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

Yutian Lei† Zhipeng Qi ‡

December 9, 2024

Abstract

How can higher education reduce gender inequality? Taking the college expansion in China since 1999—the largest such expansion globally—as a quasi-natural experiment, we study whether and how college expansion narrows the entrepreneurship gender gap. Using novel business registration records and multiple data source, we show that college expansion significantly reduces the disadvantaged growth rate for female. We identify two main channels: (1) overcoming barriers specific to women's entrepreneurship: promoting mobility, greater family independence, marriage independence and fertility rates, and (2) transferring regional cultural and institutional characteristics (Confucian traditions, gender ratio imbalance, women education attainment). The narrow effect is driven by both knowledge-intensive firms and university's spillover effect on local women-friendly firms. College expansion also reduces the quality gap in entrepreneurship. Women who attended college demonstrated more advanced business management practices and more independent gender concepts than those without college education. Taken together, our asymmetrical effect results reveal how higher education can differentially affect genders when underlying structural constraints are gender-specific.

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.

†Lei: Sino-French Institute, Renmin University of China (E-mail:leiyutian0803@ruc.edu.cn)

‡Qi: School of Social Science Nanyang Technological University (E-mail: s240022@e.ntu.edu.sg)

1 Introduction

Gender equality is a fundamental pillar of human civilization, functioning as a transformative mechanism through which society can unlock its full economic and social potential Ben-Porath & Welch (1976); Bertrand (2011); Doepke et al. (2012); Duflo (2012). While 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 & Giuliano (2015); Acemoglu & Robinson (2021); Bau & 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 institutional 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). By examining the China's college expansion—the largest college enrollment expansion worldwide—we find that the college expansion can narrow the entrepreneurship gender gap by reshaping both formal and informal social institutional context.

Higher education plays an important role in reducing institutional 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 & 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, making it a critical

[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 & Goldberg (2024) for a comprehensive review)

context for understanding how education can overcome cultural barriers 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 records, firm survey data, national population census data and historical cultural data. Taking intensity difference-in-differences (DID) as our empirical strategy, we find that for every 1,000 more students admitted by university, there is an increase of 7 female entrepreneurs, while that of male is much less. Moreover, college expansion makes the increasing speed of female entrepreneur is much faster than that of male, indicating college expansion narrows the entrepreneurship gender gap.

To address potential endogeneity concerns arising from the non-random spatial distribution of universities, we use China's 1952 higher education reorganization to construct the Bartik 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 Bartik IV estimates corroborate our baseline findings, further highlighting that access to higher education significantly contributes to reducing the entrepreneurship gender gap.

We conduct 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.

Next, we show the narrowing effect is primarily driven by two distinct types of 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.

For the latter, We find that after the college expansion, the number of technology-intensive firms founded by women increased significantly. This result indicates that the college expansion gives more women the opportunity to go to college and start businesses based on the specific knowledge and skills they have acquired. However, we find that the similar firms founded by men had a significant increase trend before the expansion of college enrollment. Such asymmetrical results show that, only the increase of women's technology-intensive firms is mainly driven by college expansion. This results highlight the impotent role of college in knowledge transfer and reduce the gender gap, particularly in technology industry.

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, female entrepreneurs in areas with greater college access exhibit longer firm survival duration, higher survival rates, and increased investment propensity compared to their counterparts in areas with limited educational opportunities.

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 new evidence on narrowing entrepreneurship gender gap. Despite entrepreneurship 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 De Mel et al. (2014) or theoretical model to conduct the analyze Chiappori & Oreffice (2008); Egger et al. (2022); Chiplunkar & 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 & 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 the economic consequences of college expansion. 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 &Song (2015), federalism Qian & Roland (1998), and local government incentives Li & 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 & 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 & Katz (2002); Goldin (2023).The interaction between formal and informal institutions play an important role in shaping gender inequality Nunn (2012); Grosjean & 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 Institutional Background

In this part, we introduce college expansion and entrepreneurship gender gap in China, and discuss what does college expansion bring to narrow such gap.

2.1 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 [2] . To accommodate this influx, the number of higher education institutions (HEIs) rose 75% from 1,022 to 1,792, and full-time

[2]The data source is from:National Bureau of Statistics of China, 1999-2006

faculty increased 136% from 0.41 million to 0.97 million over the same period [3].

2.2 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 [4]. 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 [5].

Compared with men, women entrepreneurs in China face formidable obstacles rooted in traditional social constraints, institutional barriers, market structure impediments Rosenzweig & 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 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 [6], 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

[3]The data source is Ministry of Education of the PRC, 2006

[4]The source of this data is from National Bureau of Statistics of China, 2012

[5]The data source is from National Bureau of Statistics of China, 2012

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

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 .

3 Data and Research Design

3.1 Data Source

Firm registration data Our firm-level data is from Tianyancha, a firm offering universal China's firm registration records. 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[7] to get the longitude and latitude of the firm.

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

[7]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.

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).

3.2 Empirical Strategy

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

$$Y_{pt} = \beta_0 + \beta_1 \text{After}_t \times \text{Layoff}_p + \gamma_p + \eta_t + \epsilon_{pt}, \tag{1}$$

where p and t respectively index the province and the year, and Y_{pt} represents either the number of new firm registrations or the number of new entrepreneurs in province p in year t. After_t is a dummy variable that takes value 1 for years from 1998 onward, and 0 otherwise; Layoff_p measures the treatment intensity for province p, which we constructed according to Equation (4); γ_p and η_t controls a series of variables year or province related.

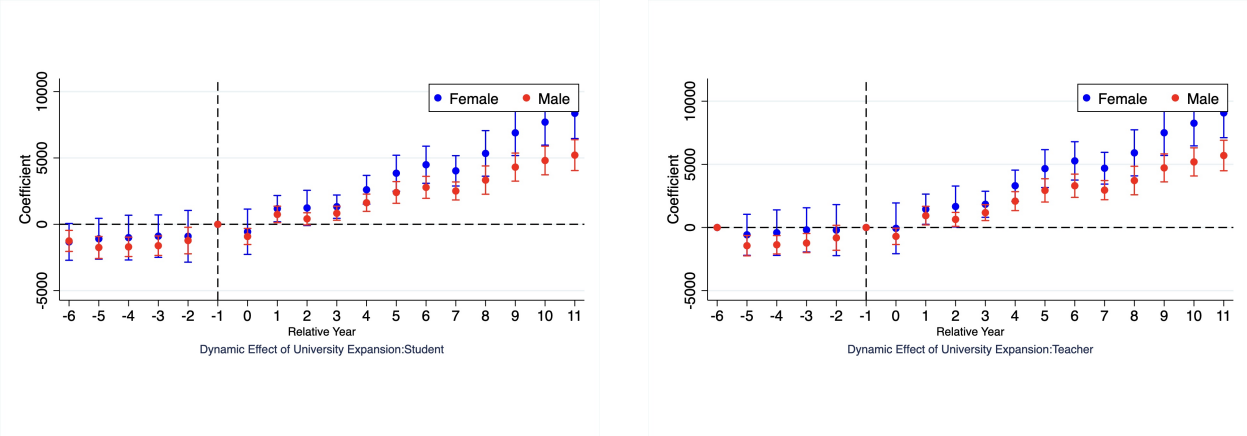
4 Whether the Expansion of College Expansion Affects Women Entrepreneurship

4.1 Baseline result

The paper investigates the impact of the substantial expansion of higher education in China since 1999 on the gender gap in entrepreneurship. Figure 1 depicts the dynamic effect of university expansion. We use both the increase of students and teacher as the measurement of college expansion.

Prior to the university expansion, the entrepreneurship coefficients for both female and male entrepreneurs follow similar trends. However, after the expansion (year 0 and beyond), a distinct divergence emerges between the entrepreneurship coefficients for females versus males. The female entrepreneurship coefficient increases substantially in the post-expansion period, indicating that the university expansion had a stronger positive effect on entrepreneurial outcomes for women compared to men. Conversely, the male entrepreneurship coefficient exhibits a more muted response, suggesting the university expansion did not provide the same level of boost to entrepreneurship for men as it did for women. The results show university expansion helped narrow the gender disparity in entrepreneurship.

The asymmetrical impact suggests that increasing access to university education may have been particularly beneficial for alleviating barriers or constraints that were more salient for female entrepreneurship.



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

Figure 1: Baseline regression results

Note: This figure shows the effect of college expansion on Male and Female entrepreneurship. Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable

Table 1: Regression Results on Entrepreneurship by Gender

Variables	Entrepreneurship (Male)		Entrepreneurship (Female)	
	(1)	(2)	(3)	(4)
DID	4546.16***		5607.176***	
	(425.05)		(703.71)	
DIDt		4983.47***		6273.872***
		(430.17)		(759.82)
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	5400	5400	5400	5400

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 2: Regression Results on Entrepreneurship by Gender and Speed

Variables	Entrepreneurship (Women)		Entrepreneurship (Male)		Speed	
	(1)	(2)	(3)	(4)	(5)	(6)
DID	-0.074		-0.051		0.0134177***	
	(0.08)		(0.13)		(0.00)	
DIDt		-0.079		-0.0373		0.011296***
		(0.08)		(0.13)		(0.00)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.598	0.614	0.683	0.688	0.124	0.128
Observations	5400	5400	5400	5400	5400	5400

Notes: This table reports the effect of college expansion on the share of male and female firms, and on the difference in growth rates between male and female firms, with columns (1)(2) reporting the did results for the share of female firms, (3)(4) reporting the did results for the share of male firms, and columns (5)(6) reporting the did for the difference in growth rate. Standard errors are reported in parentheses and clustered at the city level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.2 Which industry contributes more

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:

$$\text{IndustryInno}_{c,r,t} = \sum_{r=1}^{9} \beta_r \times (\text{Treatment}_c \times \text{Post}_t \times \text{Ring}_r) + d_r + d_t + d_t + \varepsilon_{c,r,t} \quad (2)$$

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.

Table 3: Regression Results on Service by Distance (Female)

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.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

knowledge-intensive firms Table 4 provides evidence on the differential impacts of college expansion on entrepreneurship across three distinct sectors: labor-intensive, technology-intensive, and capital-intensive industries. The results underscore critical heterogeneities in the policy's effects across gender and sectoral dimensions, offering significant insights into the role of human capital in shaping entrepreneurial activity.

The results in Columns (1) and (2) demonstrate that college expansion had a substantial impact on labor-intensive entrepreneurship, with the effect on male entrepreneurs being markedly larger. For men, the DID estimate is 3666.928 , indicating a significant increase in the number of labor-intensive firms. This reflects the structural advantage men often have in labor-intensive sectors, where physical capital, pre-existing experience, and traditional male-dominated networks are crucial for firm formation.

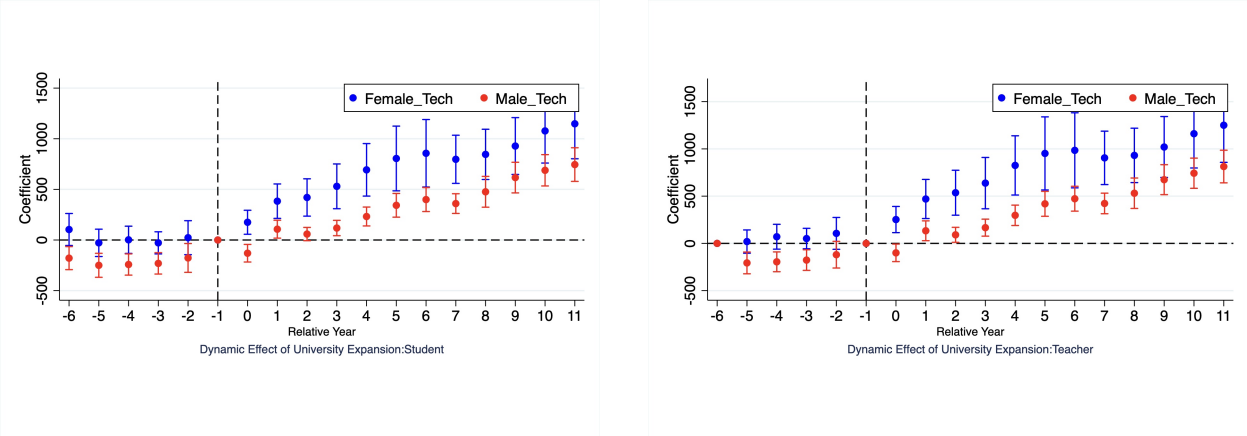
By contrast, the impact on female entrepreneurship, while statistically significant, is notably smaller, with a DID estimate of 683.46 . This gender disparity suggests that while access to higher education provided women with improved opportunities, other barriers—such as gender-specific constraints in access to informal networks, credit markets, or cultural norms around female employment in labor-intensive industries—likely limited their entrepreneurial potential in this domain.

Columns (3) and (4) shift the focus to technology-intensive sectors, where the college expansion policy appears to have facilitated a more pronounced reduction in gender gaps. The DID coefficient for male entrepreneurs in this sector is 1083.41 , indicating significant growth in technology-intensive entrepreneurship. Notably, the policy's impact on female entrepreneurs is also highly significant, with a DID estimate of 683.46 . This narrowing of the gender gap reflects the transformative role of human capital accumulation in leveling the playing field for women in industries where skill acquisition and technological knowledge are critical.

This result is consistent with theories of occupational crowding, which posit that barriers to female participation in high-skill sectors erode as education expands. By providing women with access to higher education, the policy enhanced their ability to compete in technology-driven industries, thereby reducing their reliance on traditional, lower-value-added activities. The result also aligns with endogenous growth theory, where investments in education disproportionately enhance productivity in skill-intensive industries, particularly for historically disadvantaged groups.

The results in Columns (5) and (6) reveal a surprising finding: in capital-intensive sectors, the policy had a larger estimated impact on female entrepreneurs compared to their male counterparts . This reversal of traditional gender patterns may be indicative of two interrelated mechanisms. First, the expansion of higher education likely improved women's access

to financial and social capital through formalized networks, reducing historical disadvantages in credit markets and enabling greater participation in capital-intensive entrepreneurship. Second, women may have leveraged newly acquired managerial and business skills to enter sectors where entry barriers are traditionally higher for female entrepreneurs.



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

Figure 2: Knowledge-intensive firm regression results

Note: This figure shows the effect of college expansion on Male and Female Knowledge-intensive entrepreneurship. Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable.

Table 4: Regression Results on Entrepreneurship by Labor, Tech, and Capital

Variables	Labor		Tech		Capital	
	Male	Female	Male	Female	Male	Female
DID	3666.928***		683.46***		852.95***	
	(470.09)		(129.17)		(121.27)	
DIDt		4082.854***		1083.41***		997.4***
		(506.64)		(148.59)		(129.68)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.712	0.765	0.732	0.719	0.801	0.786
Observations	5400	5400	5400	5400	5400	5400

Notes: This table reports the effect of college expansion on the number of firms that are labour-intensive, technology-intensive, and capital-intensive for men and women, with the dependent variable being the number of firms that are labour-intensive, technology-intensive, and capital-intensive for men/women, respectively.Columns (1) , (3) and (5) 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), (4) and (6) 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. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.3 Bartik 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 Bartik 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.

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.

5 How the Expansion of College Expansion Affects Women Entrepreneurship

5.1 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.

Table 5: Regression Results on Entrepreneurship by Birth and Gender

Variables	Entrepreneurship (Female)		Entrepreneurship (Male)	
	(1)	(2)	(3)	(4)
DiD*birth	21.08373***		23.00312	
	(1.59)		(22.15)	
DiDt*birth		14.49876***		19.27968
		(1.54)		(17.56)
DID	4644.79***		3483.275***	
	(421.08)		(420.97)	
DIDt	5093.98***		3925.175***	
	(429.78)		(460.54)	
birth	155.2024***	109.1042***	188.1931	163.0683
	(83.50)	(81.80)	(70.06)	(66.92)
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	5400	5400	5400	5400

Notes: This table reports the results of our mechanism tests, where we use the birth rate as the channel variable, its cross-multiplier with the policy shock variable as the dependent variable, and control for the channel variable and the policy shock variable.Columns (1) and (2) report their impact on the number of female enterprises, and columns (3) and (4) report their impact on the number of male enterprises. Standard errors are reported in parentheses and clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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.

Table 6: Regression Results on Entrepreneurship by Mobility and Gender

Variables	Entrepreneurship (Female)		Entrepreneurship (Male)	
	(1)	(2)	(3)	(4)
DiD*mobility	31.5273***		5.08373	
	(3.76)		(4.97)	
DiDt*mobility		26.7836***		4.876
		(2.98)		(4.10)
DID	4132.39***		5409.88***	
	(470.12)		(509.71)	
DIDt		3709.18***		5183.23***
		(308.12)		(498.73)
mobility	209.2***	196.75***	55.2	59.1
	(33.86)	(31.54)	(43.49)	(41.79)
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	5400	5400	5400	5400

Notes: This table reports the results of our mechanism tests, where we use the mobility rate as the channel variable, its cross-multiplier with the policy shock variable as the dependent variable, and control for the channel variable and the policy shock variable.Columns (1) and (2) report their impact on the number of female enterprises, and columns (3) and (4) report their impact on the number of male enterprises. Standard errors are reported in parentheses and clustered at the firm level. denotes significance at 1%, at 5%, and at 10%.

5.2 Concerning the regional character

Our analysis reveals that the expansion of college enrollment significantly reduces the gender gap in entrepreneurship. This effect is more pronounced in regions where Confucian culture exerts a stronger influence, characterized by traditional gender norms that have historically limited women's economic participation. Specifically, we find that the narrowing of the gender gap is amplified in areas where women previously had lower levels of educational attainment, lower survival rates, and reduced labor force participation rates. These results suggest that increased access to higher education not only fosters entrepreneurial activity among women but also helps counteract structural disadvantages rooted in cultural and

socioeconomic constraints. Importantly, the differential impacts of college expansion across regions underscore the role of local cultural factors in shaping the responsiveness of gender-specific outcomes to policy interventions. The robustness of these findings is confirmed through a series of sensitivity analyses, including instrumental variable estimation to address potential endogeneity concerns and the inclusion of regional fixed effects to account for unobserved heterogeneity. Collectively, these results provide compelling evidence that higher education policy can serve as a catalyst for narrowing gender disparities in entrepreneurship, particularly in contexts where structural barriers to women's economic empowerment are most pronounced.

Table 7: Regression Results on Various Factors

Variables	Jinshi	Ratio Wenmang	Total Work	Women Live	First Marriage
DID*dummy	776.4813***	303.4387**	281.9661*	446.0493***	693.0234***
	(152.11)	(138.65)	(158.04)	(146.09)	(137.57)
DIDt*dummy	1136.376***	362.7989**	456.5868*	697.3074***	1020.507***
	(207.44)	(195.76)	(226.38)	(197.82)	(184.23)
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	5400	5400	5400	5400	5400

Notes: This table reports the results of our regressions using grouped dummy variables, from columns (1) to (5), the dummy variables used are proxies for traditional culture, the right to education, the right to work, the right to basic subsistence, and marital autonomy, and the dependent variable is the interaction term between the policy shock and the grouped variable.Standard errors are reported in parentheses and clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

6 Further Evidence

6.1 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.

Table 8: Regression Results on Active Participation by Gender

Variables	Active Participation (Female)		Active Participation (Male)	
	(1)	(2)	(3)	(4)
DID	2176.32***		2832.016***	
	(314.23)		(354.86)	
DIDt		2967.27***		3175.967***
		(298.76)		(384.52)
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	5400	5400	5400	5400

Notes: This table reports estimated the impact of college expansion on the quality of entrepreneurship. 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 active 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 firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

6.2 What does college bring to women entering college

Our study examines the impact of college education on women's socio-economic outcomes. The results, presented in Table 9, indicate that women who attended college exhibited significantly more advanced business management practices and developed stronger independent gender concepts compared to those without college education. Specifically, the coefficient for "Organization Advance" is 0.367 , indicating that college education is associated with a 36.7% improvement in organizational modernization and business management capabilities. Similarly, the coefficient for "Self-recognition" is 0.524, reflecting a substantial enhancement in women's self-perception and independent gender awareness. These findings suggest that higher education plays a critical role in empowering women, fostering more progressive social attitudes, and equipping them with skills relevant for organizational leadership and personal development.

In addition, the results highlight positive yet heterogeneous effects across other dimensions. For example, women's participation in political activities, proxied by the variable "Political", increased significantly, with a coefficient of 0.187. This finding underscores the transformative influence of education in increasing civic engagement. While the impact on technological industry advancement ("Tech Industry") and funding source modernization ("Fund Source") is comparatively smaller—coefficients of 0.039 and 0.031, respectively—they remain statistically significant, affirming the multifaceted benefits of education.

These results are robust to the inclusion of year and province fixed effects, as well as year-province interaction terms. Observations across outcomes range from 3,143 to 3,330, and standard errors are clustered at the firm level to account for heterosexuality. Collectively, these findings underscore the pivotal role of higher education in enhancing women's professional and social outcomes in developing economies.

Table 9: Regression Results on Various Factors

Variables	Organization Advance	Tech Industry	Political	Self-recognition	Fund Sou
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, technologisation of the industry, level of political participation, social I self-perception, and a proxy variable for modernisation of funding sources.Standard errors are reported in parentheses and clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

7 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 asymmetric - generating approximately seven new female entrepreneurs per thousand additional college admissions, significantly exceeding the male response. This asymmetry reveals how educational access can differentially affect genders when underlying structural constraints are gender-specific.

Our mechanisms analysis yields crucial insights into 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 **?**.

Reference

Acemoglu, D., & Robinson, J. A. (2021). Culture, institutions and social equilibria: A framework (No. w28832). *National Bureau of Economic Research*.

Alesina, A., Giuliano, P., & Nunn, N. (2013). On the origins of gender roles: Women and the plough. *The Quarterly Journal of Economics*, 128(2), 469–530.

Alesina, A., & Giuliano, P. (2015). Culture and institutions. *Journal of Economic Literature*, 53(4), 898–944.

Almond, D., Li, H., & Zhang, S. (2019). Land reform and sex selection in China. *Journal of Political Economy*, 127(2), 560–585.

Amornsiripanitch, N., Gompers, P. A., Hu, G., & Vasudevan, K. (2021). Getting schooled: The role of universities in attracting immigrant entrepreneurs (No. w28773). *National Bureau of Economic Research*.

Ashraf, N., Bau, N., Nunn, N., & Voena, A. (2020). Bride price and female education. *Journal of Political Economy*, 128(2), 591–641.

Bau, N., & Fernández, R. (2023). Culture and the family. In *Handbook of the Economics of the Family* (Vol. 1, No. 1, pp. 1–48). North-Holland.

Beaman, L., Duflo, E., Pande, R., & Topalova, P. (2012). Female leadership raises aspirations and educational attainment for girls: A policy experiment in India. *Science*, 335(6068), 582–586.

Ben-Porath, Y., & Welch, F. (1976). Do sex preferences really matter? *The Quarterly Journal of Economics*, 90(2), 285–307.

Bertrand, M. (2011). New perspectives on gender. In *Handbook of Labor Economics* (Vol. 4, pp. 1543–1590). Elsevier.

Bils, M., & Klenow, P. J. (2000). Does schooling cause growth? *American Economic Review*, 90(5), 1160–1183.

Bisin, A., & Verdier, T. (2001). The economics of cultural transmission and the dynamics of preferences. *Journal of Economic Theory*, 97(2), 298–319.

Bisin, A., & Verdier, T. (2024). On the joint evolution of culture and political institutions: Elites and civil society. *Journal of Political Economy*, 132(5), 1485–1564.

Blattman, C., Fiala, N., & Martinez, S. (2014). Generating skilled self-employment in developing countries: Experimental evidence from Uganda. *The Quarterly Journal of Economics*, 129(2), 697–752.

Boelmann, B. (2024). Women's missing mobility and the gender gap in higher education: Evidence from Germany's university expansion (No. 280). *ECONtribute Discussion Paper*.

Brandt, L., Van Biesebroeck, J., Wang, L., Zhang, Y. (2017). WTO accession and performance of Chinese manufacturing firms. American Economic Review, 107(9), 2784-2820.

Caner, A., Derebasoglu, M., & Okten, C. (2024). Attainment and gender equality in higher education: Evidence from a large-scale expansion. *Journal of Human Capital*, 18(3), 469–530.

Carland, J. W., Hoy, F., Boulton, W. R., & Carland, J. A. C. (1984). Differentiating entrepreneurs from small business owners: A conceptualization. *Academy of Management Review*, 9(2), 354–359.

Cha, Y. (2010). Reinforcing separate spheres: The effect of spousal overwork on men's and women's employment in dual-earner households. *American Sociological Review*, 75(2), 303–329.

Chen, S., Oliva, P., & Zhang, P. (2022). The effect of air pollution on migration: Evidence from China. *Journal of Development Economics*, 156, 102833.

Chiappori, P. A., & Oreffice, S. (2008). Birth control and female empowerment: An equilibrium analysis. *Journal of Political Economy*, 116(1), 113–140.

Chiplunkar, G., & Goldberg, P. K. (2024). Aggregate implications of barriers to female entrepreneurship. *Econometrica*, 92(6), 1801–1835.

Deaux, K. (1985). Sex and gender. *Annual Review of Psychology*, 36(1), 49–81.

De Mel, S., McKenzie, D., & Woodruff, C. (2014). Business training and female enterprise start-up, growth, and dynamics: Experimental evidence from Sri Lanka. *Journal of Development Economics*, 106, 199–210.

Doepke, M., Tertilt, M., & Voena, A. (2012). The economics and politics of women's rights. *Annual Review of Economics*, 4(1), 339–372.

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, 50(4), 1051–1079.

Egger, D., Haushofer, J., Miguel, E., Niehaus, P., & Walker, M. (2022). General equilibrium effects of cash transfers: Experimental evidence from Kenya. *Econometrica*, 90(6), 2603–2643.

Fernández, R., Fogli, A., & Olivetti, C. (2004). Mothers and sons: Preference formation and female labor force dynamics. *The Quarterly Journal of Economics*, 119(4), 1249–1299.

Fernández, R., & Fogli, A. (2009). Culture: An empirical investigation of beliefs, work, and fertility. *American Economic Journal: Macroeconomics*, 1(1), 146–177.

Fernández, R. (2013). Cultural change as learning: The evolution of female labor force participation over a century. *American Economic Review*, 103(1), 472–500.

Field, E., Jayachandran, S., & Pande, R. (2010). Do traditional institutions constrain female entrepreneurship? A field experiment on business training in India. *American Economic Review*, 100(2), 125–129.

Goldin, C. (1990). *Understanding the gender gap: An economic history of American women.* Oxford University Press.

Goldin, C. D. (1991). The role of World War II in the rise of women's employment. *The American Economic Review*, 741–756.

Goldin, C. (2023). Why women won (No. w31762). *National Bureau of Economic Research.*

Goldin, C., & Katz, L. F. (2002). The power of the pill: Oral contraceptives and women's career and marriage decisions. *Journal of Political Economy*, 110(4), 730–770.

Grosjean, P., & Khattar, R. (2019). It's raining men! Hallelujah? The long-run consequences of male-biased sex ratios. *The Review of Economic Studies*, 86(2), 723–754.

Hershatter, G. (2011). *The gender of memory: Rural women and China's collective past* (Vol. 8). Univ of California Press.

Hsieh, C. T., & Song, Z. M. (2015). Grasp the large, let go of the small: The transformation of the state sector in China (No. w21006). National Bureau of Economic Research.

Johnson, K. A. (2009). *Women, the family, and peasant revolution in China*. University of Chicago Press.

Li, J., Liu, S., & Wu, Y. (2020). Identifying knowledge spillovers from universities: Quasi-experimental evidence from urban China. Available at SSRN 3621422.

Liu, C., Lu, W., & Yuan, Y. (2025). The quiet revolution: Send-down movement and female empowerment in China. *Journal of Development Economics*, **172**, 103379.

Lowes, S. (2022). Culture in historical political economy (No. w30511). *National Bureau of Economic Research*.

Ma, X. (2024). College expansion, trade, and innovation: Evidence from China. *International Economic Review*, 65(1), 315–351.

Nunn, N. (2012). Culture and the historical process. *Economic History of Developing Regions*, 27(sup-1), 108–126.

Qian, N. (2008). Missing women and the price of tea in China: The effect of sex-specific earnings on sex imbalance. *The Quarterly Journal of Economics*, 123(3), 1251–1285.

Qian, Y., Roland, G. (1998). Federalism and the soft budget constraint. American economic review, 1143-1162.

Rosenzweig, M. R., & Schultz, T. P. (1982). Market opportunities, genetic endowments, and intrafamily resource distribution: Child survival in rural India. *The American Economic Review*, 72(4), 803–815.

Rosenzweig, M. R., & Zhang, J. (2009). Do population control policies induce more human capital investment? Twins, birth weight, and China's "one-child" policy. *The Review of Economic Studies*, 76(3), 1149–1174.

Song, Z., Storesletten, K., & Zilibotti, F. (2011). Growing like China. *American Economic Review*, 101(1), 196–233.

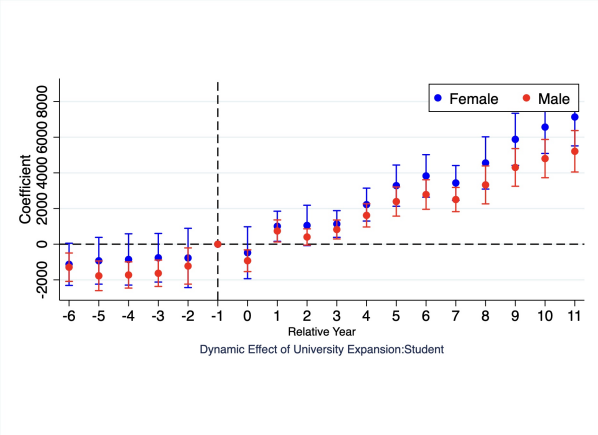
Wu, L., Yan, K., & Zhang, Y. (2020). Higher education expansion and inequality in educational opportunities in China. *Higher Education*, 80(3), 549–570.

Xue, M. M. (2016). High-value work and the rise of women: The cotton revolution and gender equality in China. Available at SSRN 2389218.

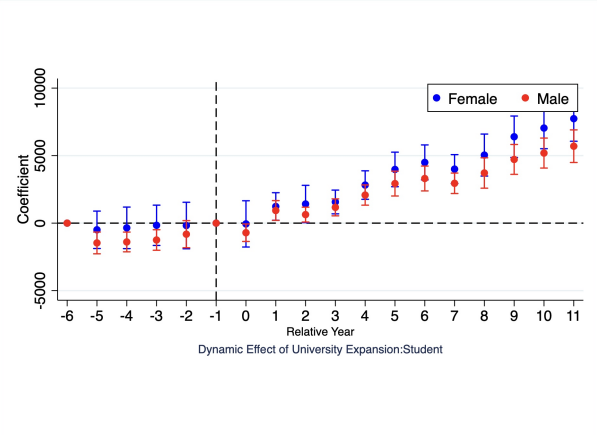
Li, H., Zhou, L. A. (2005). Political turnover and economic performance: the incentive role of personnel control in China. Journal of public economics, 89(9-10), 1743-1762.

Online Appendix

Appendix A: More Concerning Robustness Checks



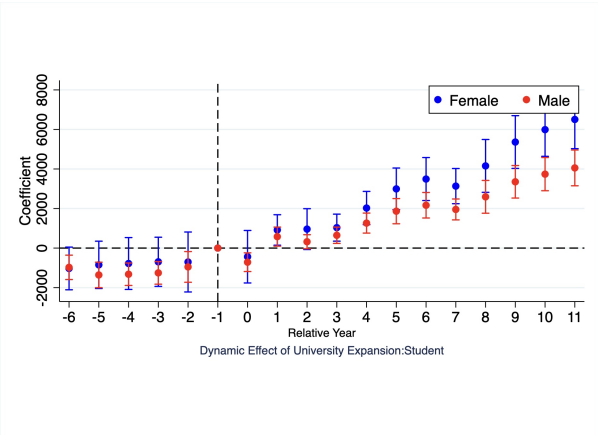
(a) student as explanatory variable



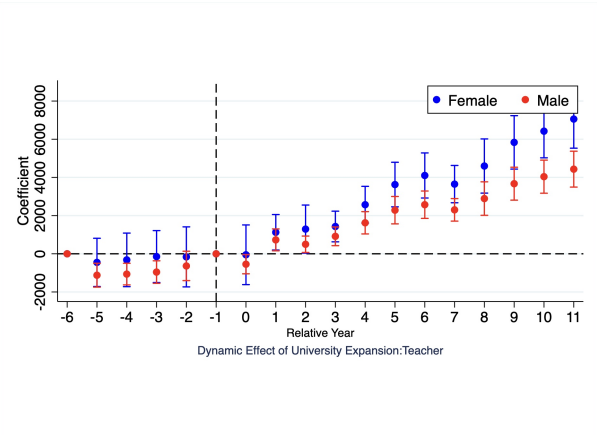
(b)teacher as explanatory variable

Figure 3: Robust:changing the algorithm for predicting gender

Note: This figure shows the robust check results, by changing the algorithm for predicting gender . Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable.



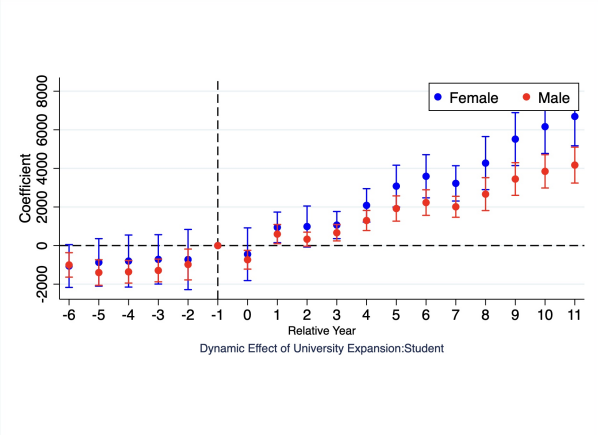
(a) student as explanatory variable



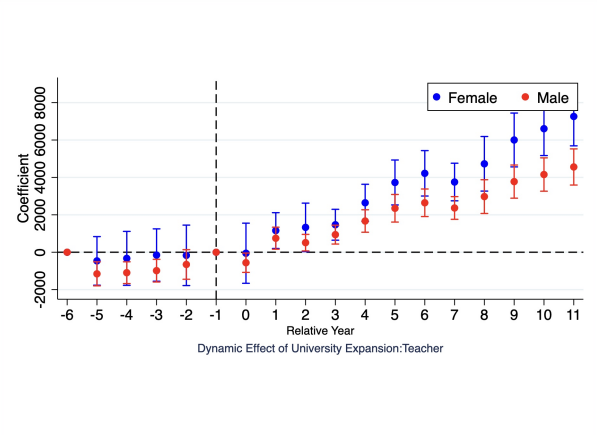
(b)teacher as explanatory variable

Figure 4: 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.



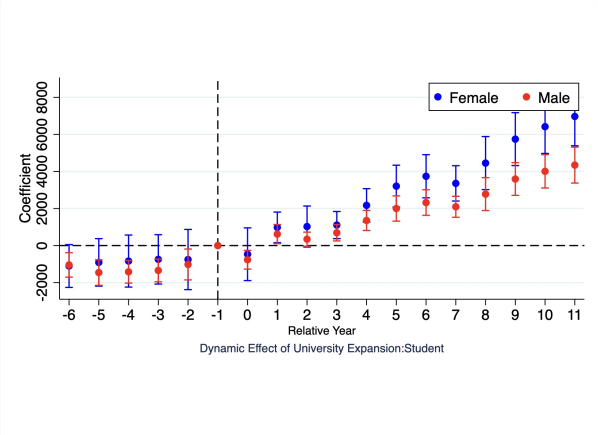
(a) student as explanatory variable



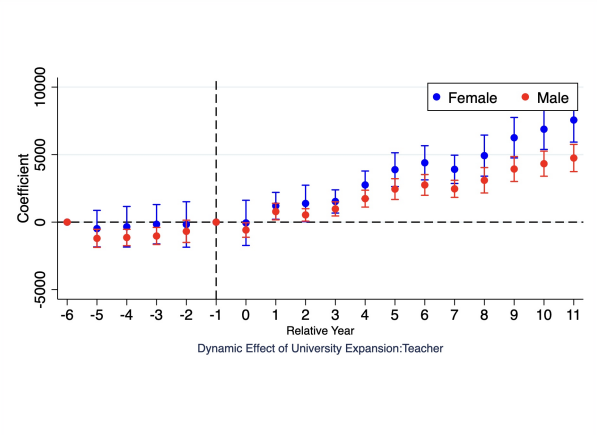
(b)teacher as explanatory variable

Figure 5: Robust: excluding the impact of SOE reform

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



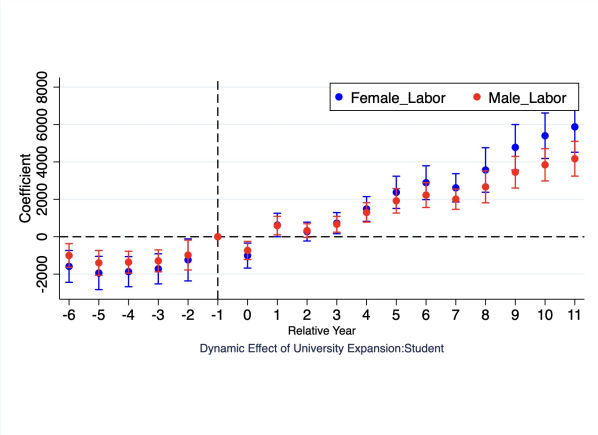
(a) student as explanatory variable



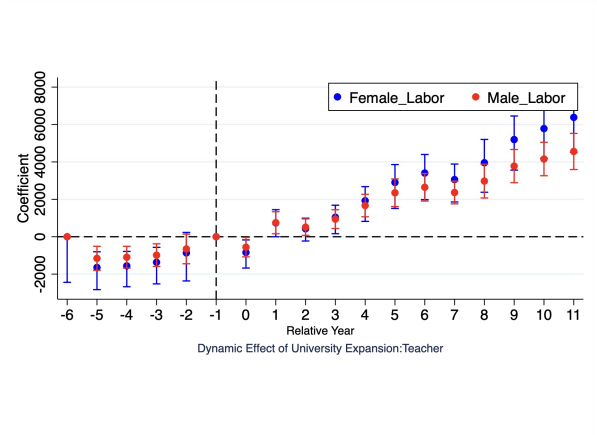
(b)teacher as explanatory variable

Figure 6: Robust: excluding the impact of WTO

Note: This figure shows the robust check results, by excluding the impact of entering WTO . Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable.



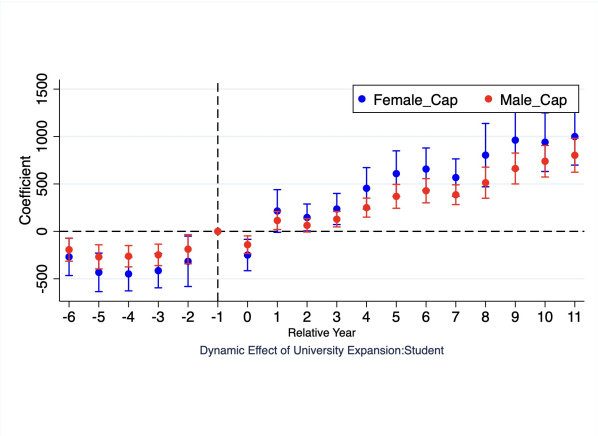
(a) student as explanatory variable



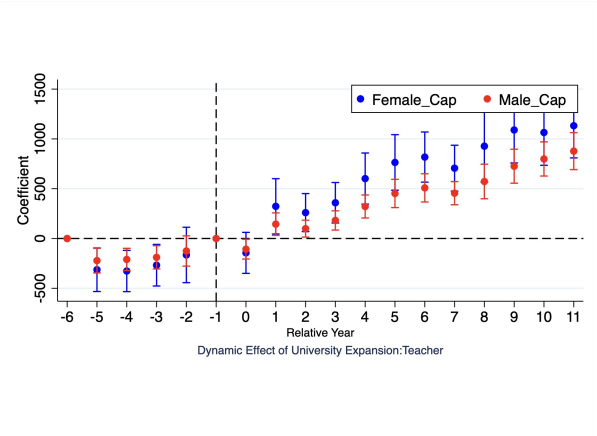
(b)teacher as explanatory variable

Figure 7: Labor-intensive firm regression results

Note: This figure shows the effect of college expansion on Male and Female Labor-intensive entrepreneurship. 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 8: Capital-intensive firm regression results

Note: This figure shows the effect of college expansion on Male and Female Capital-intensive entrepreneurship. Figure (a) takes student as explanatory variable, while (b) takes teacher as explanatory variable.

Table 10: Descriptive Statistics of Main Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
y1_woemn	5400	3330.60	5630.70	0.0067	63539.87
y2_women	5400	9366.75	16451.37	1	171232
y3_women	5400	35.16	4.04	0.67	66.44
y1_men	5400	5775.35	9680.67	0.50	107692.1
y2_men	5400	13463.87	20189.76	1	267691
y3_men	5400	64.85	4.05	33.56	99.33
speed_dif	5400	-0.0398	0.2064	-1.3028	0.4377
DID	5400	6.34	4.85	0	13.69
DIDt	5400	4.81	3.51	0	10.97

Notes: The table presents the descriptive statistics for the main variables in the dataset.

Table 11: Descriptive Statistics of Gender-Specific Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
birth	5400	6.27	4.89	-16.64	68.70
mobility_men	5400	2734.85	2946.37	458	7259
Mobility_women	5400	1909.51	2376.04	324	6052
Jinshi	267	182.75	250.73	1	1641
ratio_wenmang	30	1.05	0.05	0.94	1.67
total_work	30	7232.20	4195.24	867	23665
women_live	30	0.98	0.02	0.82	1
first_marige	30	22.10	0.79	18.68	24.84

Notes: The table presents the descriptive statistics of gender-specific variables.

Table 12: Descriptive Statistics for Key Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Organization Advance	3440	5.64	3.99	0	10
Political	3497	1.08	0.98	0	3
Self-recognition	3449	1.68	1.59	0	6
Tech Industry	3400	0.31	0.46	0	1
Fund Source	3309	0.50	0.50	0	1

Notes: The table presents the descriptive statistics for key variables.

Table 13: Regression Results on Entrepreneurship by Gender

Variables	Entre_male_weight		Entre_female_weight	
	(1)	(2)	(3)	(4)
DID	2092.97***		3145.819***	
	(263.42)		(394.51)	
DIDt		2336.56***		3525.959***
		(283.44)		(427.10)
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes
Adj. R^2	0.765	0.754	0.732	0.745
Observations	4815	4581	4815	4581

Notes: Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The table reports the results of DID regressions with fixed effects at the city and year levels.

Table 14: Regression Results on Entrepreneurship by Gender

Variables	Entrepreneurship (Male)		Entrepreneurship (Female)	
	(1)	(2)	(3)	(4)
DID	4546.16***		5607.176***	
	(425.05)		(703.71)	
DIDt		4983.47***		6273.872***
		(430.17)		(759.82)
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
i.idc.year	Yes	Yes	Yes	Yes
Clustering at City	Yes	Yes	Yes	Yes
Adj. Adj. R^2	0.788	0.794	0.791	0.799
Observations	5400	4581	4815	4581

Notes: Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The table reports the results of DID regressions with fixed effects at the city and year levels, as well as clustering at the city level.