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Impact of two-child policy on female employment and corporate performance: Empirical evidence from Chinese listed companies from 2010 to 2020

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In 2013, the ‘Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform’ initiated the ‘selective two-child policy’, which allowed married couples to have two children if one of the parents was a single child. In the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China in 2015, a decision was made to implement the policy that a couple can have two children; in 2016, the universal two-child policy was fully implemented. This study used female employment data disclosed by Chinese listed companies from 2010 to 2020, constructed a two-way fixed-effect model of time and industry, and empirically tested the impact of the two-child policy on female employment and corporate performance. The empirical test revealed that the higher the proportion of employed female workers, the better the firm’s performance. Expanding the scope of the two-child policy exhibited no reduction in the proportion of female employment, but weakened the positive effect of hiring female employees on corporate performance. Specifically, we found that firms with higher rates of female employment exhibit lower costs, and this low-cost effect disappears with the expansion of the scope of the second-child policy. This indicates that the economic benefits of female employment for firms result from wage discrimination. This study provides a theoretical and practical basis for safeguarding women’s reproductive and fair employment rights and promoting sustainable social development.

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Introduction

In 2002, the Population and Family Planning Law of the People's Republic of China officially implemented the 'two-child policy', thus allowing eligible couples to have two children. In 2013, the Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform instituted the 'selective two-child policy'—allowing married couples to have two children if one of the parents is a single child. In 2015, the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China decided to implement the policy that any couple could have two children, and in 2016, the 'two-child policy' became universal. Notably, discrimination against women in employment and its underlying mechanism are crucial social issues. This study investigated how the expansion of the scope of the two-child policy affected the employment of female employees and how this mechanism impacts corporate performance.

Existing studies have explored this issue from three perspectives: fertility and employment, gender diversity, and employment discrimination. Using panel data from 2011, 2013, 2015, and 2017 China Household Finance Survey (CHFS), Meng and Lyu (2022) explored the subsequent two-child policy's impact on fertility and maternal labour supply and found that an increase in the number of children impeded the maternal labour supply; one additional child reduced the maternal labour force participation rate by 3.8%. Based on 6515 sampling data from the China Health and Nutrition Survey on 12 provinces, autonomous regions, and municipalities in China between 1989 and 2011, Zhuang (2020) found that the number of children restricts urban women's employment and formal employment. Mothers with two children and three or more children are about 0.689 and 1.079 times, respectively, more likely to experience reduced employment than mothers with one child. Zhang (2022), based on 3720 panel data from the China Household Tracking Survey conducted between 2014 and 2018, found that the expansion of the fertility policy significantly negatively impacts women's weekly working hours. Xu and Chen (2022) used data from the 2017 China General Social Survey with 573 women, and found that having children negatively impacts female employment; in particular, having two or more children significantly reduces the probability of female employment. Women with two or more children were about 33.5% less likely to be employed than women with one child. Using data on 969 non-twin and 697 twin rural households and 624 non-twin and 542 twin urban households from the China Twin Child Survey (CTS), Guo et al. (2018) demonstrated that the rural sample exhibited a negative correlation between fertility and parental labour supply; one additional child reduced the probability of a mother working by 6% and weekly working hours also decreased as fertility rates increased. However, in the urban sample, fertility did not reduce the labour supply of parents. Huang (2018) statistically analysed the two-child policy's impact on the occupation of Chinese urban women using a sample of professional women aged 21–50 in Shenyang, China, and found that the universal two-child birth policy exhibits both positive and negative effects on the career development of urban working women. Yang (2017) analysed the survey data on the fertility and employment situation of 2023 urban married women from May to September 2016 and found that the reproductive process, pregnancy, childbirth, and child-rearing significantly adversely impact female employment. Childbirth adversely impacted the employment of 45.81% of urban women, and pregnancy, childbirth, and child-rearing affected women's employment by 20–36%. Tong and Gong (2020), based on a sample of 16,000 households in the 2016 China Family Panel Study (CFPS) data, demonstrated that an increasing number of childbirths exhibits both negative and positive effects on the labour force

participation of married women, revealing a 'U'-shaped nonlinear relationship.

Based on gender diversity, Liu et al. (2014) empirically tested board gender diversity's impact on corporate performance from 1999 to 2011 based on a sample of 16,964 financial and board of directors of more than 2000 Chinese listed companies, and the results demonstrated that board gender diversity positively affects firm performance, and boards with three or more female directors exhibit a greater impact on firm performance than boards with two or fewer female directors. Wu et al. (2021) based on data from Chinese and UK companies—demonstrated that high gender diversity levels in top management teams (TMT) or boards of directors (BOD) precipitate greater organisational innovation, which ultimately improves firm performance. Woolley et al. (2010) revealed that teams with a higher proportion of women performed better because team members' average social sensitivity level was higher. Using working groups from Chinese companies, Zhang and Hou (2012) found a positive relationship between gender diversity and group performance. Based on 1,158,200 manufacturing sample data and 2,354,746 service industry sample data from the 2004 and 2008 China Economic Census survey, Wang and Wei (2017) demonstrated that, on average, women's productivity in manufacturing enterprises is 34.1% lower than men's productivity, but no significant difference exists in service enterprises.

Berik et al. (2004) used employer discrimination theory to find that discrimination is inconsistent with increasing competitiveness. Kawaguchi (2007) examined the empirical significance of employer discrimination theory and revealed that increasing the proportion of female workers in firms increased profits. Agarwal et al. (2020) investigated the direct impact of fertility relaxation on the gender wage gap based on an anonymised 2012–2014 employer–employee matching dataset from over 100,000 employers and ~5.4 million employees in major Chinese cities and demonstrated that female new hires were paid 1.8% lower than male new hires after the policy shock, thus precipitating a 34% increase in the gender pay gap in the data. Chi and Li (2014) explored the gender employment and gender pay gaps in China, and demonstrated an overall decline in China's employment rate, with female workers exhibiting a greater decline than male workers; the raw gender pay gap from 2005 to 2009 was underestimated by 12–14%. Cooke (2017) explored the employment impact of China's two-child policy on female college graduates and demonstrated that the policy would significantly impact Chinese female college graduates' employment prospects, thus exacerbating labour market discrimination against female graduates. Luo et al. (2019) discussed the changing characteristics of gender wages, especially the influence of industry structure and discriminatory factors on gender wages. The study found relatively serious gender discrimination in most industries and discriminatory factors that precipitate the gender wage gap.

Although previous studies have analysed the economic consequences of female fertility and female labour force participation, these were mainly based on census and laboratory data, which are collected every few years, and no direct data supporting female employment, fertility, and productivity levels are available. Based on Kahn et al. (1964) role conflict theory, Copeland (1988) diversity theory, and Becker's (1971) employer discrimination theory, we constructed a model illustrating the mechanism of the two-child policy's effect on female employment and corporate performance to combine the factors of work–family, team diversity, and employer discrimination perspective. Through the manual collection, sorting, and text-mining of corporate social responsibility reports of Chinese listed companies, this study presented the actual situation of female employment in Chinese

listed companies and the real data regarding its impact on enterprise production efficiency. On one hand, this significantly alleviates the problem of insufficient continuity in census data and limited universality of questionnaires and experimental data. Additionally, studying the two-child policy, an external quasi-natural experimental event empirically alleviates the endogenous problem in existing research: the question of whether fertility selection is caused by low productivity or productivity is reduced by reproductive selection. Based on data from Chinese listed companies from 2010 to 2020, this study used return on assets (ROA) and TobinQ as measures of firm performance to empirically examine the impact of the two-child policy on female employment and firm performance. This study presented evidence that confirmed a direct relationship between female fertility and firm performance, filled the gap in the literature, and provided a rationale and empirical basis for reducing gender discrimination, as well as achieving higher quality and fuller employment for women.

This study is structured as follows: Section “Literature review” presents the literature review; Section “China’s fertility policy and female employment” discusses China’s birth policy and women’s employment status; Section “Research hypothesis” illustrates the research hypotheses; Section “Data and methods” describes the experimental research design; Section “Results” reports the analysis of empirical results; and finally, Section “Conclusions” presents the conclusions.

Literature review

The literature on female employment primarily includes the study of the impact of reproductive behaviour on female labour supply, the impact of female structural proportion on organisational performance, and employment discrimination. Using 2005 Chinese census data, Cao (2019) demonstrated that the labour force participation of mothers with two children decreased by 4.6 percentage points and labour supply intensity (working hours) decreased by 1.4 h. Li (2021) reviewed relevant studies on China’s two-child policy and found that this policy could promote the expansion of China’s labour market and economic development. Zhang (2022) found that public sector households where the first child is a daughter (husbands working in the public sector) have fewer children and wives exhibit a greater labour supply than in non-public sector households where the first child is a son.

Further research has revealed that fertility exhibits a long-term negative impact on female labour participation. Angrist and Evans (1998) found that an increase in the number of children born significantly reduced female labour force participation and labour supply. Becker (1985) argued that bearing and raising children can limit women’s career choices. Huang et al. (2021) found that stricter birth restrictions lead to young people achieving higher levels of education, more white-collar workers, postponing marriage, and decreasing fertility. Fertility restrictions imposed on young people have powerful repercussions throughout their lifespan. Kahn et al. (2014) believed that having children is beneficial to women, career impacts are temporary, and women tend to return to work as their children grow, thereby making up for the delay in their career progression. van Steenberg and Ellemers (2009) found that women’s experience in work and family roles helps them achieve better organisational performance than men, based on working hours, number of children, or parenting arrangements.

Most studies on women’s productivity and its impact on organisational performance believe that women’s productivity is lower than that of men’s. In the German context, Pfeifer and Wagner (2014) demonstrated that women’s productivity is generally lower than that of men’s globally. David et al. (2016)

assumed that women are weaker than men in terms of bargaining power. Flory et al. (2015) believed that women’s competitiveness is weaker than that of men’s, and Krishnan and Parsons (2008) believed that compared to men, women exhibit a weaker tolerance for high risks and can bring a more stable management style to companies; therefore, enterprises with more women exhibit better corporate performance.

Gender diversity theories generally believe that a higher ratio of female participation in the labour force effectively improves team performance. Tsou and Yang (2019) used a sample of Chinese manufacturing firms in 2004 and found that firms with higher proportions of female workers exhibit lower productivity but increasing the proportion of female workers with higher education significantly improves firm performance. Brahma et al., (2020), based on data from FTSE 100 companies in the UK, found a significant positive relationship between gender diversity and corporate performance. Zhu et al. (2022) used a small group data sample of non-financial listed companies in Pakistan from 2005 to 2020 and demonstrated that the proportion of female directors and CEOs on the board significantly positively impacts corporate sustainability performance. However, Solal and Snellman (2019) found that companies with diverse boards experience a decline in market value and that companies with more female directors are penalised, especially companies with higher ratings across the organisation. Ofori-Sasu et al. (2022) found that female board members made cautious decisions about financial disclosure, significantly reducing the likelihood of a banking crisis that could ensure the stability of the banking system.

Existing studies found that female employment and gender discrimination exist. Abendroth et al. (2014) found that the mother’s income is reduced relative to women without children, and women’s professional identity is also negatively affected by motherhood. Based on employer discrimination theory, Weber and Zulehner (2014) found that companies with a stronger preference for men than the industry average, therefore, a lower proportion of female employees exhibit significantly lower survival rates, and industry competition accelerates the elimination rate of such biased firms. Dumauli (2019) analysed whether women pay a high price for motherhood, using data from the Japanese Family Group survey from 2004 to 2015 and found that childbearing negatively affects Japanese women’s wages.

Although numerous studies have investigated women’s wage benefits and differences (Luo et al., 2019; Abendroth et al., 2014), these studies have not directly explained women’s productivity in enterprises. Second, ascertaining whether women choose to give birth due to low productivity or fertility reduces female productivity is impossible (Bloom et al., 2009; Yang, 2017). Third, prior studies mainly used census data (Glauber, 2007; van Steenberg and Ellemers, 2009; Daouli et al., 2009; Cao, 2019), questionnaires, and survey data (Meng and Lyu, 2022; Huang, 2018; Zhuang, 2020, 2022), or laboratory data (Woolley et al., 2010; Hoogendoorn et al., 2013). These censuses were conducted only every few years, and given the differences between subjective perception and objective existence in the questionnaire surveys, laboratory data can neither consider fertility’s impact on women’s output nor provide direct data support for women’s employment, fertility, and productivity levels. This study integrated female employment, fertility, and firm performance into a unified theoretical framework, by combining the actual situation of female employment in Chinese listed companies and real data to test its impact on the production efficiency of enterprises.

China’s fertility policy and female employment

China’s fertility policy. From the founding of the People’s Republic of China in 1949 to the present, China’s birth policy has

evolved for 70 years into a comprehensive two-child policy. Liu and Tang (2015) believed that the gradual liberalisation of the fertility policy is in line with the original intention and development direction of China's population policy. This study combined studies such as those by Feng et al. (1999), Deng and Yin (2019), and Yuan (2016), among others. According to the policy orientation, implementation environment, and attitude of the decision-making level, from the perspective of the policy process and the specific policy content and historical fragments, this study systematically sifted and summarised the changes in the birth policy since its formation. The birth policy has experienced a tortuous development process, from encouraging birth to birth control and the repetition of birth restrictions. The development process is divided into six stages.

Fertility was encouraged from 1949 to 1953. During this period, no policy encouraged fertility, but a laissez-faire attitude toward population fertility was adopted. Mao Zedong published 'The Bankruptcy of the Idealist View of History' in 1949 and clarified his idea of a population—China's large population is desirable because it means more production. Additionally, the national health management and other relevant departments promulgated policies to restrict abortion, birth control, and artificial abortion. In 1950, the Ministry of Health of the Central People's Government and the Ministry of Health of the Chinese People's Revolutionary Military Commission issued 'Measures for Restricting Abortion of Women Cadres in Organs and Troops' and adopted the draft of 'Interim Measures for Restricting Birth Control and Abortion'.

The birth control and reversionary period spanned from 1954 to 1959. National decision-makers were aware of the association between population and economic development and were concerned about rapid population growth. In 1954, the State Council adopted the 'Measures on Contraception and Abortion', advocating contraception. The Ministry of Health issued the 'Circular on Improving Contraception and Abortion', lifting contraception and birth control restrictions. In 1956, the Ministry of Health issued the Notice on Induced Abortion and Sterilisation and the Instructions on Contraception, which indicated that contraception is a democratic right of the people and should be freely used.

The revival of family planning thought lasted from 1960 to 1969. Faced with the dual pressures of rapid population growth and severe economic setbacks, birth control was proposed. In 1962, the CPC Central Committee and State Council issued the Instructions on Seriously Promoting Family Planning in urban and densely populated rural areas to advocate birth control and appropriate control of the natural population growth rate, such that the fertility problem gradually moved from an unplanned to a planned state. In 1963, the Protocol of the Second Conference on Urban Work established clear indicators for family planning work, focussing first on urban areas and then on densely populated rural areas. In the 1960s, the instructions and minutes of the CPC Central Committee and the State Council presented clearer and specific policies on birth control.

The initial stage of the family planning policy lasted from 1970 to 1983. Given the unbalanced population and economic development, China entered a phase of comprehensive family planning. In 1970, the State Council approved and forwarded the 'Report on Doing a Good Job in Family Planning', emphasising family planning. The first national family planning report in December 1973 proposed the policy of 'late, rare, and few'. In March 1978, Article 53 of the Constitution of the People's Republic of China stipulated that 'the state advocates and promotes family planning' and family planning was included in China's Constitution. In 1980, the Central Committee of the Communist Party of China issued the 'Open Letter to All

Communist Party Members and Communist Youth League Members on Controlling China's Population Growth', mandating that a couple must have only one child. In 1982, family planning was designated as the basic state policy.

The fertility phase was strictly limited to 1984–2001. In 1984, the No. 7 document of the Central Committee proposed that the conditions for a second child in rural areas should be appropriately relaxed. As the new population's rapid growth in 1990 exerted great pressure on the economic and social development of the country and the improvement of people's lives, the Central Committee of the Communist Party of China and the State Council reaffirmed the unswerving implementation of the family planning policy with the Decision on Strengthening Family Planning Work and Strictly Controlling Population Growth. The 2000 Decision of the Central Committee of the Communist Party of China and State Council on Strengthening Population and Family Planning Work to Stabilise the Low Birth Levels, indicated that the main task of population and family planning would be maintaining low fertility levels.

Since 2002, the family planning phase was gradually liberalised. On 1 September 2002, the 'Population and Family Planning Law of the People's Republic of China' came into effect, stipulating that 'double independent' couples are allowed to have two children; on November 15, 2013, the "Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform" was officially implemented as the 'selective two-child policy', allowing married couples to have two children if one of the parents is a single child. In 2015, the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China decided to fully implement the policy that any couple can have two children, and in 2016, the universal two-child policy was adopted. Since the implementation of the 'double one-two-child policy', the average annual number of new births has reached 16.05 million.

Figure 1 presents the new population and total fertility rate at each stage of China's fertility policy from 1949 to 2020. With the adjustment of the fertility policy, the new population and total fertility rate have changed significantly. The total fertility rate has decreased from 5.76% in 1960 to 1.3% in 2020. The total number of newborns has also developed differently under different fertility strategies.

Employment situation of females in China. This study is based on Pan (2002), Gale (2016), and other similar studies, which reviewed the 2010–2020 Corporate Social Responsibility Report of Chinese Listed Companies through manual sorting and obtained the 2010–2020 female employment status and corporate female employee employment data.

Actual situation of female employment in China as a whole. With the continuous improvement of national laws and employment policies, the female employment rate has increased steadily, and the female labour supply has become an important part of the labour market in China. According to the data released by the National Bureau of Statistics of China, the number of female employees in China dropped to 326.52 million in 2020 from 343.35 million in 2013. The proportion of female employees in China also decreased from 45% in 2013 to 43.5% in 2020. However, during this period, data from the Chinese government indicates that the proportion of female personnel employed remained greater than 40% of the total workforce. Figure 2a presents the data.

Female employment and corporate performance in Chinese listed companies. This study compiled data on female employment and

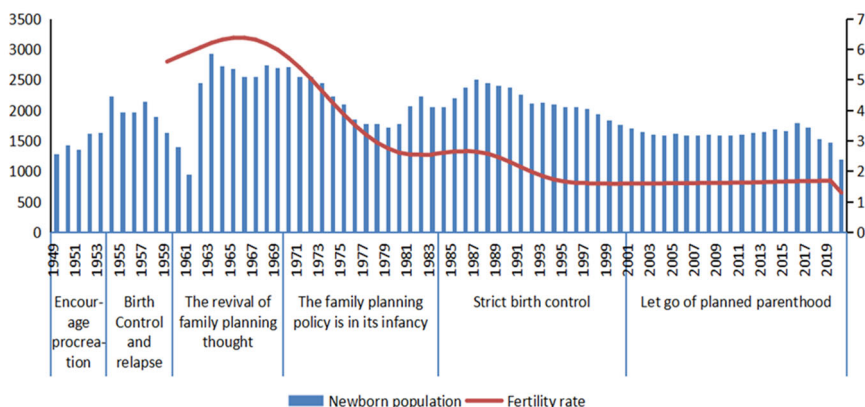


Fig. 1 China's newborn population and fertility rate from 1949 to 2020. Newborn population and total fertility rate at each stage of China's fertility policy (newborn population unit: 10,000).

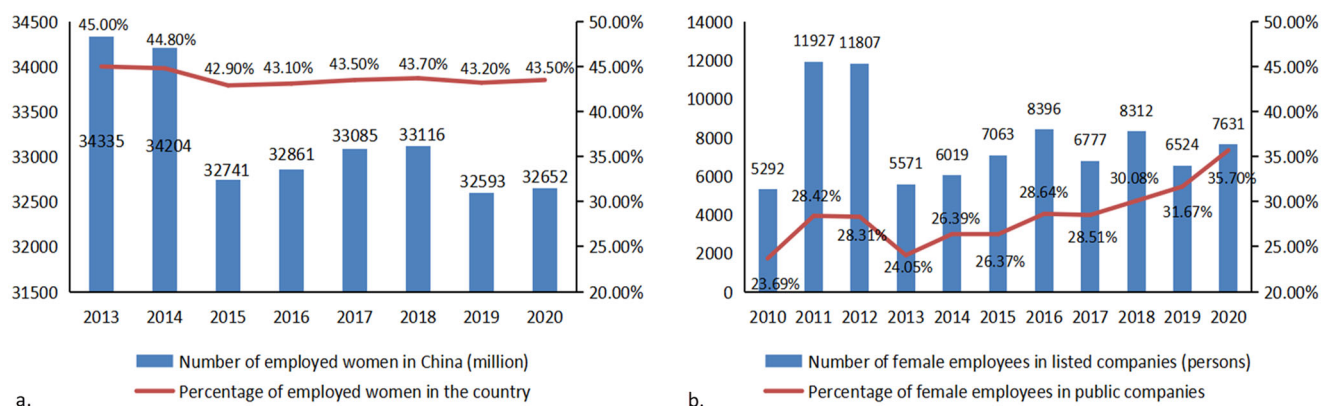


Fig. 2 Female employment situation in Chinese society and in the listed companies. a Female employment in China as a whole. b Female employment in the listed companies.

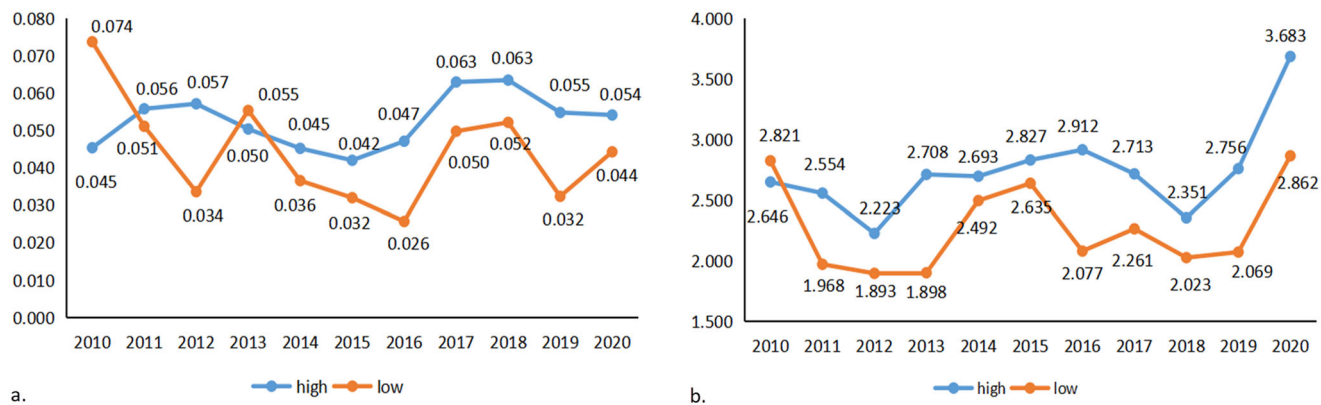


Fig. 3 2010-2020 listed companies' disclosed corporate performance of female employees. a Corporate performance ROA of listed companies. b Corporate performance of listed companies TobinQ.

corporate performance published in the Corporate Social Responsibility Reports of listed companies for 2010–2020. Figure 2b illustrates female employees' employment situation. The average number of female employees in listed companies increased from 5292 in 2010 to 7631 in 2020, that is, from 23.69% in 2010 to 35.7% in 2020—an increase of 12.01%. Notably, from the 'double one-two-child policy' to the 'selective two-child policy', the employment rate of female employees in listed companies first increased and then decreased. From the 'selective two-child policy' to the 'universal two-child policy', the proportion of

female employees increased. Figure 3 presents the performance of companies that disclosed female employment. In this study, the listed companies are divided into two groups—a low proportion of female employees and a high proportion of female employees—using the disclosed average of the proportion of female employees as the dividing line of 0.2987. Companies with a high proportion of female employees exhibited higher performance than those with a low proportion. According to the published data, the female employment rate in the listed companies, which are the best in China, is significantly lower than

that in the whole country. In 2020, when the employment rate was at its highest, the employment rate of female employees in the listed companies was 7.8% lower than that of Chinese society.

Research hypotheses

Analysis of female employment's effect on corporate performance. First, the gender diversity theory argues that hiring female workers can boost company performance. Hoogendoorn et al. (2013) found that the increase in the proportion of women improves team performance. Conyon and He (2017) found that women's presence on the board positively affects corporate performance. Salloum et al. (2019), Garanina and Muravyev (2021), Sánchez-Teba et al. (2020), Habash and Abuzarour (2022) argued for a positive relationship between female board directors and corporate performance—the higher the proportion of female directors, the higher the corporate performance.

Second, according to the gender-enhancing effect, for people with mature sexual awareness, the opposite sex has a stronger role in promoting specific behaviours than the same sex. In theory, the synergy between men and women in the work environment helps mobilise labour motivation better and increases overall labour productivity. Goldey and van Anders (2012) found that women improve male workers' productivity in the production process. von Siemens (2015) believed that male workers are willing to exert greater effort to gain the favour of women at work. Ronay, Hippel (2010) found that female spectators improve male athletes' sports performance.

Third, the contribution of traditional manual labour factors has gradually weakened, and women's attributes such as attentiveness, patience, effective communication, and warm service have become increasingly important. Consequently, the comparative advantage of the female workforce has improved. Gobel and Zwick (2011) argued that in technology and capital-dominated service industries, production technology will lessen the requirement for physical strength, and female productivity will increase accordingly. Menon (2015) found that skill-deepening can improve the business performance of female owners, but the effect is not significant for male-owned enterprises' performance.

Finally, based on the employer discrimination theory, Kawaguchi (2007) examined the empirical implications of the employer discrimination theory and indicated that increasing female employee proportion in firms increases corporate profits. Weber and Zulehner (2014) found that companies with a strong preference for discrimination, compared to the industry average, and companies with a lower proportion of female employees exhibit significantly lower survival rates, as industry competition accelerates biased firms' elimination rate.

Therefore, this study believes that increasing the employment of female employees helps improve corporate performance and proposes the following hypothesis:

H1: Increased employment of female employees will improve corporate performance.

Analysis of the two-child policy's effect on female employment.

Women, as practitioners of the fertility policy, need to play different roles. The responsibilities of different roles will affect the other role-playing. From the perspective of role conflict theory, Glauber (2007), Daouli et al. (2009), and Silles (2016) found that fertility will adversely impact female employment. Bloom et al. (2009) claimed that women's labour force participation is negatively impacted by fertility during the reproductive age and long term. Lyness and Judiesch (2014) found that self-reported experiences of men and women in finding work–life balance were similar, but supervisors generally believed that women were less able to combine work and family. Adda et al. (2016) argued

that having children will interrupt women's jobs and their effective working hours. Sheng (2019) found that after the fertility policy's expansion, female employment quality reduced significantly, and the fertility policy increased the actual and potential fertility costs borne by employers and women by impacting women's willingness to bear children and the number of childbirths. Liang (2018) found that the decision to have a second child is a rational choice that women of childbearing age make by comprehensively considering the family's economic base, the opportunity cost of childbirth, family resources, and support factors. Economic pressure, childcare pressure, and women's career development pressure are obstacles to the implementation of two-child policy.

Second, childbirth reduces female employees' productivity. Xu and Chen (2022) demonstrated that children's status affects women's employment and labour intensity. Cuddy et al. (2004) found that women who returned to work after childbirth and devoted part of their energy to the family were considered 'apathetic' and less attractive than men who became fathers.

Third, from a firm perspective, Barron and Bishop (1985) highlighted those employer decisions are influenced by factors such as company size, training, adjustment costs, and labour market conditions. From the perspective of employer demand for willingness, Neoclassical economists Gustafsson and Shi (2000) argued that since each job applicant's ability cannot be accurately assessed, and women may drop out of work due to fertility and other family factors, from a rational perspective, companies are more inclined to employ male workers. Gorman (2005) found that when the selection criteria for employee recruitment included stereotyped masculine characteristics, women accounted for a smaller proportion of new hires.

In sum, whether it is a macro policy, employer preference, or personal factors, there will be potential impacts on female employment. Therefore, this study proposes the following hypothesis:

H2: The two-child policy will reduce women's employment.

Analysis of the influence mechanism of female employment and corporate performance under the two-child policy.

Pregnancy, childbirth, and child-rearing lead to women being intermittently separated from work, which lowers labour force participation rates and business performance. During pregnancy, women are required to visit the hospital for prenatal check-ups, and a small number of women might need to take extended time off for pregnancy-related complications. During childbirth, women must take parental leave, which means they are constantly away from work and cannot work. Consequently, their job skills may weaken. The need to conceive a new life or care for infants and young children during the child-rearing period reduces women's work hours and efforts, affecting their labour force participation rate. Adda et al. (2016) also stated that career interruption and reduced effective work hours of women due to childbearing bring about a reduction in labour force participation.

The labour Law of the People's Republic of China stipulates that women receive special protection during menstruation, pregnancy, childbirth, and lactation. Therefore, we believe that as the scope of the implementation of the two-child policy expands, more women will choose to have children, and enterprises will, therefore, increase the potential and actual costs of childbirth for women. For example, enterprises need to extend maternity and paternity leave and implement a flexible working system, which is equal to enterprises bearing the cost of social childbirth. Enterprises must also bear the economic cost, operational pressure, and personnel burden of paying for parental leave. Sheng (2019) found that the fertility policy increased the actual

Table 1 Annual distribution of female employees in the sample.

Year	Number of female employees	Proportion of female employees (%)
2010	25	23.69
2011	31	28.42
2012	36	28.31
2013	46	24.05
2014	49	26.39
2015	83	26.37
2016	101	28.64
2017	127	28.51
2018	156	30.08
2019	140	31.67
2020	217	35.70
Total	1011	29.87

and potential fertility costs borne by employers and women, by affecting women’s willingness to bear children and have more children.

Therefore, this study assumes that having a second child inhibits women’s work hours and work efficiency, and consequently, H3 has been proposed.

H3: The two-child policy inhibits the improvement of corporate performance from the employment of female employees.

Data and methods

Sample selection and data sources. In this study, Chinese companies listed on the Shanghai and Shenzhen stock exchanges from 2010 to 2020 were selected as research subjects. We selected data from 2010 to 2020 for the following reasons: First, since the employment data and information of female employees are disclosed voluntarily, the female employment data in this paper mainly comes from the manual collection and processing of the Corporate Social Responsibility Report; not all enterprises disclose the employment of females, thus we can collect the earliest data of female employment in 2010. Second, the research is based on the quasi-natural experiment during the implementation of the two-child policy, since China’s birth policy was adjusted to the comprehensive three-child policy from May 31, 2021, which may affect the employment of female employees and impact the results of the natural experiment. Therefore, we define the data range from 2010 to 2020. Company performance data were collected from the CSMAR database. Moreover, after accounting for incomplete data disclosed by listed companies and financial industry companies and abnormal fluctuations in the related data, 1011 samples were retained, and 1% and 99% of data were truncated. Table 1 shows that the lowest value of the disclosed proportion of female employees is 0.2369, the highest value is 0.357, the average value is 0.2987, and the proportion of female employees is relatively low.

Variable definition

Dependent variable. The dependent variable in this study is company performance—measured using the following accounting and market indicators:

(1) ROA: It represents an enterprise’s profitability. Based on Triana et al. (2014) and Doan and Iskandar-Datta (2020), ROA is calculated by dividing net profit by the average balance of total assets.

(2) TobinQ: It reflects enterprises’ market performance (Chen et al., 2018). TobinQ is calculated by dividing total assets minus book value plus market value by total assets.

Independent variable. The following are the independent variables in this study:

(1) Employment ratio of female employees (Pofs): It is calculated as the proportion of female employees in the company to the total number of employees in the company.

(2) Two-child policy (Second): It represents the implementation norm of the two-child policy in the sample period. If the sample is in the period 2010–2013, the implementation policy is the two-child-only policy, and the variable value is 1; if the sample is in the period 2014–2015, the implementation of the selective two-child policy is 2; if the sample is in the period 2016–2020, the universal two-child policy is implemented, and the variable value is 3.

Control variables. We referred to Kawaguchi (2007), Wang and Qian (2011), and Chen et al. (2018) and selected the following indicators as control variables:

(1) Enterprise size (Size): The natural logarithm of the market value of the listed companies at the end of the year was selected as the variable control size, to control the impact of company size on performance.

(2) Asset–liability ratio (Lev): An enterprise’s asset–liability ratio significantly affects the enterprise’s value. Our study used this ratio to control enterprise liabilities’ impact on enterprise performance. The asset–liability ratio is equal to the total liabilities at the end of the year divided by the total assets at the end of the year.

(3) Enterprise age (Age): This is calculated based on the enterprise’s actual operating time.

(4) Female educational level (FEdu): This is calculated based on the number of women with a college degree or above where the listed company is located divided by the total number.

(5) Industry (Ind_Dummy): After excluding the financial and insurance industries, there were nine dummy variables.

(6) Year_Dummy: Taking 2010 as the base year, 10 dummy variables were chosen.

Table 2 presents the variable definitions.

Research methods and model. To test hypotheses H1 that increased female employment will improve corporate performance and H3 that the two-child policy inhibits the improvement of corporate performance due to female employment, we established Model 1:

$$ROA/TobinQ = \beta_0 + \beta_1 * Pofs + \beta_2 * Second + \beta_3 * PofsSecond + \beta_4 * Size + \beta_5 * Lev + \beta_6 * FEdu + \beta_7 * Age + \beta_8 * Ind + \beta_9 * Year + \epsilon \tag{1}$$

In this model, both ROA and TobinQ represent corporate performance, and Pofs represent the proportion of female employees. Second represents the two-child policy, and Ind and Year represents fixed industries and years, respectively. Model (1) shows female employees’ impact on corporate performance and female employment’s impact on firm performance under the two-child policy. We assumed that female employees’ employment would promote corporate performance. In the regression results, if the value of β_1 is positive and significant, female workers’ employment will promote corporate performance, H1 is accepted. We assumed that the two-child policy inhibits the improvement of corporate performance due to the employment of female staff. In the regression results, if the β_3 value is negative and significant, the two-child policy will inhibit the performance output of female employees, H3 is accepted. To test hypothesis H2, the two-child policy will reduce the employment of female employees by

Table 2 Variable definitions.

Variable	Variable name	Variable symbol	Variable declaration
Dependent variable	Return on equity	ROA	It is divided by net profit by the average balance of total assets.
	TobinQ	TobinQ	Calculate by dividing (total assets minus book value plus market value) total assets.
Independent variable	Percentage of female employees	Pofs	The number of female employees at the end of the year is divided by the total number of employees.
	Two-child policy	Second	It represents the implementation norm of the two-child policy in the sample period: when the sample is in the 2010–2013 time period, the implementation policy is the dual-only two-child policy, and the variable value is 1; when the sample is in the 2014–2015 time period, the implementation of the selective two-child policy is 2; when the sample is in the 2016–2020 time period, the universal two-child policy is implemented, and the variable value is 3.
Controlled variable	Firm size	Size	It is the natural logarithm of the year-end market value.
	Asset-liability ratio	Lev	The asset-liability ratio is equal to the total liabilities at the end of the year divided by the total assets at the end of the year.
	Enterprise age	Age	Calculate business operation time.
	Educational level of women	FEdu	It represents the proportion of women with college degrees or above in the sample.
Dumb variable	Year	Year	-
	industry	Ind	-

Table 3 Descriptive statistics of variables.

Variables	N	Mean	Min	Max	s.d.
ROA	1011	0.0492	-0.0668	0.236	0.0482
TobinQ	1011	2.544	0.805	9.031	1.422
Pofs	1011	0.322	0.0590	0.800	0.151
Size	996	24.46	21.73	27.51	1.339
Lev	1011	0.522	0.114	0.857	0.185
FEdu	986	0.0982	0.0283	0.231	0.0588
Age	850	19.34	5.170	33.42	5.998

Table 4 The t-test table of the mean difference in the female employment rate.

Variables	G1(high)	Mean1	G2(low)	Mean2	MeanDiff
Pofs	454	0.46	557	0.21	0.24***
ROA	454	0.05	557	0.05	0.01**
TobinQ	454	2.81	557	2.32	0.49***
Second	454	2.63	557	2.57	0.06
Size	447	24.36	549	24.54	-0.17**
Lev	454	0.52	557	0.53	-0.01
FEdu	445	0.09	541	0.10	-0.01***
Age	405	20.25	445	18.52	1.72***

, and * represent significance at 0.1, 0.05, and 0.01 levels, respectively. The same applies to the subsequent tables.

companies we established Model 2:

$$\begin{aligned}
 Pofs = & \beta_0 + \beta_1 * Second + \beta_2 * Size \\
 & + \beta_3 * Lev + \beta_4 * FEdu + \beta_5 * Age \\
 & + \beta_6 * Ind + \beta_7 * Year + \epsilon
 \end{aligned}
 \tag{2}$$

Pofs represents the proportion of female employees. Second represents the two-child policy, and Ind and Year represent fixed industries and years, respectively. Model 2 shows the impact of the two-child policy on female employment. We assumed that the two-child policy would reduce the employment of female employees. If the β_1 value in the regression results is negative and significant, H2 is accepted.

Results

Descriptive statistical analysis of variables. In this study, A-share-listed enterprises from 2010 to 2020 in China were selected as the research objects. Table 3 reports the maximum, minimum, mean, and standard deviation of ROA, TobinQ, Pofs, and FEdu. Table 4 presents the t-test results for the mean difference in the female employment rate.

Table 5, presenting the correlation results between the explanatory and explained variables, shows that the correlation coefficients of ROA and TobinQ for female employment in the enterprises are 0.117 and 0.248, respectively, and both are significantly positively correlated at the 0.01 level, indicating that female employment has a significant positive impact on company performance. The correlation coefficient of the two-child policy for female employment is 0.089 and exhibits a significant positive correlation at the 0.01 level, indicating that the two-child policy promotes female employment.

Analysis of empirical test results

Female employment’s impact on corporate performance. To test hypotheses H1, the impact of female employment on firm performance, and H3, the effect mechanism of women’s employment and firm performance under the two-child policy, Model 1 was regressed. Table 6 presents the regression results. Notably, the coefficients of female employment on firm ROA and TobinQ are 0.141 and 1.904, respectively, and the results are both significantly positively correlated at the 0.05 level. Therefore, employing female workers has an improving effect on firm performance, which supports H1. The results present that the ROA and TobinQ regression coefficients of employment of female employees and the two-child policy crossover term (PofsSecond) are 0.0444 and 0.699, respectively, and they are significantly negatively correlated at the 0.01 and 0.05 levels, respectively. Our results indicate the mechanism of the effect of the two-child policy on companies’ performance, that is, the two-child policy significantly reduces the improvement effect of female employment on firm performance. It exhibits a negative moderating effect on current and long-term firm performance; thus, H3 is supported.

Two-child policy’s effect on female workers’ employment. In this study, the proportion of female employees was used as the

Table 5 Correlation analysis of variables.

	ROA	TobinQ	Pofs	Second	Size	Lev	Age	Edu
ROA	1							
TobinQ	0.527***	1						
Pofs	0.117***	0.248***	1					
Second	0.0100	0.0490	0.089***	1				
Size	-0.086***	-0.213***	-0.122***	0.079**	1			
Lev	-0.483***	-0.433***	-0.101***	-0.083***	0.513***	1		
Age	-0.091***	-0.149***	0.071**	0.309***	0.0300	0.0330	1	
FEdu	-0.140***	-0.094***	-0.087***	0.083***	0.228***	0.158***	-0.070**	1

Table 6 Regression analysis on the impact of female employment and corporate performance under the two-child policy.

Variables	ROA	TobinQ	Pofs
Pofs	0.141** (0.0639)	1.904** (0.914)	
Second	-0.0139 (0.0177)	-0.609*** (0.207)	0.127*** (0.0279)
PofsSecond	-0.0444* (0.0237)	-0.699** (0.316)	
Size	0.0223*** (0.0057)	0.978*** (0.160)	-0.0121 (0.0107)
Lev	-0.153*** (0.0481)	-1.937*** (0.561)	0.0694* (0.0404)
Age	-0.0003 (0.0038)	0.0270 (0.0371)	-0.0278*** (0.00632)
FEdu	0.127 (0.175)	5.459** (2.460)	-0.497** (0.222)
Constant	-0.484*** (0.158)	-20.66*** (3.810)	0.915*** (0.261)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	817	817	817
R-squared	0.192	0.417	0.039
F	4.41	20.30	14.90

*, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively.

explanatory variable, and the level of the two-child policy (Second) as the explanatory variable. Table 6 presents the results. The coefficient of the two-child policy for female employees was 0.127 and was significantly positive at the 0.01 level, indicating that female employment is increasing. Thus, H2 is rejected. Therefore, the expansion of the scope of the two-child policy exhibited not reduced female workers' employment.

Influence mechanism of female employment on enterprise performance. To further verify the impact mechanism of female employment on firm performance, this study conducted a regression analysis at the levels of corporate operating costs and main business income. The results are shown in Table 7. First, without controlling for the two-child policy, the coefficients of the impact of female employment on corporate costs and main business income are 0.330 and 0.231, respectively. These are significantly negatively correlated at 0.01 and 0.05 levels, respectively. Therefore, female employment will reduce the firm's costs to improve firm performance, which will also reduce the firm's business income. Nevertheless, the regression coefficient and significant correlation of women's employment with business costs are larger than that of the firm's business income, suggesting that female employees can reduce business costs and increase business income. When the two-child policy is controlled, the

Table 7 Analysis of the influence mechanism of female employment on enterprise performance.

Variables	COST	COST	Income	Income
Pofs	-0.330*** (0.104)	-0.299 (0.423)	-0.231** (0.107)	-0.266 (0.436)
Second		0.0260 (0.0655)		0.0102 (0.0675)
PofsSecond		-0.0118 (0.152)		0.0130 (0.157)
Size	0.00128 (0.0131)	0.0013 (0.0132)	-0.0001 (0.0136)	-0.0010 (0.0136)
Lev	0.530*** (0.101)	0.530*** (0.101)	0.538*** (0.104)	0.539*** (0.104)
Age	-0.0027 (0.0024)	-0.00276 (0.0024)	-0.0035 (0.0025)	-0.0035 (0.0025)
FEdu	0.164 (0.245)	0.165 (0.246)	0.172 (0.253)	0.172 (0.253)
Constant	0.194 (0.325)	0.159 (0.369)	0.350 (0.335)	0.349 (0.380)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	817	817	817	817
R-squared	0.299	0.299	0.302	0.302
F	15.40	14.71	15.62	14.93

, *, represent significance at 0.1, 0.05, and 0.01 levels, respectively.

coefficients for female employment's impact on enterprise costs and main business income are 0.299 and 0.266, respectively. Nevertheless, there is no significant impact, indicating that the two-child policy weakens female employment's impact on firm costs and income.

Endogenous test

Dependent variable lag test. The employment of women by companies might depend endogenously on their environment and characteristics. There might be a bidirectional causality between female employment and firm performance. To mitigate this potential endogenous, we regressed the firm performance data with a lag of one period. Let t be the current period data, and $t - 1$ be the one-year lag data; L.ROA and L.TobinQ are expressed as firm performance data for $t - 1$. Table 8 presents the results, which reveal that the influence coefficients of female employment on ROA and TobinQ of firms at $t - 1$ are 0.111 and 1.637, respectively, and the coefficient on firm ROA is significantly positively correlated at the 0.05 level. The coefficient of influence of the two-child policy and female employment (PofsSecond) on ROA and TobinQ of firm performance at $t - 1$ are 0.0317 and 0.138, respectively. Although the coefficient on firm ROA was significantly negatively correlated at the 0.1 level, the coefficient

Table 8 Endogenous test of female employment and firm performance.

Variables	L.ROA	L.TobinQ	ROA	TobinQ
Pofs	0.111** (0.0484)	1.637* (0.899)	0.131** (0.0637)	1.853** (0.904)
Second	-0.0001 (0.00773)	-0.135 (0.159)	1.011** (0.390)	4.719 (4.367)
PofsSecond	-0.0317* (0.0181)	-0.138 (0.350)	-0.0401* (0.0235)	-0.677** (0.314)
Size	0.0099*** (0.0018)	0.00571 (0.0428)	-0.0614* (0.0319)	0.543 (0.381)
Lev	-0.178*** (0.0166)	-3.078*** (0.436)	0.334* (0.171)	0.597 (2.137)
Age	-0.0003 (0.0002)	-0.0280*** (0.0076)	-0.227*** (0.0861)	-1.150 (0.961)
FEdu	-0.108*** (0.0295)	-2.272*** (1.637)	-3.540*** (1.362)	-13.61 (15.88)
Imr			12.92*** (4.948)	67.19 (55.01)
Constant	-0.110** (0.0489)	4.203*** (1.139)	-3.914*** (1.341)	-38.50** (15.45)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	509	509	817	817
R-squared	0.382	0.425	0.219	0.419
F	11.59	9.41	4.41	20.30

*, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively.

on TobinQ was not significant, which implies that reverse causality was not significant, and the main test was further supported.

Heckman two-stage test. In the first stage of the Heckman two-stage method, the proportion of female employees was used as the explained variable, and the variables that may affect female employment were used as explanatory variables for the regression. Moreover, the probability of the two-child policy's impact on female employment was estimated. The inverse Mills Imr was obtained from the first-stage regression and added as an additional control variable in the second-stage regression, to verify the relationship between female employees and firm performance. Table 8 presents the regression results. We found that the coefficients of the effect of the proportion of female employees on firm ROA and the effect on firm TobinQ were 0.131 and 1.853, respectively. Thus, both results passed the test at the 0.05 significance level, and the main test was further supported.

Robustness and further examination

Change the measurement method of the two-child policy. To compare the impact of different fertility policies on female employment, the 2010–2013 dual-independence two-child policy data were selected as the benchmark group DM1, the 2014–2015 selective two-child policy data as DM2, and the 2016–2020 universal two-child policy data as DM3, forming the control group for the comparative analysis of the data and regressing Model 2 (Table 9). Notably, the coefficients of the selective two-child policy and universal two-child policy on female employment were 0.114 and 0.253, respectively, and both were significantly positively correlated at the 0.01 level, indicating that both the selective two-child and universal two-child policies promoted female employment. Thus, the different birth policies exhibit different effects on female employment.

Two-child policy's long-term effect on female employment. To further examine the two-child policy's impact on female

Table 9 Further analysis of the employment of female employees by the two-child policy.

Variables	Pofs	F.Pofs	F2.Pofs	F3.Pofs
Second		0.117*** (0.0405)	0.0564 (0.0646)	0.0497 (0.0390)
DM2	0.114*** (0.0294)			
DM3	0.253*** (0.0557)			
Size	-0.0121 (0.0107)	-0.0108 (0.0101)	-0.0095 (0.0119)	0.0103 (0.0138)
Lev	0.0694* (0.0404)	0.0080 (0.0344)	-0.0804 (0.0773)	0.187** (0.0741)
Age	-0.0278*** (0.0063)	-0.0277*** (0.0103)	-0.0129 (0.0198)	-0.0177 (0.0163)
FEdu	-0.497** (0.222)	-0.489 (0.310)	-0.340 (0.291)	-0.723* (0.420)
Constant	1.042*** (0.276)	0.864*** (0.264)	0.744* (0.399)	0.233 (0.439)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	817	489	338	230
R-squared	0.039	0.049	0.068	0.095
F	14.90	26.27	18.76	21.94

*, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively.

employment, we lagged and regressed the female employment data by three periods. Let t be the current data and $t + 1$ be the subsequent-year data, and so on; F.Pofs indicate $t + 1$ female employment data, F2.Pofs indicate $t + 2$ female employment data, and F3.Pofs indicate $t + 3$ female employment data. Table 9 reveals that the coefficient of the two-child policy on the employment of female employees at $t + 1$ was 0.117, indicating a significant positive correlation at 0.01 level; the coefficient of the two-child policy on female employment at $t + 2$ did not show a significant effect; the coefficient of the second-child policy on the employment at $t + 3$ did not show a significant effect.

Change the regression measurement method using the OLS method. We used the alternative OLS method to test the robustness of the results of the relationship between the proportion of female employees and firm performance. The coefficients of female employment on firm ROA and TobinQ in Table 11 were 0.122 and 1.630, respectively, and the coefficients were significantly positively correlated at the 0.01 and 0.05 levels, respectively. The ROA coefficient of the intersection and corporate performance between the two-child policy and female employment was 0.0410 and exhibited a significant negative correlation at the 0.01 level. The result indicates that female employment improves firm performance. Nevertheless, the two-child policy will inhibit the improvement of firm performance by female employees.

Control variable substitution method. We used the control variable substitution method to test the robustness of the results on the relationship between the proportion of female employees and firm performance. We replaced Size, the control variable for enterprise size, with the total operating income of the enterprise (GRevenue) and took its logarithm, while keeping other variables the same. Regression was performed on Model 1, and Table 11 shows the results. The coefficients of the two-child policy on female employment and firm performance ROA and TobinQ are 0.0459 and 0.437, respectively; both are significantly negatively correlated at the 0.1 level. Thus, the robustness test also supports this study's hypothesis 1.

Table 10 PSM equilibrium test results.

Variable	Unmatched (U) Matched (M)	Mean value		% bias	bias % reduct	t-test	
		Treat	Control			T-value	P-value
Size	U	24.454	24.817	-27.6	89.4	-3.96	0.000
	M	24.48	24.441	2.9			
Lev	U	0.509	0.557	-26.1	87.0	-3.72	0.000
	M	0.514	0.520	-3.4			
Age	U	20.344	18.558	30.2	94.5	4.32	0.000
	M	20.159	20.061	1.7			
FEdu	U	0.091	0.106	-26.5	99.7	-3.79	0.000
	M	0.092	0.092	0.1			

Table 11 Robustness test of female employment and firm performance.

Variables	OLS method		Control the variable substitution method		PSM matching effect test	
	ROA	TobinQ	ROA	TobinQ	ROA	TobinQ
Pofs	0.122*** (0.038)	1.630** (0.800)	0.144** (0.065)	1.066 (0.753)	0.148** (0.0683)	1.950** (0.969)
Second	0.008 (0.005)	0.356** (0.150)	-0.017 (0.021)	0.078 (0.276)	-0.0276** (0.0123)	-0.586** (0.245)
PofsSecond	-0.041*** (0.014)	-0.067 (0.325)	-0.046* (0.024)	-0.437* (0.260)	-0.0469* (0.0256)	-0.716** (0.340)
Size	0.011*** (0.001)	0.133*** (0.045)			0.0197*** (0.00506)	0.982*** (0.166)
GRevenue			0.029*** (0.007)	0.195** (0.092)		
Lev	-0.170*** (0.012)	-3.448*** (0.372)	-0.148*** (0.044)	-0.412 (0.595)	-0.152*** (0.0481)	-1.961*** (0.572)
Age	-0.001*** (0.000)	-0.0407*** (0.007)	0.000 (0.004)	-0.046 (0.058)	0.0032 (0.0021)	0.0277 (0.0405)
FEdu	-0.118*** (0.025)	-2.125*** (0.711)	0.149 (0.175)	4.637 (2.867)	0.176 (0.195)	5.146* (2.735)
Constant	-0.164*** (0.036)	0.181 (1.145)	-0.611*** (0.181)	-2.247 (2.357)	-0.458*** (0.143)	-20.60*** (3.924)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	817	817	831	831	765	761
R-squared	0.379	0.434	0.213	0.189	0.199	0.418
F	21.040	26.440	5.000	11.570	20.430	25.110

*, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively.

PSM matching effect test. This study used the proportion of female employees as the basis for matching. The female employees were divided into two groups—the low proportion in the control group (50%) and the high proportion in the experimental group (50%)—to test the PSM matching effect. Table 10 shows the PSM matching test’s results. The absolute value of the standardised variance of each variable is controlled at the 10% level. The *P*-values of all variables in the *t*-test were not significant after matching, indicating that the null hypothesis is accepted—the difference between the groups was not significant. Thus, the experimental and control groups are balanced and satisfy the PSM equilibrium hypothesis. Model 1 was regressed after adjustment. Table 11 presents the regression results. Notably, the coefficients of ROA and TobinQ of female employees were 0.148 and 1.950, respectively, with a significant positive correlation at the 0.05 level. The coefficients of ROA and TobinQ for female employment and two-child policy were 0.048 and 0.713, respectively, and exhibited a significant negative correlation at the 0.01 and 0.05 levels, respectively. Therefore, the robustness test supports hypothesis 1.

Conclusions

This study investigated the impact of China’s two-child policy on female employment and corporate performance, using female employment data from the listed Chinese companies. Our findings are as follows: first, an increase in the proportion of female employees improved corporate performance. Second, the expansion of the implementation scope of the two-child policy did not reduce the employment of female workers; instead, the proportion of female employees has increased. Third, the expansion of the two-child policy’s implementation scope reduced the effect of hiring female employees on corporate performance. Particularly, gender discrimination in firms did not improve corporate performance. Contrastingly, wage discrimination can make businesses profitable. Companies can increase their profits by hiring cheaper female staff. Additionally, the output of female employees is the same as that of male employees; companies with more female employees tend to have lower employee compensation costs. The results suggest that the increase in company performance through female employment is not the result of lower gender discrimination in female-employing firms; the increase in diversity increases the company’s output, and companies that are

more discriminatory against women will pay women lower wages, thereby reducing the firms' labour costs.

An implication of the study findings is that in the new economic environment, female productivity is similar to that of males, coupled with the rising educational level of women, which also narrows the gap between women and men in the labour market. Therefore, hiring more female employees can improve corporate performance. Additionally, women reduce the cost of enterprises because the labour cost of women before giving birth is lower, as they tend to accept lower wages, thereby increasing enterprises' willingness to hire more women. With the birth of a second child, the company will have to bear the additional cost of childbirth, and because of the increase in cost, the performance improvement due to female employment disappears; this will increase female employment discrimination in the labour market, resulting in the loss of job opportunities for women and the retardation of their career development. Women may actively or passively reduce the quality of work to prepare for childbirth or cater to the needs of their family; this will also lead to more severe discrimination against women in terms of employment. Over the course of time, this will not only impact the supply of the female labour force negatively but also impose a certain degree of inhibition on women's willingness to have children, which is not conducive to the implementation of the birth policy.

This paper has the following limitations: first, we discuss the impact of female employment on corporate performance at the enterprise level; since the female employment data of listed companies are voluntarily disclosed, this study can only collect enterprise-level data in 2010 at the earliest. Second, the three-child policy was promulgated and implemented in China in 2021 to avoid the impact of the three-child policy on the economic consequences of female employment on the preliminary test. Consequently, our data can only be up to 2020; therefore, the time of our sample data is short. Third, female employment's economic consequences have often been influenced by women's educational background, social development level, and culture. Because of scope limitations, this study mainly discussed the economic consequences of female employment brought about by the changes in birth policy. Women's reproductive choice is a complex mechanistic environment that needs a further examination of the changing trend and coping strategies for the long-term impact of reproductive policy adjustment on female employment and corporate performance.

Data availability

The analysis of some of the original datasets generated in the current study was sourced from the database CSMAR at <http://www.gtarsc.com>. Some of the specific datasets generated in this study are not publicly available, as they are part of the authors' ongoing research. These data are available from the corresponding authors upon reasonable request.

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Ethical statements

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Informed consent

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Additional information

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