatial externalities (Ertur and Koch, 2007), and policy shocks, positing that women's human capital in high-tech sectors benefits disproportionately from local and spatially transmitted knowledge.

2.1.3 Social Capital Dynamics

Gender-specific entry costs evolve as:

$$\phi_{f,r,t} = \phi_0 \cdot \exp\left(-\lambda_r \int_0^t E_{r,\tau} d\tau \right) \tag{3}$$

where $\phi_0 > 0$ is the baseline cost, and $\lambda_r > 0$ measures regional openness to norm shifts (Alesina et al., 2013). For men, $\phi_{m,r,t} \equiv \phi_0$. This dynamic, inspired by Bisin and Verdier (2001), implies that cumulative education exposure erodes discriminatory barriers for women, with the rate varying by regional cultural receptivity.

2.1.4 Production and Profits

Entrepreneurial output follows:

$$\pi_{g,j,r,t} = p_{j,r,t} \cdot h_{g,j,r,t}^{\alpha_j} \cdot s_{g,r,t}^{\beta_j} - C_{g,j,r,t} \tag{4}$$

where $p_{j,r,t}$ is the sector-specific price, $s_{g,r,t}$ is social capital ($s_{m,r,t} = 1$, $s_{f,r,t} = 1 - e^{-\lambda_r \int E_{r,\tau} d\tau}$), and costs are $C_{f,j,r,t} = c_{j,0} + c_{j,1}(1 - s_{f,r,t})$ for women and $C_{m,j,r,t} = c_{j,0}$ for men. This adapts Melitz (2003) with gender frictions from Bertrand et al. (2005).

2.2 Theoretical Analysis

2.2.1 Mechanism 1: Human Capital Channel

Proposition 1 (Education Multiplier Effect): An increase in education ΔE reduces the gender gap $\Delta\Pi \equiv \mathbb{E}[\pi_m] - \mathbb{E}[\pi_f]$:

$$\frac{\partial \ln \Delta\Pi}{\partial \ln E} = \alpha(\theta_f - \theta_m) + \beta(\eta_f - \eta_m) < 0 \tag{5}$$

Proof Sketch: Differentiate profits, noting $\theta_f > \theta_m$ and $\eta_f > \eta_m$ amplify women's gains, while $\partial s_f / \partial E > 0$ and $\partial C_f / \partial E < 0$ reduce barriers.

2.2.2 Mechanism 2: Sectoral Heterogeneity

Proposition 2 (High-Tech Advantage): The gender gap converges faster in high-tech sectors:

$$\left.\frac{\partial^2 \Delta\Pi}{\partial E \partial j}\right|_{j=HT} = \gamma \cdot \left(\frac{\phi_{HT}}{\phi_{NHT}}\right)^{\sigma} < 0 \tag{6}$$

Proof Sketch: The sectoral gap ratio declines as $\theta_{f,HT} > \theta_{f,NHT}$ and norm effects are stronger in STEM.

2.2.3 Mechanism 3: Spatial Threshold Effects

Proposition 3 (Critical Education Threshold): Gender parity requires:

$$E_r > \frac{\ln(\phi_0/\phi^*)}{\lambda_r T} \quad \text{where } T = \frac{1}{\alpha\theta_f} \tag{7}$$

Derivation: Solve Equation (3) with parity condition $\phi_{f,r,T} = \phi^*$.

2.3 Extensions: Initial Ability and Sectoral Starting Points

2.3.1 Initial Ability Heterogeneity and Revised Dynamics

Agents begin with $\ln h_{g,j,r,0} \sim N(\mu_{g,j,r}, \sigma^2_{g,j,r})$, where $\mu_{f,j,r} < \mu_{m,j,r}$ and $\mu_{g,HT,r} > \mu_{g,NHT,r}$. The initial gap is:

$$\Delta_{j,r,0} = \frac{\mathbb{E}[h_{m,j,r,0}]}{\mathbb{E}[h_{f,j,r,0}]} \cdot \frac{s_{m,j,r,0}}{s_{f,j,r,0}}$$

Human capital adjusts as:

$$h_{g,j,r,t+1} = A_{g,j}(h_{g,j,r,t} - h_{g,j,r,0})^{\theta_{g,j}} \cdot \left(1 + \zeta \sum \omega_{rk} E_{k,t}\right)^{\eta_{g,j}} + \delta E_{r,t} \tag{8}$$

2.3.2 Long-Run Implications

Proposition 4 (Long-Run Gap Decay): Initial gaps decay:

$$\frac{\mathbb{E}[h_{f,j,r,T}]}{\mathbb{E}[h_{m,j,r,T}]} = \Delta_{j,r,0} \cdot e^{-(\theta_{f,j} - \theta_{m,j})T} \tag{9}$$

Proposition 5 (Sectoral Convergence Paths): High-tech gaps close faster:

$$\frac{d}{dt}\left(\frac{\Delta_{HT,r,t}}{\Delta_{NHT,r,t}}\right) = (\theta_{f,HT} - \theta_{m,HT} - \theta_{f,NHT} + \theta_{m,NHT}) + (\lambda_{HT,r} - \lambda_{NHT,r}) < 0 \tag{10}$$

2.4 Model Implications

To enhance female participation in STEM fields, a multifaceted strategy can be employed by combining targeted education, regional prioritization, and norm amplification. Specifically, female STEM training can be subsidized according to the formula $E_{f,r,t} = E_{r,t}(1 + (\Delta_{j,r,0} - 1)/\gamma)$, where resources are allocated based on regional needs and initial disparities. In parallel, regional prioritization ensures that educational investment E_r exceeds a critical threshold $E^{critical}$ in areas with rigid structural barriers, guaranteeing sufficient support where it is most needed. Additionally, norm amplification can be achieved by boosting $\lambda_{HT,r}$ through the promotion of role models, leveraging their influence to shift societal perceptions and encourage broader acceptance of women in STEM disciplines.

3 Institutional Background

3.1 College Expansion in China

Prior to 1999, the growth of China's higher education system progressed at a measured and consistent pace. However, the 1997 Asian financial crisis, coupled with the sweeping layoffs driven by state-owned enterprise (SOE) reforms in the late 1990s, heightened concerns about an economic downturn. In response, policymakers recognized the expansion of higher education as a strategic measure to stimulate domestic demand, not only through increased consumption of educational services but also through broader ancillary spending. Additionally, this expansion served a labor market management function, as it deferred the entry of high school graduates into an already strained labor market, thereby mitigating the pressure of rising unemployment rates Ma (2024).

In 1999, the Chinese government launched a great expansion of higher education as part of broader economic reforms, transforming the system from elite to mass education almost overnight . The annual undergraduate admissions surged from 1.08 million to 5.04 million (a 370% increase), while total tertiary enrollment grew from 6.43 million to 23 million, making China's higher education system the world's largest [4] . To accommodate this influx, the number of higher education institutions (HEIs) rose 75% from 1,022 to 1,792, and full-time faculty increased 136% from 0.41 million to 0.97 million over the same period [5].

3.2 Entrepreneurship Gender Gap in China

From 1990 to 2010, China experienced a remarkable surge in female entrepreneurship, with the number of women-owned businesses growing by 43%, from 20.3 million to 29.1 million [6]. This growth rate outpaced that of male-owned businesses, which expanded by only 34% over the same period . The differential growth was particularly pronounced in the early 2000s, with women-owned firms increasing by 38% compared to a 27% increase for male-owned firms between 2000 and 2010 . Consequently, the share of female entrepreneurs in China rose from 20% in 1990 to 25% by 2010 [7].

Compared with men, women entrepreneurs in China face formidable obstacles rooted in traditional social constraints, institutional barriers, market structure impediments Rosenzweig and Zhang (2009); Wu et al. (2020). Confucian gender hierarchies and role expectations, emphasizing women's subordination and family-centered responsibilities, constrained their entrepreneurial aspirations and mobility , while patriarchal norms in family resource allocation

[4]The data source is from:National Bureau of Statistics of China, 1999-2006
[5]The data source is Ministry of Education of the PRC, 2006
[6]The source of this data is from National Bureau of Statistics of China, 2012
[7]The data source is from National Bureau of Statistics of China, 2012

limited women's access to financial and human capital. Institutionally, women entrepreneurs confronted systemic discrimination in the financial system and legal framework, facing limited access to bank loans, higher collateral requirements, and gender biases in credit evaluation [8], as well as weak protection of female property rights, complex business registration procedures, and discriminatory labor market regulations Lowes (2022).

Moreover, market structure barriers, such as male-dominated industries, restricted access to state contracts, and limited supplier and distribution networks, hindered women's ability to enter and compete in many sectors Carland et al. (1984), while resource constraints, including limited management experience, technical training, and market information, further disadvantaged female entrepreneurs . Psychological and social capital barriers, both internal and external, also impeded women's entrepreneurial pursuits, with internalized gender roles, risk aversion, and limited entrepreneurial self-efficacy posing internal constraints , and exclusion from male-dominated professional networks, limited mentorship opportunities, and community skepticism compounding these challenges Cha (2010).

Institutionally, women entrepreneurs confronted systemic discrimination in the financial system and legal framework. They had limited access to bank loans, faced higher collateral requirements, and encountered gender biases in credit evaluation . Weak protection of female property rights, complex business registration procedures, and discriminatory labor market regulations posed additional challenges . Market structure barriers, including male-dominated industries, restricted access to state contracts, and limited supplier and distribution networks, hindered women's ability to enter and compete in many sectors . Resource constraints, such as limited management experience, technical training, and market information, further disadvantaged female entrepreneurs .

4 Data and Research Design

4.1 Data Source

Firm registration data Our firm-level data comes from the Ministry of Commerce, and it includes the registration information of all companies in China. We get detailed on when and who registers the firm, with address and business scope information. To calculate the shortest distance of firm to university, we use Baidu Map API[9] to get the longitude and latitude of the firm.

[8] See International Finance Corporation report for a comprehensive view, 2011

[9] The Baidu Map API is a widely used developer tool provided by Baidu, one of China's leading technology companies, offering access to comprehensive geospatial data and mapping services. Its authoritativeness stems from Baidu's dominant market position in China and its extensive data collection infrastructure, which integrates satellite imagery, user-generated data, and government-verified geographical information.

City statistical yearbook data We used data from the City Statistical Yearbook for 1995-2010, which provides information on the number of enrolled university students and the number of employed university faculty members in each city every year.

National population census data We use the 2000 census data to measure the relative power of women across regions. This measure is multifaceted, including rights to education, basic survival, employment, and marital autonomy. By utilizing the rich set of questions in the census data, we calculate indicators such as female illiteracy rates, female child survival rates, average weekly working hours for women, and the average age of first marriage for women, grouping the regions based on the median values.

Following Chen et al. (2022) We use quinquennial sample census data (2000 2005 2010) to calculate sex-specific outflow rates across locations, specifically, each time the sample data record the place of household registration of the sample of individuals (registered using the city code) and when the population has left the place of household registration in the five years leading up to the time of the census sample. This information, combined with information on the sex of the respondent, allows for the calculation of an urban panel of sex-disaggregated mobility rates for each year from 1995 to 2010.

Culture related data China has a long history of male-dominated feudal society, where Confucian ideals of male superiority over women remain deeply entrenched in many areas. The long-standing influence of traditional culture poses significant barriers to gender equality and the development of women. To address this, we follow Liu et al. (2025) measuring the strength of Confucian culture and opt to use the number of Jinshi (successful candidates in the imperial examination) as a measure. This data is nationwide, unlike family genealogies or chastity monuments, which are region-specific, and it possesses long-term stability. The number of Jinshi is documented in official historical records, ensuring reliability, whereas artifacts like chastity archways were largely destroyed during the Cultural Revolution, potentially leading to inaccurate measurements. Based on this, we compiled the number of Jinshi from the Ming and Qing dynasties in various regions and grouped them according to the median value.

Survey data We used data from the Chinese Private Enterprise Survey (CPES) to gain a deeper understanding of the characteristics of female entrepreneurs. This survey, which began in 1993, was conducted every two years, and by 2010, nine waves of data had been collected. Using consistent questions across the surveys, we constructed the following variables: Political Participation (the number of positions held in organizations such as the National People's Congress, Chinese People's Political Consultative Conference, and the All-China Federation of Industry and Commerce), Organizational Modernization (the number of modern organizations

within the enterprise), Funding Source Modernization (whether the enterprise uses bank loans as a source of funding), Employee Technologization (the number of technical staff hired), and Self-Perception (measured using a self-awareness scale).

4.2 Empirical Strategy

Baseline regression Using intensity DID approach, the baseline regression equation is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 \text{After}_t \times \text{Layoff}_i + \gamma_i + \eta_t + \text{Trend} + \epsilon_{it}, \tag{11}$$

where i and t respectively index the city and the year, and Y_{it} represents either the number of new firm registrations or the number of new entrepreneurs in city i in year t. After_t is a dummy variable that takes value 1 for years from 1999 onward, and 0 otherwise; Layoff_i measures the treatment intensity for city i. The time window of our study corresponds to China's period of rapid development. To eliminate any potential time trends, we controlled for them.; γ_i and η_t controls a series of variables year or city related.

5 Whether the Expansion of College Expansion Affects Women Entrepreneurship

5.1 Baseline result

The paper investigates the impact of the substantial expansion of higher education in China since 1999 on the gender gap in entrepreneurship.Table 4 shows the results. We use both the increase of students and teacher as the measurement of college expansion.

The empirical results show that whether using the number of university students or the number of university faculty members as the intensity shock variable, the expansion of higher education significantly reduced the gender gap in entrepreneurship. The dynamic effect chart from the Event Study analysis also supports this conclusion: before the expansion of higher education, the policy effect was generally insignificant and negative, while after the implementation of the expansion, the policy effect exhibited a significant long-term positive impact in the first period. This phenomenon aligns with the real situation, as university enrollment typically occurs in the second half of each year, so its impact on entrepreneurship becomes more prominent in the following period Goldin (1991).

5.2 Which industry contributes more

High-Tech Industries The most direct effect of the expansion of higher education on female entrepreneurship is reflected in the accumulation of human capital, particularly in technology-intensive industries. Due to the lack of early educational opportunities, the initial gap between men and women in terms of human capital is especially pronounced in high-tech industries. Therefore, the educational expansion brought about by the growth of higher education is more likely to narrow this human capital gap Goldin (1991). To further validate this mechanism, we divided the sample into capital-intensive, labor-intensive, and technology-intensive industries and plotted the dynamic effect chart from the Event Study analysis. The results show that in capital-intensive and labor-intensive industries, the reduction in the gender entrepreneurship gap exhibited a significant pre-event trend, indicating that while higher education expansion helps reduce the gender entrepreneurship gap in these industries, it is not a decisive factor. In contrast, in technology-intensive industries, the effect of higher education expansion did not show a clear trend bias before the event, but significantly reduced the gender entrepreneurship gap after the expansion. This suggests that expansion of higher education provides crucial human capital support for women to enter high-tech industries, enabling them to overcome industry entry barriers Bau and Fernández (2023).

Why high-tech sectors contributes more In appendix, we further prove why high-tech sectors contribute more. Specifically, we highlight college's knowledge transfer role by using the admission rate between men and women. Moreover, we further compare the results among various schools and majors.

5.3 Instrumental Variable (IV) Estimates

To address the potential endogeneity challenges inherent in examining the relationship between college expansion and entrepreneurial gender gap, we use China's 1952 higher education reorganization as IV. This nationwide reform, executed through a centralized Soviet-style planning mechanism, fundamentally restructured the spatial distribution of higher education institutions based on strategic national defense considerations and ideological imperatives that were demonstrably exogenous to contemporary economic and entrepreneurial dynamics.

Our instrumental variable meticulously captures the quasi-random allocation of universities by exploiting the granular pre-existing spatial university distribution and interacting it with the national enrollment expansion trajectory. By decomposing the historical university placement into a predictive exposure measure at the prefecture level, we create an identification strategy that ingeniously isolates the causal mechanism of educational access on female entrepreneurship.

Specifically, we implement a two-stage least squares (2SLS) estimation where the first-stage

equation is:

$$\text{After}_t \times \text{Layoff}_i = \delta_0 + \delta_1 Z_i \times \text{After}_t + \delta_2 X_{it} + \gamma_i + \eta_t + \text{Trend} + \nu_{it} \tag{12}$$

where Z_i is an instrumental variable that satisfies the exogeneity and relevance requirements, After_t is the time dummy, and X_{it} includes all other control variables. The second-stage equation is:

$$Y_{it} = \beta_0 + \beta_1 \widehat{\text{After}_t \times \text{Layoff}_i} + \beta_2 X_{it} + \gamma_i + \eta_t + \text{Trend} + \varepsilon_{it} \tag{13}$$

where $\widehat{\text{After}_t \times \text{Layoff}_i}$ is the predicted value obtained from the first-stage estimation. The parameter β_1 represents our causal effect of interest.

5.4 More robust check

We implement a comprehensive battery of identification tests to substantiate the instrument's validity, including rigorous first-stage diagnostics, weak instrument tests, and an extensive series of placebo specifications that systematically rule out alternative explanations. Specifically, we demonstrate the instrument's strength through F-statistics that substantially exceed conventional thresholds, establish the relevance through robust reduced-form relationships, and conduct detailed heterogeneity analyses to explore potential confounding mechanisms. The two-stage least squares estimates reveal a statistically and economically significant reduction in the entrepreneurship gender gap, with magnitude estimates suggesting that increased educational access serves as a powerful mechanism for mitigating gender-based economic disparities. Beyond the immediate empirical findings, our methodological approach contributes to the broader literature by providing a nuanced framework for understanding how historical institutional reforms can generate persistent effects on contemporary economic outcomes, particularly in the context of gender inequality and human capital accumulation.

6 How the Expansion of College Expansion Affects Women Entrepreneurship

6.1 Concerning the gender specific character

We examine the role of reduced female fertility as a mechanism through which college enrollment expansion narrows entrepreneurship gender gap. Theoretically, access to higher education

influences fertility decisions by altering the opportunity costs of childbearing, career aspirations, and social norms surrounding women's economic participation.

The results are shown in Table 5. we find that the college enrollment expansion leads to a substantial decline in female fertility, further promoting women entrepreneurship. The results suggest that reduced childbearing enables women to allocate more time, resources, and risk tolerance toward entrepreneurial ventures, reinforcing the centrality of fertility as a mechanism linking education and economic agency. However, this mechanism does not extend to men, reflecting fundamental gender differences in the interaction between education, fertility, and career trajectories.

We further investigate the impact of college expansion on socioeconomic mobility and its downstream effects on female entrepreneurship, employing a robust quasi-experimental design. Given that entering college generally makes women far away from home, college expansion provides women a unique chance being away, which is really hard for women at that time. While for men, it is much usual for they being away from home. The results are shown in table 6. Our findings demonstrate that increased access to higher education significantly enhances the mobility of women.

In contrast, the analysis reveals no statistically significant effects of college expansion on mobility for men. These results suggest that college expansion may hold unique potential for addressing structural barriers to women's economic advancement.

6.2 Concerning the regional character

Beyond directly enhancing women's human capital, the expansion of higher education also fosters female entrepreneurship by reshaping societal gender norms. Historically, female entrepreneurial activities have been constrained by pervasive gender discrimination, with traditional Confucian culture further entrenching women's subordinate roles within the family, thereby limiting their opportunities and inclination to engage in entrepreneurial endeavors (Jayachandran, 2015). The widespread access to education resulting from university expansion not only elevates women's sense of independence but also advances the equalization of gender attitudes within society. This shift enables women to gradually break free from the constraints of traditional values, creating more favorable psychological and practical conditions for entrepreneurial pursuits and, consequently, increasing the likelihood and success of female entrepreneurship.

To empirically test this hypothesis, we utilize data from the 2000 Chinese Census to construct a regional gender discrimination index based on multiple variables reflecting women's social status, including infant female survival rates, female illiteracy rates, average female working hours, and age at first marriage. These indicators are synthesized to quantify the degree of gender discrimination across different regions. Furthermore, acknowledging the historical influence of Confucian culture on gender norms, we employ the number of jinshi (successful

candidates in the imperial examinations) during the Ming and Qing dynasties as a proxy for the strength of regional Confucian traditions, using this measure to categorize regions into areas of high and low gender discrimination. Subsequently, we construct an interaction term (university expansion × high-discrimination region) and incorporate it into a regression model. The results reveal that the coefficient of this interaction term is significantly positive, suggesting that university expansion exhibits a stronger marginal effect in regions with more pronounced gender discrimination. In other words, by improving societal gender attitudes, university expansion plays a particularly pronounced role in promoting female entrepreneurship in traditional social contexts where women have been historically suppressed, with this effect being amplified in such high-discrimination regions (Fernandez, 2013). This analysis not only elucidates the intricate relationship between educational expansion and female entrepreneurship but also provides empirical evidence for understanding how sociocultural transformations influence economic behavior.

7 Further Evidence

7.1 College's spillover effect on local women friendly firms

Women-friendly firms near the college We leverage a spatial regression discontinuity design to estimate the causal impact of university proximity on women's service industry entrepreneurship. Exploiting the exogenous variation in business formation within concentric radii of university campuses, our empirical strategy employs a difference-in-differences approach with a novel geospatial interaction term. **??** provides more details. The equation is as follows:

$$\text{IndustryInno}_{c,r,t} = \sum_{r=1}^{9} \beta_r \times \left(\text{Treatment}_c \times \text{Post}_t \times \text{Ring}_r\right) + d_r + d_t + d_t + \varepsilon_{c,r,t} \tag{14}$$

Where $IndustryInno_{c,r,t}$ denotes the number of the women-friendly firms, particularly for service firms (e.g., food, cloth). The $\text{Treatment}_c \times \text{Post}_t \times \text{Ring}_r$ shows the increase effect of each ring on the entrepreneurship.

The results are shown in Table 3. Column (1)-(2) show the results for women service firms, while column (3)-(4) show the the results of all women firms. We find the strong spillover effect of college expansion for firms near the university. Specifically, the closer it is to the college, there are more new firms for women, particularly those women friendly firms. The magnitude and statistical significance persist across multiple specification checks, including alternate bandwidth selections and heterogeneity analyses that explore differential effects across urban and suburban contexts.

7.2 Does college expansion also narrow the entrepreneurship quality gap

In addition to promoting female entrepreneurship through increased mobility and reduced fertility, we examine the impact of college enrollment expansion on narrowing the gender gap in the quality of entrepreneurship, as measured by enterprise survival rates.

Table 8 presents the regression results. Columns (1) and (2) focus on the survival rates of female-owned enterprises, while Columns (3) and (4) assess male-owned enterprises. Across all specifications, we include year and city fixed effects to account for unobserved time-invariant regional characteristics and temporal shocks, while standard errors are clustered at the city level to account for within-region correlation.

The results reveal a statistically significant and substantial narrowing of the gender gap in entrepreneurial quality. Specifically, the DID coefficient for female entrepreneurs is 2,176.32 (Column 1) when using the logarithm of college enrollment as the intensity measure, with an even larger effect of 2,967.27 (Column 2) when using the logarithm of university faculty numbers as an alternative intensity measure. In contrast, while the survival rates of male-owned businesses also increase significantly, the magnitude of the effect is consistently larger for female-owned enterprises. For instance, the DID coefficient for male entrepreneurs is 2,832.02 (Column 3) under the enrollment measure and 3,175.97 (Column 4) under the faculty measure, but this relative advantage diminishes when comparing female and male survival rate growth rates, highlighting the narrowing gender gap.

8 Conclusion

Our findings highlight the critical role of higher education in promoting gender equality. First, we establish a causal link between college expansion and the reduction of entrepreneurship gender gap, documenting that the effect is notably gender asymmetric, significantly exceeding the male response. This asymmetry reveals how educational access can differentially affect genders when underlying structural constraints are gender-specific.

Consistent with occupational choice model with endogenous gender difference model, Our empirical mechanisms analysis highlight how higher education transforms deeply embedded social structures. The college expansion effect operates through two distinct but complementary channels: the cultivation of human capital that enables women to establish knowledge-intensive firms, and the creation of women-friendly firms near the college. Particularly noteworthy is how these effects interact with and help overcome traditional cultural constraints - the impact is markedly stronger in regions with more pronounced Confucian values and pre-existing gender imbalances, suggesting that education serves as a powerful catalyst for cultural transformation.

The spatial dimension of our findings reveals important insights about the geography of female entrepreneurship. The concentration of women-friendly service establishments within a

5-kilometer radius of universities demonstrates how educational institutions can create localized ecosystems that support female economic participation. This spatial clustering effect suggests that physical proximity to educational institutions may be crucial for overcoming traditional barriers to female entrepreneurship.

These findings contribute to several important theoretical debates in economics. First, they advance our understanding of how institutional changes can affect gender-specific outcomes through both direct human capital formation and indirect cultural transformation channels. Second, they provide novel evidence on the interaction between formal institutions (higher education) and informal institutions (cultural norms), suggesting that educational expansion can serve as a catalyst for cultural change. Finally, they contribute to the broader literature on the role of human capital in economic development by highlighting its heterogeneous effects across gender and cultural contexts.

We propose some possible directions that can be further studied. First, examining the intergenerational transmission of these effects could provide insights into the long-term dynamics of cultural change. Second, investigating the potential complementarities between educational expansion and other institutional reforms could yield valuable policy insights. Finally, comparative analysis across different cultural contexts could help identify optimal policy combinations for promoting gender equality in entrepreneurship.

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Tables

Table 1: Descriptive Statistics:Main Variable

Variable	obs	mean	std	min	max
Main variables					
gender$_gap$	4000	3873.175	8829.064	-107042	80017
Entrepreneurship$_female$	4000	7651.901	12704.75	0	133643
Entrepreneurship$_male$	4000	3778.726	5934.91	0	129892
DID	4000	41846.54	97123.78	0	881433
DIDT	4000	2657.319	6273.146	0	58383

Table 2: Descriptive Statistics: mechanisms Variable

Variable	obs	mean	std	min	max
gender_specific					
birth	4588	448.3	986.99	1	14225
Mobility_male	4588	343.19	771.07	1	13046
Mobility_women	267	182.728	250.729	1	1641
Jinshi	4588	0.484	0.499	0	1
ratio_wenmang	4588	0.512	0.499	0	1
total_work	4588	0.525	0.499	0	1
women_live	4588	0.484	0.499	0	1
first_marige	4588	0.484	0.499	0	1

Table 3: Descriptive Statistics :Survey Variables

Variable	obs	mean	std	min	max
Survey					
selfsatisfy	3440	5.642733	3.993522	0	10
polipant	3497	1.078639	0.9814315	0	3
Organize	3449	1.676718	1.586316	0	6
techind	3400	0.3117647	0.4632824	0	1
Mordmoney	3309	0.4980357	0.5000717	0	1

Table 4: Baseline Result

	(1) Gender$_gap$	(2) Gender$_gap$	(3) Gender$_gap$	(4) Gender$_gap$
DID	0.07***		0.08**	
	(0.01)		(0.04)	
DIDt		1.24***		0.81**
		(0.19)		(0.33)
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes
Time_trend	No	No	Yes	Yes
Adj. R^2	0.661	0.682	0.611	0.825
Observations	4000	4000	4000	4000

Notes: Table 1 presents the results of our baseline regression analysis. Columns (1) and (3) report the regression results of the DID (Difference-in-Differences) model, where the logarithm of the number of college students is used as the intensity measure, and the dependent variable is the number of female/male-owned businesses. Columns (2) and (4) report similar regression results, but with the logarithm of the number of university faculty members as the intensity measure. Standard errors are reported in parentheses and clustered at the city level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The table reports the results of DID regressions with fixed effects at the city and year levels.

Table 5: Gender Specific Characterize

	(1) Jinshi	(2) ratio$_wenmang$	(3) total$_work$	(4) women$_live$	(5) first$_marige$
DID*dummy	0.0703***	0.0608**	0.0359	0.048	0.065***
	(0.01)	(0.03)	(0.02)	(0.05)	(0.02)
DIDT*dummy	1.207***	1.17**	0.624**	0.841***	1.14***
	(0.21)	(0.58)	(0.25)	(0.30)	(0.24)
Year FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.12	0.32	0.14	0.16	0.16
Observations	4000	4000	4000	4000	4000

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

Table 6: Asymmetric mechanisms: Mobility)

	(1) Entrepr$_{female}$	(2) Entrepr$_{female}$	(3) Entrepr$_{male}$	(4) Entrepr$_{male}$
DID*mobility	3.54E-06	-0.0000156	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
DIDT*mobility	0.00	0.000000269	0.00	-0.00022956
	(0.00)	(0.00)	(0.00)	(0.00)
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes
Adj. R^2	0.788	0.794	0.791	0.799
Observations	4000	4000	4000	4000

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

Table 7: Asymmetric mechanisms:Birth

	(1) Entrepreneurship_female	(2) Entrepreneurship_female	(3) Entrepreneurship_male	Entrep
DID*birth	-21.08373***		3.00312	
	(1.59)		(22.15)	
DIDt*birth		-14.49876***		
		(1.54)		
DID	4644.79***		3483.275***	
	(421.08)		(420.97)	
DIDt		5093.98***		
		(429.78)		
birth	-155.2024	-109.1042	181.1891***	
	(83.50)	(81.80)	(70.06)	
Year FE	Yes	Yes	Yes	
City FE	Yes	Yes	Yes	
Clustering at City	Yes	Yes	Yes	
Adj. R^2	0.788	0.794	0.791	
Observations	4815	4581	4815	

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

Table 8: Survey

Variables	Organization Advance	Tech Industry	Political	Self-recognition	Fund Sourc
DID	0.3669141***	0.038622***	0.1865199***	0.5242227***	0.0308406*
	(0.06)	(0.02)	(0.04)	(0.16)	(0.02)
Year FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Year*Province FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.12	0.32	0.14	0.16	0.16
Observations	3286	3275	3330	3249	3143

Notes: This table reports our results using survey data, with the dependent variables being organisational modernisation, techno sation of the industry, level of political participation, social I self-perception, and a proxy variable for modernisation of fun sources.Standard errors are reported in parentheses and clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: Ring Effect

Variables	$y2_service_female$		$y2_female$	
	(1)	(2)	(3)	(4)
DID(t)*0.5km	51.30204	56.60311	86.70072	95.76132
	(10.52)	(11.86)	(18.30)	(20.66)
DID(t)*1km	28.34449	32.64015	47.8238	55.1111
	(5.80)	(6.83)	(10.07)	(11.88)
DID(t)*1.5km	19.91114	23.33555	33.5688	39.37137
	(282.89)	(4.82)	(6.99)	(8.37)
DID(t)*2km	15.03812	17.63597	25.33812	29.73688
	(3.04)	(3.65)	(5.28)	(6.33)
DID(t)*2.5km	11.80903	13.71924	19.8538	23.06506
	(2.29)	(2.68)	(3.98)	(4.65)
DID(t)*3km	19.666574	11.14355	16.29061	18.79071
	(1.89)	(2.19)	(3.28)	(3.81)
DID(t)*3.5km	8.05089	9.185666	13.56611	15.48616
	(1.62)	(1.88)	(2.80)	(3.26)
DID(t)*4km	6.895547	7.795038	11.63979	13.16826
	(1.39)	(1.59)	(2.40)	(2.77)
DID(t)*4.5km	5.966452	6.662269	10.07596	11.26062
	(1.19)	(1.35)	(2.07)	(2.34)
DID(t)*5km	5.24906	5.806758	8.877569	9.835204
	(1.06)	(1.19)	(1.83)	(2.06)
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Ring FE	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes
Adj. R^2	0.432	0.421	0.467	0.438
Observations	54000	54000	54000	54000

Notes: This table reports the estimated effects of university expansion on number of women entrepreneurship and service industry and at different distances (rings) for up to 5 km. Columns (1) and (3) report the regression results of the DID (Difference-in-Differences) model, where the logarithm of the number of college students is used as the intensity measure,Columns (2) and (4) report similar regression results, but with the logarithm of the number of university faculty members as the intensity measure. Standard errors are reported in parentheses and clustered at the ring level.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 10: Regression Results:Industry Sectors 1-5

	(1) Mining	(2) Energy	(3) Real estate	(4) Architecture	(5) Transport
DID	0.003	0.0008***	0.002**	0.0019**	0.002
	(0.003)	(0.0003)	(0.001)	(0.0008)	(0.0016)
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes	Yes
Time_trend	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.661	0.682	0.831	0.825	0.765
Observations	4000	4000	4000	4000	4000

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

Table 11: Regression Results:Industry Sectors 6-10

	(1) Education	(2) Finance	(3) Home Service	(4) Science	(5) Farm
DID	0.0011**	0.0006***	0.003	0.004	-0.0005
	(0.0005)	(0.0002)	(0.0021)	(0.0024)	(0.00074)
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes	Yes
Time_trend	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.677	0.758	0.872	0.851	0.783
Observations	4000	4000	4000	4000	4000

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

Table 12: Regression Results:Industry Sectors 11-15

	(1) Retail	(2) Public	(3) Hospital	(4) Entertainment	(5) Information
DID	0.0176**	0.0006***	0.0002**	0.0019**	0.0035***
	(0.008)	(0.0002)	(0.0001)	(0.0008)	(0.0011)
Year FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes	Yes
Time_trend	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.618	0.677	0.876	0.78	0.765
Observations	4000	4000	4000	4000	4000

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

Table 13: Regression Results:Industry Sectors 16-18

	(1) Fabric	(2) Cater	(3) Lease
DID	0.0173	0.0044***	0.0025***
	(0.0089)	(0.0011)	(0.0009)
Year FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes
Time_trend	Yes	Yes	Yes
Adj. R^2	0.762	0.773	0.817
Observations	4000	4000	4000

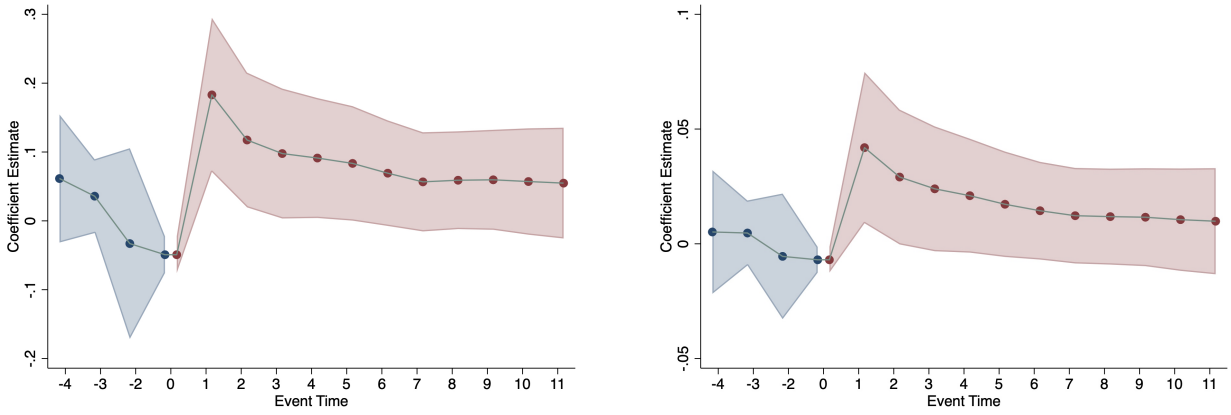
Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 14: Regression Results (Sector Gaps)

	(1)	(2)	(3)
	Fin_gap	Tech_gap	Science_gap
985	0.072***	0.089***	0.034***
	(0.003)	(0.005)	(0.004)
211	0.043***	0.038***	0.026***
	(0.002)	(0.003)	(0.009)
Fin	0.198***	0.233	-0.23
	(0.06)	(0.267)	(0.456)
Tech	-0.231	0.216***	0.113
	(0.391)	(0.034)	(0.298)
Science	0.651	0.213	0.108***
	(0.892)	(0.766)	(0.023)
Year FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes
Time_trend	Yes	Yes	Yes
Adj. R^2	0.754	0.798	0.866
Observations	4000	4000	4000

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

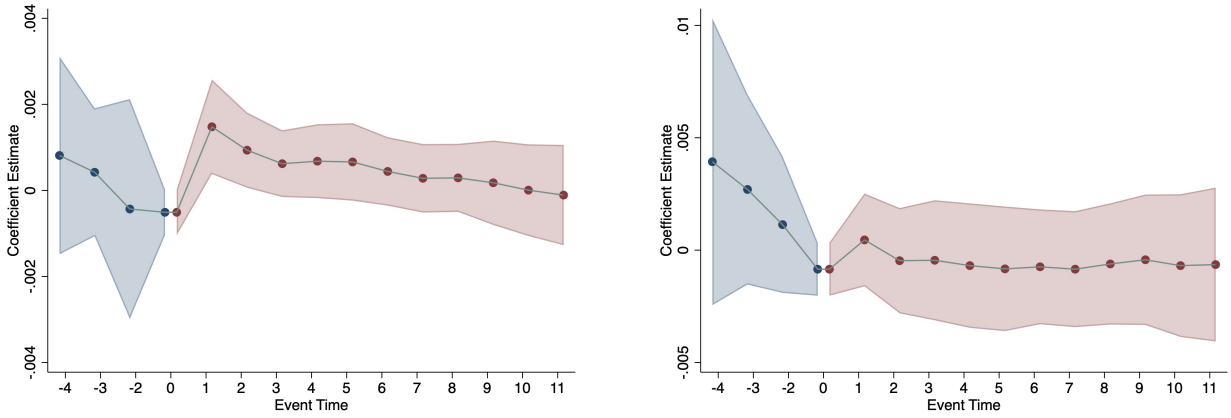
Figures



(a) student as explanatory variable (b)teacher as explanatory variable

Figure 1: Robust: excluding the impact of real estate market reform

Note: This figure shows the robust check results, by excluding the impact real estate market reform . Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable.



(a) student as explanatory variable (b)teacher as explanatory variable

Figure 2: Robust: excluding the impact of real estate market reform

Note: This figure shows the robust check results, by excluding the impact real estate market reform . Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable.