



More Rights but Less Gains: Relaxed Birth Control Policy and the Loss for Women

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Abstract

In view of its aging population, China initiated in 2012 a relaxed birth control policy after a three-decades-long implementation of the restrictive one-child policy. This paper examines how China's relaxed birth control policy leads to gender inequality. It specifically focuses on migrant workers because they account for a significant portion of the working group. Using the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016, we found that China's two-child pilot policy reduced female labor force participation by 1.4 percentage points. This negative effect was more pronounced for women with higher educational levels or working in the private sector because employers foresee greater risks of productivity decline. We demonstrated that the gender pay gap increased from RMB956 to RMB1,053 during this same period. Pinpointing these unintended consequences brought about by the relaxation of the one-child policy helps provide a more complete picture of inequality and make sense of persistent relative poverty in Chinese society. To counteract gender discrimination, females are advised to work outside their home jurisdictions and take advantage of positive peer effects.

Keywords: birth control, gender inequality, migrant worker, two-child policy, wage gap
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I. Introduction

The rationale underlying birth control policies stems from the Malthusian trap, where more children would bring more demand, leading to an inadequate food supply,

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triggering individual distress, and resulting in social unrest (Malthus, 1798). From Medieval Europe to Modern times, birth control was utilized worldwide to lower regional population growth (McCann, 2009). These birth control efforts, by and large, have helped boost the labor participation rate and employment opportunities for females as they are able to dedicate more years to their education. With the advances in agricultural productivity and automation, however, the Malthusian trap pales in comparison with the issue of population aging, which is directly attributable to the presence of birth control policies and has gradually become a demographic crisis that endangers the social structure of any economy.

In view of its aging population, for instance, China initiated a relaxed birth control policy after the three-decades-long implementation of the restrictive one-child policy. The relaxed policy, dubbed the two-child pilot policy, allowed a couple to have a second baby if either the husband or the wife was from a single-child family. Female workers were thus faced with the increased demands involved in caring for multiple children, making it more difficult to achieve work–life balance. In this paper, we examine the intricacies of the interplay between birth control and gender equality addressed in the previous literature (Blau and Kahn, 2017). Specifically, we estimate the financial impact on women associated with the two-child pilot policy in China.

Our focus is on women’s employment opportunities and wage earnings before and after the implementation of the two-child pilot policy and the implications of this policy shift for gender equality. In contrast to prior literature on gender and income disparity, we do not use variations in top income classes (Boschini et al., 2020) or across markets (Blau and Kahn, 2017). Instead, we explore the income differences among migrant workers over time. According to the national survey, China has more than 277 million rural workers who have left the village or town associated with their *hukou* and have sought employment elsewhere (Su et al., 2018).¹ However, the majority of “rural migrants in cities lead second-class lives without much access to urban benefits” (Su et al., 2018, p. 143). With their low incomes, these workers are hardly able to diversify the potential employment-related risks brought about by the changes in the birth control policy. More troublingly, this employment-induced pressure has been found to be passed on to the children of migrant parents, who are more likely to be academically underperforming, engage in bullying, and suffer from physical and psychological

¹China’s *hukou* system is more famously known as the Chinese household registration system. Under this system, all households: (i) have to be registered in the locale where they reside, and (ii) are categorized as either an “agricultural” or “nonagricultural” (i.e., “rural” or “urban”) type. Individuals without an “urban household status” can still move to a city to work; however, they will neither be granted permanent residency rights nor many of the associated social benefits by these cities.

illnesses (Cui and To, 2019). Pinpointing the unintended consequences triggered by the relaxation of the one-child policy helps attain a complete portrait of inequality and makes sense of persistent relative poverty in Chinese society.

The empirical analysis in this study is based on a unique dataset from the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016. We focus solely on this period because this pilot policy was implemented nationally in 2014, and a more relaxed version of the two-child policy, in which the “single-child family” condition of eligible parents was removed, was initiated in 2016. Given the fact that the adoption of such a policy at the provincial level is unlikely to be affected by unobservable information that may change the employability of female workers, our empirical identification relies on the exogeneity of the pilot policy in a difference-in-differences setting.

Our main findings can be summarized as follows: the two-child pilot policy has resulted in a significant financial loss for women in terms of their professional careers. It lowered the employment rate of female workers by an additional 1.4 percentage points — a rate that was already five percentage points lower when compared to that of males. We further explore the variations by sector and education level over time and notice that the negative effects elicited by the policy are more pronounced for women with higher educational levels or those working in the private sector. Furthermore, women experience wage discrimination when they work. For a position with an average wage level of RMB3,032, female workers earn around RMB1,053 less compared to their male counterparts. We attribute these estimated negative effects of the two-child pilot policy on women's careers largely to the foreseen risks of productivity decline in the eyes of employers when females temporarily exit the labor market for gestation.

In the context of the existing literature, this study makes two key contributions. So far, studies on China's demographic policies have focused primarily on the macro-level, revolving around understanding how the policy impacts the nation's socio-demographic structures (Guo, 2015) and household savings rate (Wei and Zhang, 2011). Micro-level data, such as the relationship between population policies and individual families' work and birth decisions, are largely overlooked (Huang et al., 2016). In fact, China's firm implementation of the one-child policy over the past 3 decades has exerted significant effects on both the supply and demand sides of the labor market. The former refers mainly to female workers' behavioral patterns and career choices, whereas the latter refers to employers' perceptions and preferences toward female job seekers. Yet, empirical analyses of these dimensions are scant (Adda et al., 2017). Given that the relaxed birth control policy allows eligible families to give birth to a second child, employers may have concerns about female workers' ability to join, stay, or remain

competitive in the labor market. These concerns add fuel to the fire of the already grim employment prospects for the female population (Kahn and Lange, 2014). While global trends suggest that the differences in incomes between males and females have narrowed, China's figures depict a more complicated and fluctuating picture. Scholars led by Lai and Sarkar (2017) contended that females are still subject to various forms of discrimination in the job market. This paper has strong social significance in promoting gender equality in the workforce.

The paper also contributes to understanding the seminal “voting with feet” concept.² We studied how the negative effects of the policy vary according to the migration patterns of the workers affected. Our results show that relocating within the central region or from the western to the central or eastern region has a negative impact on the ability of female workers to find a job. However, such measurable impacts are not discernible for other types of migration patterns. Working outside of their home jurisdiction can be risky for female migrant workers originating from the western region. Peer effects also play a positive role. Workers from the same home region or those staying in the same destination may share information to mitigate the impacts of the policy shock. Notably, the negative effects of the two-child pilot policy persist even when it is further relaxed to the national two-child policy that unconditionally allows all married couples to have a second child. In other words, gender inequality inevitably arises as long as birth control policies are relaxed.

The remainder of this paper proceeds as follows. Section II describes the background and historical developments of the birth control policy in China. A summary of the related literature is also presented in this section. Section III summarizes the data and presents the empirical model. Section IV provides the benchmark results alongside the related analysis. Section V investigates the productivity mechanism through indirect empirical evidence. Section VI extends our analysis to several additional aspects. Section VII concludes with recommendations for future studies.

II. Background and related literature

The existing literature suggests that gender discrimination, family responsibilities, and differences in human capital are the three most important reasons for the income disparity between males and females (Blau and Kahn, 1992; Goldin, 2014). It has

²Charles Tiebout (1956) suggests that people “vote with their feet” to find the community that provides them with the optimal bundle of taxes and public goods. This concept is subsequently generalized to describe the phenomenon in which citizens express their preferences through actions rather than words.

also been well documented that birth control helps boost the labor participation rate and employment opportunities of females due to increased female education (Bailey, 2006). In China, for example, the one-child policy is the main reason females have been able to stay longer in school since its implementation in 1978 (Huang et al., 2016). Consequently, the employment opportunities for women increased with their improved education level. With that said, discussions of the female employment market in the absence of birth control policies are incomplete. Since 2014, China began to relax its one-child policy to combat its aging population. One can perhaps speculate that the relaxation of the one-child policy is a mixed blessing, compromising the achievement of gender equality associated with birth control.

1. Background of institutional adjustments

The implementation of China's one-child policy from 1978 to 2013 resulted in a gradual increase in the average age of the nation's employees and a relatively low fertility rate. Specifically, the total fertility rate of Chinese females plummeted from 2.24 in 1980 to 1.18 in 2010, which was below the mean number in OECD countries (1.7) as well as the world average (2.5). Both the fertility desires and fertility potential of Chinese females declined from 1985 to 2011. The average number of children for females of child-bearing age dropped from 2.4 in 1985 to 1.94 in 2011, with an unprecedented low of 1.7 in 2001 (Wang and Fu, 2013). In addition to birth restriction, the changing social environment, particularly the influence of urban agglomeration on child-bearing philosophy, also functions as a significant cause of the low fertility rate (Guo, 2015).

In the wake of the three-decades-long implementation of the draconian birth control measure, the aging population has become a demographic challenge for China's further development. According to the national census, between 1953 and 2010, the proportion of the elderly (above age 65) to the overall population increased steadily over the decades, from 4.41 percent in 1953 to 8.87 percent in 2010. The ratio of the young (below age 14) to the overall population declined from 27.69 percent (317 million) in 1990 to 16.52 percent (227 million) in 2015, whereas the percentage of the elderly soared from 5.57 percent (63.68 million) to 10.47 percent (143 million) of the nationwide population in this same period.

As the undesirable consequences of the one-child policy began to outweigh its benefits, the Chinese government adjusted the family planning policy to a pilot and national two-child policy in 2014 and 2016, respectively. Despite the much-anticipated policy relaxation, however, the population growth rate did not soar as expected. Since the loosening of the one-child policy in 2014, the ratio of eligible couples (of child-bearing ages) applying for second-birth permits to the total number of eligible

couples has remained surprisingly low. In fact, the national health and family planning commission has publicized the number of monthly approved applications for a second-child permit since the adoption of the pilot two-child policy. We can review data from Beijing and Shanghai, China's two most economically advanced cities, as an example of the effects of the policy change. The total number of issued permits in Beijing averaged 113 in the first three months and dropped to 95 in the fourth month; in Shanghai, the approved cases numbered 61, 89, 58, and 57 in each of the initial four months, respectively. More notably, this downward trend was observed in other major provinces and centrally controlled municipalities as well. In summary, Chinese couples' enthusiasm for having a second child waned shortly after the introduction of the pilot two-child policy, evidenced by a sharply decreased number of permit applications filed since the third month of this new policy.

2. Possible mechanisms whereby birth control improves gender equality

Studies in the literature have provided three possible reasons to explain why birth control policy improves gender equality: the accumulation of human capital (Huang et al., 2016), shifted risk-aversion preferences (Niederle et al., 2013), and reduced perceived uncertainty associated with female productivity from an employer's standpoint (Adda et al., 2014). The first two causes have compelled more women to join the labor market, while the increased employer confidence in women has led to an expansion in job openings for female job seekers.

First, the one-child policy increases the bargaining power of female workers in the job market by equalizing educational opportunities. Conventional wisdom suggests that female workers, on average, have a lower willingness to bargain for promotion and salary increases than their male counterparts (Bertrand, 2011). Female workers with high incomes can attribute their success, at least partly, to following the career example set by their husbands, who often have jobs with even higher earning capacity (Blau and Kahn, 2017). The major reason behind this phenomenon is that those female workers face thorny work–family trade-offs regardless of their competency levels. For example, Bertrand et al. (2010) traced and analyzed MBA students who graduated from the Booth School of Business from 1990 to 2006 and found a widening income gap between genders. To a considerable extent, the one-child policy reduces women's difficulties in striking a work–life balance, thus expanding their educational opportunities and bargaining power in the labor market.

Second, the one-child policy also positively influences employment opportunities for females by changing their preferences for competition, which serves as a key factor in predicting the gender difference in employment opportunities (Bertrand, 2011). A

school experiment conducted by Buser et al. (2014) indicated that competitiveness was an important element that explained individual differences in career choices. In fact, competition preference plays a decisive role not only in whether one can enter an industry but also one's subsequent salary negotiations and career promotions (Leibbrandt and List, 2015). Given the fact that females generally err on the side of caution, their career choices and promotion prospects are inevitably limited (Charness and Gneezy, 2012). That being said, a recent study conducted by Flory et al. (2015) revealed that women's risk aversion in employment decision-making was relative rather than absolute. More importantly, by virtue of proper education and the introduction of supporting institutions, female employees can become as competitive as their male counterparts (Niederle et al., 2013). By imposing strict limits on the number of children that women are allowed to have, the one-child policy liberates female workers from the burdens of multiple births, reduces the amount of time they have to spend on taking care of their families, and ultimately alters their risk and competition preferences in the workplace.

Third, the one-child policy lessens the doubts and concerns held by employers regarding the productivity of females. In the past, female workers often sought intermittent employment, faced career interruptions, or even exited the labor market entirely to take better care of their children (Adda et al., 2017). These choices inevitably put them in a disadvantageous position in the workplace, as evidenced by the findings of countless empirical studies that female employees, when compared to their male counterparts, showed a lower willingness to participate in on-the-job training (Altonji and Spletzer, 1991), performed worse in situations involving teamwork (Flory et al., 2015), and had a dramatically reduced likelihood of becoming senior executives (Gayle et al., 2012). As a corollary, female job hunters were regarded less favorably, if not discriminated against, in the labor market. In this regard, the strictly enforced one-child policy lightened a plethora of family responsibilities expected of women, who then became less likely to make choices that risked sabotaging their career prospects. Advances in technology and the advent of laborsaving devices for housework have further reduced the uncertainty associated with female productivity (Greenwood et al., 2005). Taken these factors together into account, employers are inclined to downplay their concerns about female productivity.

Briefly, restrictive population policies tend to generate substantial impacts not only on socio-demographic structures but also on the employability of female workers. China's one-child policy exemplifies this. In addition to its direct outcome of containing the overall population size, the policy has helped increase the desirability of female job seekers in the job market. That is, by limiting the number of children married couples are allowed to have, China's one-child policy considerably alleviates the domestic

workloads of females. Less burdened women can then afford to spend time and energy building up their credentials (Huang et al., 2016), taking on risky but rewarding tasks (Niederle et al., 2013), implementing long-term career plans, and impressing prospective employers concerned about productivity (Adda et al., 2017). On this note, it leads us to surmise that the two-child pilot policy has unintentionally eroded the social gains derived from the one-child birth control policy (Wang et al., 2016). This paper thus attempts to provide quantitative proof of this bold conjecture.

3. Pertinent literature review

The relationship between fertility and female labor supply has been widely studied in economics (Aaronson et al., 2021). Most of the empirical studies, which were based on various collected data (e.g., twin data, gender composition of children) or natural experiments conducted in developed countries, found that having more children reduced female labor supply (Lundborg et al., 2017).

However, research findings in developing countries remain inconclusive owing to mixed evidence. Agüero and Marks (2011) and Caceres-Delpiano (2012) obtained completely different conclusions from the demographic and health surveys. The former found that having children had a detrimental impact on female employment but the latter concluded that having children had no impact on the female labor supply. At the same time, the effect of fertility on the female labor supply could be complex. For example, Heath (2017) examined the Ghana Household Urban Panel Survey and found that fertility decreased the labor supply to a considerable degree but increased working hours.

In China, there is still a lack of consensus on the influence of fertility on the supply of female labor. Some scholars (Cao, 2019; Wu, 2022) found that young children negatively impacted women's labor supply whereas He and Zhu (2016) and Guo et al. (2018) came to contradictory conclusions in both urban and rural areas using population census data and Chinese child twin surveys.

Birth control policy, which has a direct connection with fertility, is also a popular research topic in China. For example, Zhang (2017) compiled the empirical results on the one-child policy's effects in the literature, suggesting that its effects on fertility and human capital investment in children are contentious. Zeng and Hesketh (2016) noted that low fertility due to the stringently enforced one-child policy had increased women's chances of well-paid work and career advancement. However, research on other potentially important effects of the one-child policy in China, including its potential effects on divorce, labor supply, and rural-to-urban migration, is lacking. Most previous studies have focused only on macro-level data and ignored the nuanced aspects mentioned above. Marvalová et al. (2018) argue that the vast majority of research on

the one-child policy, particularly those concerning women's well-being, has primarily focused on the negative effects of the policy on women's materialistic lives in China. Studies examining the effects of reformed family planning policy are even rarer.

As China has transitioned from a socialist centralized economy to a profit-driven market economy, public and private spheres have become increasingly separated, and gender inequality (e.g., in employment and earnings) has worsened in recent decades. Schwank et al. (2018) and Shen and Jiang (2020) found that the two-child policy may pose a risk for women in terms of employment and induce additional childcare labor. He et al. (2022) conducted a field experiment to investigate the labor market discrimination caused by the new two-child policy. Their results demonstrated strong evidence of discrimination against expected family responsibilities. Wu (2022) uses the newly introduced two-child policy to construct an instrumental variable for the number of children and found negative effects of fertility on the maternal labor supply. Agarwal et al. (2019) used employer-employee matched data from a major city in China and found that employers hired fewer female employees and that the gender wage gap increased after the relaxation of the one-child policy in 2013. However, Agarwal's work only considered formal employment, which may not accurately reflect the overall effect of the two-child policy on women.

To fill the important research gap mentioned above, this study conducted an empirical analysis based on a unique dataset from the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016. Unlike Agarwal et al. (2019), we focused on migrant workers who are more sensitive to the birth control policy and can more accurately show its effect. Our work overcomes the shortcoming stemming from the absence of micro-level data in previous studies and contributes to the understanding of the seminal "vote with feet" concept by analyzing the migration patterns of the workers affected. In comparison with previous studies, we also contrasted the one-child and two-child policies by comprehensively discussing their advantages and disadvantages for fertile women.

III. Data and model

1. Data

The data used in this study were obtained from the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016. The dataset includes information on the population dynamics in the labor market and job placement, covering migrant populations in 31 provinces and megacities of China by random sampling. The respondents were migrant workers aged between 16 and 65 years. The survey includes

four categories of questions: family information, work and living conditions, marital status, and life experience.

We used the dataset mentioned above in this study for several reasons. First, it is the only data source that can be used to track the impacts of the new birth control policy on migrant workers, particularly female cohorts. Second, compared to local workers, migrant workers who are recent graduates are more sensitive to employment opportunities, enabling us to identify better the changes in outcome due to the policy changes. This is because local workers are eligible for unemployment compensation or minimum living standard security funds, whereas migrant workers are not eligible for such social benefits in places where they seek job opportunities. They need to find a job to stay in; otherwise, they must move back to their hometowns. The dataset thus offers a clear way to identify migrant workers.

The two-child pilot policy commenced in January 2014 in China. The survey was conducted in May when the new birth policy was in force in 21 of 31 provinces. It is likely that the 2014 survey data cannot be effectively used to tease out the policy effect due to the short period of the time gap between the policy enactment and the survey. We therefore used the 2015 survey data in our main analysis to investigate the impact of the two-child birth control policy on the employment opportunities of females. Data from 2014 were utilized for placebo tests instead. In 2016, the universal two-child policy was initiated, helping us to verify the extended effects of birth control policies.

The reason we do not merge the data for each of the three waves is that the survey does not trace migrant workers every year. The change in labor status over several years may not truly reflect the change in employment opportunities due to the existence of self-selection. Moreover, up to 26 percent of the surveyed workers were considered migrant workers who moved to their working locations in less than six years. This relatively quick relocation time makes it difficult for migrant workers to capitalize on changes in employment opportunities to their advantage.

Migrant workers. In the sample, we define migrant workers as people who move to the city where they are looking for a job at least 1 month prior, are aged 15–65, and do not have a *hukou* in the city where they are seeking employment. As migrant workers can gain local residency status after working in a location for a certain period of time, we included migrant workers who moved to their current cities after 2008, implying a less-than-6-year time window before the policy shock. In general, migrant workers can be categorized as employees, employers, or self-employed workers in the market. The status of an employee requires active participation in the job market and the acceptance of a job offer. Female unemployment can be attributed to many factors, including an inability to work, working only in the household, gestation, and needing

to feed an infant. We do not include these workers in our analysis as they have partly or temporarily exited the labor market. In this paper, we categorize an individual as unemployed only when he or she is 16 or older and actively looking for a job but with no success. We dropped observations with missing values and winsorized extreme values by 1 percent for variables. The final sample size for our study was 84,258 for 2014, 94,850 for 2015, and 66,729 for 2016.

Recent graduates. The *Labor Law of China* stipulates that it is illegal to recruit workers who are under the age of 16. The *Law of Compulsory Education* also requires that children aged 6 or above must receive at least 9 years of education. That is, individuals who enter the labor market are typically graduates with secondary education or higher. As the minimal education age varies across regions, graduates from secondary schools may not be eligible to enter the labor market due to age limits. We, therefore, define job-seeking labor as people who graduated from high school or above in 2015.

Choice of dependent variables. The selection of demographic control variables in this study follows the suggestions of Miner (1974). In addition to individuals' age, education, and work experience, we also included their *minzu* and marital status. The term *minzu* refers to whether a person is a *Han* or a minority. We also considered a set of family and work-related background information. Table 1 provides the descriptive statistical details of all variables.

Table 1. Summary statistics

Statistics	Min	Max	Mean	Median	Observations
Individual characteristics					
Employment opportunity	0	1	0.859	1	94,850
Age	16	65	33.160	31	94,850
<i>Minzu</i>	0	1	0.919	1	94,850
Experience	1	49	5.664	3	94,850
<i>Hukou</i>	0	1	0.163	0	94,850
Marital status	0	1	0.656	1	94,850
Education	1	7	3.548	3	94,850
Individual income	0	13.122	8.017	8.007	85,031
Family income	0	13.122	8.470	8.517	94,850
Spouse characteristics					
Age	1	65	36.828	35	72,070
<i>Minzu</i>	0	1	0.922	1	72,070
Experience	1	46	4.052	3	60,687
<i>Hukou</i>	0	1	0.121	0	94,850
Education	1	7	3.347	3	71,882

(Continued on the next page)

(Table 1 continued)

Statistics	Min	Max	Mean	Median	Observations
Family and work backgrounds					
Number of children	0	7	1.246	1	65,167
Number of people living together	1	10	2.198	2	94,850
Economic zone	1	4	3.148	4	94,850
Ownership	1	12	4.821	6	94,850
Industry	1	20	6.235	5	94,850
Hour	0	120	51.001	48	81,487

Source: Obtained from the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016.

Notes: Family income is given in the log form of amounts in RMB. The whole country is divided into four economic zones including east, central, west, and northeast regions. The survey covers 20 industries, including primary industries such as farming, forestry, animal husbandry, and fishery (1), secondary industries such as mining (2), manufacturing (3), and coal exploitation and washing (4), as well as the tertiary industries such as traffic, storage, and mail business (7), cultural, physical, and entertainment (18), public administration, social welfare, and social organizations (19), and international organizations (20). Ownership of the firms where the workers stay has been classified into 12 categories in the survey, ranging from government agencies, institutions, and social organizations (1), state-owned and state-holding enterprises (2), collective-owned enterprises (3), cooperative and joint ownership enterprises (4), limited liability corporations (5), private enterprises (6), to being unemployed or unaffiliated (12).

2. Empirical strategy

To investigate the effects of the relaxed birth control policy on female employment, we first estimated a set of probit models. Admittedly, migrant workers who are not from single-child families are not eligible for the two-child pilot policy. In other words, those workers will not be affected by this new policy. According to data from the National Bureau of Statistics of China, women accounted for 33.6 percent of all migrant workers in 2015. Besides, the proportion of migrant workers who were the only child in their respective families was around 62 percent in that year. The proportion of women in our sample was 45.5 percent, which seems slightly higher than the nationwide average. The main reason is that those migrant workers were mainly engaged in labor-intensive industries, especially in the service industry where women have the edge over their male counterparts. In short, our sample is representative, despite the fact that the gender ratio does not mirror the national composition of this targeted population.

The two-child pilot policy in the destination locations triggers concerns about the employability of women workers in the labor market, thereby drawing our attention to the issue of gender discrimination. We therefore need to focus on the following two aspects: (i) The proportion of migrant workers who are the only children in their families reflects the degree to which the policy affects migrant workers. (ii) The

proportion of women migrant workers reflects the gender disparities caused by the policy. Specifically, we model the probability of individual i being employed in region j using Equation (1):

$$Y_{ijgt}^* = \beta_0 + \beta_1 Policy_{jt} + \beta_2 Gender_{ig} + \beta_3 Policy_{jt} \times Gender_{ig} + \phi X + \delta_j + \gamma_t + \varepsilon_{ijgt}, \quad (1)$$

where t and g are the migration time and gender, respectively. Y_{ijgt}^* is a latent variable, and we observe Y_{ijgt} , a dummy variable indicating that i has found a job in region j and only if $Y_{ijgt}^* > 0$. $Gender_{ig}$ is a gender dummy for individual i , which is set at a value of 1 when the person is a female. The vector X encompasses a variety of controls at the individual level, including age, education, work experience, social characteristics, and spousal characteristics. δ_j captures the fixed effects across cities. γ_t is the time fixed effect. ε_i is a normally distributed random error with zero mean and unit variance. $Policy_{jt}$ is a policy dummy variable in region j at time t .³ In the survey data, individual respondents indicated when they moved to their current city from a different location. As the pilot policy started in 2014, we first constructed the policy dummy on a yearly basis by setting $Policy_{jt}$ at a value of 1 for 2014 and onwards; otherwise, it was set at 0. Eligible individuals moving to the city after 2014 were therefore expected to be in the treated group.⁴ Our identification strategy was similar to the strategy used by Archibong and Annan (2017), hence turning the survey data into a standard difference-in-differences setting.

Our key parameter of interest is β_3 , which measures not only the impacts of the two-child pilot policy on female respondents' employment opportunities relative to their male counterparts but also the extent to which these impacts vary across regions and by migration months. We then study the second type of gender discrimination reflected by the employment remuneration or wage rate. If the salary of female workers declines compared to that of male workers after the two-child policy, we can thus confirm that wage discrimination exists and is due to the introduction of the new birth control policy. As described in Equation (1), we replace the dependent variable with the wage of the individual respondents 1 month before the survey administration.

³As the policy dummy variable in our model is set in accordance with the year the policy was implemented, which is 2014 without any exceptions across jurisdictions, there is no need to add a subscript t . To identify this policy impact more precisely, we came up with a second approach to the definition of the policy dummy variable, namely to define it according to the implementation month. In this scenario, the subscript t in the policy dummy variable is attached with concrete meaning.

⁴The rationale behind the selection of the control group is as follows: the difference in the migration time of migrant workers will lead to the phenomenon in that only a fraction of job opportunities in the destinations are affected by the policy. In other words, if workers moved to their "dreamland" earlier than 2014 and obtained employment opportunities, they would not be affected at all by the pilot two-child policy.

IV. Empirical results

1. Benchmark results

Table 2 reports our benchmark results. As shown in column (1), the implementation of the two-child pilot policy significantly reduces the employment opportunities of females. This negative association remains even after controlling for individual characteristics and various types of fixed effects (refer to columns (2) and (3) in Table 2). We included the average wage of local workers (*wage*) and the number of permanent residents (*people*) as two control variables, which helped to eliminate the confounding impacts that result from the fluctuations in the number of laborers (i.e., the supply side of the story). By calculating the marginal effects, we find that employment opportunities for female workers have decreased by 1.4 percentage points. This is in addition to a 5 percent deficit in a female's chance of being employed in comparison with a male, as shown in column (3) of Table 2.

Table 2. Estimated effects on the employment probability of female workers using standard probits

Variables	Employment opportunity with year policy dummy			With alternative month policy dummy		Without child	With children
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gender	-0.232*** (0.013)	-0.193*** (0.014)	-0.232*** (0.014)	-0.235*** (0.013)	-0.227*** (0.014)	-0.526*** (0.051)	-0.239*** (0.018)
Policy	0.105*** (0.015)	0.110*** (0.015)	0.200*** (0.029)	0.070** (0.027)	0.023 (0.044)	-0.176 (0.116)	0.110*** (0.038)
Policy × Gender	-0.066*** (0.021)	-0.048** (0.021)	-0.067*** (0.022)	-0.073*** (0.023)	-0.077*** (0.022)	-0.152** (0.073)	-0.187*** (0.029)
Marginal effects							
Gender	-0.051***	-0.041***	-0.047***	-0.047***	-0.046***	-0.127***	-0.046***
Policy	0.023***	0.021***	0.040***	0.014**	0.005	-0.042	0.021***
Policy × Gender	-0.015***	-0.008*	-0.014***	-0.015***	-0.016***	-0.037**	-0.036***
Age	No	Yes	Yes	Yes	Yes	Yes	Yes
Work experience	No	Yes	Yes	Yes	Yes	Yes	Yes
Education	No	Yes	Yes	Yes	Yes	Yes	Yes
Social characteristics	No	Yes	Yes	Yes	Yes	Yes	Yes
Spouse effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes	Yes	Yes	Yes
City FE	No	No	Yes	Yes	Yes	Yes	Yes
Observations	94,850	94,850	94,850	94,850	94,850	7,553	57,614

Notes: ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively. All the results are derived from probit model regressions. The policy dummies in columns (1) to (3) are defined on a yearly basis. Column (4) is dichotomized in accordance with the specific month in which the pilot two-child policy was officially implemented, and column (5) is defined as the central government's announcement on the adoption of the pilot two-child policy in November 2013. Age in the model includes age and its squared term; work experience includes work experience and its squared term. Columns (6) and (7) are regressed for the subsample of respondents without or with children. The standard errors clustered at the industry level are in parentheses. FE, fixed effects.

The policy dummy in the model is defined by the year in which the central government officially announced the implementation of its policy. As it is possible that the actual starting date of the policy varies across provinces, we redefine the policy start date in two ways. First, it is defined by the exact month when the policy was implemented in a province. Second, the starting date of the policy shock was set as November 2013, which is the month in which the central government made the official announcement on the adoption of the new birth control policy. We can observe from columns (4) and (5) of Table 2 that both alternatives support our main finding that there is a statistically significant negative effect of the new birth control policy on female employment opportunities.

At least two interpretations can be derived from our main results. First, although the two-child pilot policy improved the demographic structure of the community, it reduced the employment opportunities to which females are entitled. The one-child policy implemented in the past 3 decades is likely to be one of the main contributing factors to mitigating gender inequality. Without the one-child policy, females may have even fewer opportunities to enter the labor market, enlarging the gender income gap. Finally, additional social changes, including more equal educational opportunities for teenagers (Huang et al., 2016), have resulted from the one-child policy. These societal changes also expand the employment opportunities of girls after their graduation, thus reducing gender inequality.

2. Heterogeneous effects

In addition to birth control policies, one may argue that a female can make herself competitive in the labor market by virtue of increased education. The estimated adverse effect of the two-child policy can thus be mitigated by the improved educational level of females. We addressed this potential concern by including education as one of the control variables in our model. As shown in columns (2) to (5) of Table 2, significant changes in the magnitude of the coefficients for the interaction term cannot be found. We also sorted our sample by education level and found that the two-child pilot policy had similar effects on females with high school education or below (Panel A of Table 3). However, the effects were insignificant for females who did not receive any education or those who obtained a bachelor's degree or higher.

One might also wonder if a substitution effect exists between work experience and education level. Less educated workers accumulate human capital through specialization, which could, to some extent, offset the negative effect resulting from their lower education levels on employment opportunities. In our sample, workers with a high-school education or below accounted for 82 percent of the total. We used

a subsample of recent graduates for the following analysis. Recent graduates were defined as workers who graduated in 2015. As new entrants to the labor market, their employment opportunities are, at best, marginally impacted by unobserved work capability factors. Specifically, graduates were divided into various categories based on the degrees obtained: high school, associate degree, and bachelor's degree. Our migrant data were collected in May, which is the most typical graduation month for new entrants to the labor market. Moreover, while the two-child pilot policy

Table 3. Heterogeneous impacts on employment opportunity

Panel A: Heterogeneous impacts by education level

	All workers				New graduates			
	Illiteracy	High school or below	Associate degree	Bachelor or above	All graduates	High school	Associate degree	Bachelor or above
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gender	-0.009 (0.149)	-0.051 (0.043)	-0.222*** (0.021)	-0.275*** (0.029)	0.009 (0.087)	-0.601** (0.271)	0.084 (0.113)	0.197 (0.196)
Policy	-0.091 (0.288)	0.384*** (0.081)	0.164*** (0.042)	0.245*** (0.062)	1.100*** (0.183)	1.159*** (0.426)	0.892*** (0.248)	1.834*** (0.459)
Policy × Gender	0.074 (0.210)	-0.118* (0.067)	-0.082*** (0.032)	-0.039 (0.044)	-0.028 (0.122)	0.690* (0.365)	-0.005 (0.157)	-0.559** (0.284)
Observations	1,148	9,621	44,078	22,896	2,723	345	1,791	577

Panel B: Heterogeneous impacts by sector

	All workers				New graduates			
	Public sector	Private sector	Others	Unemployed	Public sector	Private sector	Others	Unemployed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gender	0.060*** (0.012)	0.011 (0.012)	0.007 (0.027)	-0.336*** (0.024)	0.008 (0.082)	-0.034 (0.082)	0.475** (0.238)	-0.969* (0.505)
Policy	-0.182*** (0.025)	0.194*** (0.024)	-0.007 (0.057)	-0.099** (0.046)	-0.700*** (0.176)	0.743*** (0.177)	0.270 (0.504)	-1.834** (0.913)
Policy × Gender	0.022 (0.019)	-0.039** (0.018)	0.017 (0.041)	0.059 (0.037)	-0.061 (0.109)	0.038 (0.109)	-0.228 (0.299)	1.474* (0.769)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Work experience	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Social characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spouse effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94,850	94,850	94,841	94,397	2,723	2,723	1,938	822

Notes: ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively. The dependent variable for columns (4) and (8) in panel B is the likelihood of being unemployed. The standard errors clustered at the industry level are in parentheses. FE, fixed effects.

was implemented in January, it was not fully rolled out at the provincial level until March 2015. Thus, the policy has only limited effects on recent graduates with no job offers. In other words, recent graduates who secured a job offer in the winter of 2014 were less likely to be affected. The effect of the pilot policy on recent graduates became significant only when they sought job opportunities in the year following their graduation.

As shown in Panel A of Table 3, it is interesting that the effect of the two-child pilot policy on female employment opportunities becomes positive for recent graduates with a high school education. In contrast, a negative impact remains for recent graduates with a bachelor's degree or above. This is because recent high school graduates are commonly 18 years old or younger and less likely to be pregnant relative to recent college graduates, who are typically 22 years old. Moreover, as college graduates are more sensitive to employment opportunities compared with other groups of workers, the negative policy effects are the strongest among recent graduates with bachelor's degrees (-0.559). In our opinion, the heterogeneity of the policy effect across different educational categories is mainly attributed to the substitutability of productivity, which we will explain in Section V.

Although our data are gleaned from the dynamic monitoring survey of migrant workers, they do not track individual respondents over time. The migrant workers in our sample may therefore suffer from self-selection bias. This is because workers with lower self-expectations for finding a job will choose not to move, whereas workers with higher expectations for securing a job will choose to be migrant workers immediately following their graduation. If this were true, we would find an insignificant effect of the two-child pilot policy on female employment. Our results, as shown in Table 3, suggest that the negative correlation between these two types of workers persists even after controlling for city-level fixed effects. Evidently, the impact of potential self-selection bias on the main relationship of interest is marginal at best.

Will the negative effects of the policy on females differ by sector? To answer this, we divided our sample into four sectoral categories: (i) the public sector, including government-affiliated institutions, state-owned companies, and collectively owned enterprises; (ii) the private sector, which is mainly made up of privately owned firms; (iii) the "other" sector (if the respondent chooses "others" in the survey); and (iv) the unemployed (if the worker has no job and is actively looking for a job).

The results are presented in Panel B of Table 3. We found that there was no clear discrimination in terms of employment opportunities for women in the public sector, either in the full sample or for recent graduates. The negative effect is significant in the private sector due to concerns about the uncertain productivity of female workers

(Kahn and Lange, 2014). Often, female workers must take maternity leave due to pregnancy or exit from the labor market permanently. This will lower the average levels of productivity for private companies operating in highly competitive sectors. We also found that recent female graduates bear a higher risk of unemployment under the two-child policy scenario.

3. The effects of the two-child pilot policy on wage rates

As shown above, the two-child pilot policy reduces female employment opportunities. Next, we demonstrated the extent to which this pilot policy affects the income of female workers if they have successfully secured a job. The results are summarized in Table 4.

Table 4. Estimated marginal effects on the wage rate using the quantile regression

	Dependent variable: Wage		Quantile regression based on individual income			Quantile regression based on family income		
	Individual	Family	Q10	Q50	Q90	Q10	Q50	Q90
Gender	-0.298*** (0.007)	0.015*** (0.004)	-0.223*** (0.000)	-0.223*** (0.000)	-0.288*** (0.000)	-0.148*** (0.027)	0.000 (0.000)	0.105*** (0.000)
Policy	0.015 (0.013)	-0.170*** (0.009)	-0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	-0.148*** (0.026)	-0.105*** (0.000)	-0.118*** (0.000)
Policy × gender	0.052*** (0.010)	-0.052*** (0.007)	0.118*** (0.000)	-0.000 (0.000)	-0.093*** (0.023)	0.021 (0.027)	-0.000 (0.019)	-0.105*** (0.025)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Work experience	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Social characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spouse effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	85,031	94,850	85,031	85,031	85,031	94,850	94,850	94,850

Notes: *** represents significance at the 1 percent level. The standard errors clustered at the industry level are in parentheses. FE, fixed effects.

Admittedly, the two-child pilot policy increased the wages of individual female workers by RMB162. However, we found that the wage gap between men and women also widened. On average, the difference in log income by gender approximates 0.298, which is higher than the level when this pilot policy was not yet in place (0.274). That is, a male, on average, earned RMB956 more than his female counterpart in the year preceding the two-child pilot policy. Unfortunately, this number ballooned to RMB1,053 after the policy's inception. We therefore concluded that, although the two-child pilot policy increased the absolute wage rate for female workers, it concomitantly enlarged

the wage gap between male and female workers. This is primarily because the two-child pilot policy reduced the working hours of female workers and lowered their work productivity.

To understand the differential impacts that the two-child pilot policy generates on workers with different income levels, we estimate our model by employing the quantile regression method. We first ranked the income levels of individual respondents according to their family incomes. It turned out that there was no policy impact for females with family incomes below the 50th percentile group. The negative policy effects, however, became discernible for females within the 90th percentile group. This implies that females with high family incomes are more likely to suffer from policy shock. On the other hand, female workers who belonged to the bottom 10 percent of family incomes are better off after the policy shock. This pattern is in line with the findings of Durand (1975), who contends that, in the early stages, there is a positive correlation between the percentage of female workers participating in the labor market and their family incomes. However, this correlation turned negative later when the marginal utility that female workers derive from the labor market decreases. We also group the sample according to education level. The results in the appendix (Table A1) show that the wages for female workers with a high-school level of education increased because of the implementation of this pilot policy. This increase, however, does not apply to workers holding degrees at or above the bachelor level.

4. Placebo test

While the two-child policy was enacted in 2014, reforms prior to 2014 could have a lingering and confounding impact on employment opportunities. Thus, our identification can suffer from an omitted variable bias. In this regard, we performed a placebo test to examine the potential bias resulting from unobserved reform shocks by assigning the policy's start date to an earlier period. As the two-child pilot policy was announced in November 2013, it would not be appropriate to set 2013 as the policy start date because expectations on policy relaxation were already running high. We therefore set the policy start date to 2012.

We found that there was no distinctive difference between male and female laborers in employment opportunities under the “created” policy shock, evidenced by the insignificant coefficient of the interaction term in the appendix (Table A2). This confirms that the negative career impact on female workers can be attributed solely to the two-child policy adopted since 2014. The placebo estimation for recent graduates provides similar findings. Furthermore, the heterogeneous effects of this pilot policy on graduates with different education levels disappear when the start date of the policy is moved

ahead by one year. We conducted another placebo check by examining the hypothetical situation in which the policy began to take effect in 2011. The conclusions are similar to those of 2012.

V. The mechanism

We have shown in the preceding section that females with higher levels of education were less likely to find a job when the two-child pilot policy was in effect. This seems to contradict the theory of human capital. However, considering the typical child-bearing role of females in traditional Asian families, the employment opportunities for highly educated female workers would indeed be lowered because of this pilot policy. The reasons for this are detailed below.

Previous studies in the literature provide three possible explanations to make sense of the impact of the two-child policy on female employment opportunities. First, the bargaining power of female workers increased with improved educational backgrounds. Second, relaxed birth control policies changed the risk preferences of women. Third, the relaxation of birth control intensified employers' worries about the uncertain productivity of female workers. Huang et al. (2016) provided empirical evidence for the first explanation. The second theory requires an estimation of the risk preference under the framework of Buser et al. (2014), which requires trackable survey data.

In the following analysis, we provide an indirect assessment of the third explanation. It has been argued, in the literature, that social norms play a pivotal role in shaping the employment trajectory of female workers (Coen-Pirani et al., 2010; Field et al., 2010). For example, Akerlof and Kranton (2010) contend that social codes “tell people how they are supposed to think of themselves and how they are supposed to interact with each other” (Akerlof and Kranton, 2010, p. 1). Certain social norms, which are paternalistic in nature, have unfortunately been internalized by females facing ambivalence between work and family roles in many societies. As a corollary, a U-shaped curve can be observed between the participation rates of females in the labor force and the levels of economic development. That is, in the early stage of a country's economic development, women take up labor-intensive jobs to ease financial burdens and elevate their personal status within their families. With the growth of the national economy and the attendant accumulation of family wealth, however, the marginal utility of the income earned by females to their respective families gradually decreases. Women in this scenario are likely to step down from their work positions voluntarily and concentrate on fulfilling familial obligations.

The purpose of either the one-child or the two-child policy is to control the number of children that females can have. With the relaxation of one-child birth control measures, the career path of married females is very likely to be interrupted by the need to care for their newborns. This will affect the expected productivity of female workers when they enter the job market. Another factor lowering the average income level of female employees stems from the strain borne by their employers, who generally strive to minimize the risk of uncertainty. Assuming that female worker of child-bearing age will sooner or later face a trade-off between work and family commitments, risk-averse employers are prone to counteract this uncertainty by offering a discounted salary to this population. Young women entering the job market, in this sense, constitute the most vulnerable and least favorably regarded group. We can verify this argument by investigating the effect that the age gap of marriage exerts on one's employment prospects.

Undeniably, the timing for gestation is highly endogenous and is strongly affected by the economic conditions and lifestyles of individuals. However, the decision to have a baby is generally made after marriage. We thus use the legal age of marriage as the foundation for our analysis, as it is purely exogenous. In China, the legal age of marriage for women is 20. We calculate the age gap in marriage by using the difference between the minimum legal age for marriage and the actual age that women become married. It is evident from our results in Table 5 that a larger age gap broadens the employment opportunities of female workers below the legal age of marriage. For female workers who are above the legal age of marriage, however, a large age gap hurts their employment opportunities. This is because, for mature females, a large age gap indicates a higher probability of marriage and/or gestation, which will subsequently lead to a career interruption or permanent exit from the labor market. To rule out the possible unobservable bias affecting our results, we further increase the legal age of marriage from 20 to 22. It turns out that the stated relationship between the age gap and employment opportunities still holds.

We also found evidence from our data that the average age of female migrant workers after the implementation of the two-child pilot policy was two years less than the average age before the introduction of the pilot policy. The percentage of married female workers reported in the post-policy period is 57 percent, which is significantly lower than the level in the pre-policy period (67 percent). All these statistics suggest that, after the adoption of the two-child pilot policy, the share of single and young females in the total pool of migrant workers increased significantly.

Finally, by examining the data on women who exited the labor market, we found that the percentage of exits attributed to pregnancy or breastfeeding increased from

1.4 percent to 5.2 percent. This implies that the two-child policy increased the possibility of female gestation. It is therefore not surprising that companies exhibit concerns about the possible work interruption for their female employees. The potential employment opportunities for female workers are decreased as a corollary.

Table 5. The policy impact of the marriage age gap for recent graduates

Variables	For respondents below the legal age of marriage			For respondents above the legal age of marriage		
	Yearly policy dummy	Monthly policy dummy	Adjusted marriage age	Yearly policy dummy	Monthly policy dummy	Adjusted marriage age
	(1)	(2)	(3)	(4)	(5)	(6)
Policy × Gender	-0.108 (0.126)	-0.096 (0.127)	-0.146 (0.131)	0.436** (0.174)	0.544*** (0.174)	0.286* (0.146)
Gap × Gender	-0.179*** (0.061)	-0.187*** (0.059)	-0.109** (0.045)	0.112*** (0.037)	0.115*** (0.036)	0.131** (0.051)
Gap × Policy	-0.143 (0.136)	-0.148 (0.137)	0.095*** (0.036)	-0.538*** (0.183)	-0.515*** (0.184)	-0.244* (0.143)
Gap × Policy × Gender	0.186*** (0.064)	0.226*** (0.064)	0.135*** (0.046)	-0.136*** (0.038)	-0.161*** (0.038)	-0.183*** (0.051)
Age	Yes	Yes	Yes	Yes	Yes	Yes
Work experience	Yes	Yes	Yes	Yes	Yes	Yes
Education	Yes	Yes	Yes	Yes	Yes	Yes
Social characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Spouse effects	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively. The number of observations was 2,723 for all results. Columns (1) and (4) define policy on a yearly basis. Columns (2) and (5) define policy on a monthly basis. Columns (3) and (6) change the legal age of marriage from 20 to 22. The standard errors clustered at the industry level are in parentheses. FE, fixed effects. Gap, the difference between the legal age of marriage and the actual age of marriage.

VI. Further analysis

Assuming workers are rational agents, is it possible that they would avoid the policy shock to the labor market by “voting with their feet?” That is, after the enactment of the pilot two-child policy, migrant workers might anticipate that the effects it exerts on employment opportunities will vary across regions. Rational workers will thus adjust their migration patterns to mitigate negative policy effects. Following this rationale,

different migration modes of female workers affect their employability differently. Moreover, information exchange and job competition among migrant workers imply that peer effects can serve as a channel to counteract the influence of the policy shock. We also question whether the negative effects of the two-child pilot policy persist even when it is further relaxed to a comprehensive, nationwide two-child policy. In this section, we discuss these possibilities.

1. Migration modes

One of the distinctive features of migrant workers in China is cross-regional movement. In our sample, cross-province migrant workers accounted for over 50 percent of the total. Migrant workers can also resort to cross-city migrations within a province or cross-county migrations within a city. As the two-child pilot policy is implemented at the provincial level, different migration modes may result in noticeable changes in employment opportunities.

In this paper, we consider two types of migration modes – cross-regional migration and within-region migration – based on the origin and destination locations of the workers. Cross-regional migration refers to labor movement from the western to the eastern region, from the western to the central region, and from the central to the eastern region. Within-region migration refers to the movement within the worker's home region, including movement within the eastern, central, western, and northeastern regions. Similar to Equation (1), we have the following logit regression model for our analysis:

$$\begin{aligned}
 Y_{ijgt}^* = & \beta_0 + \beta_1 Policy_{jt} + \beta_2 Gender_{ig} + \beta_3 Mode_{ij} + \beta_4 Policy_{jt} \times Gender_{ig} \\
 & + \beta_5 Policy_{jt} \times Mode_{ij} + \beta_6 Gender_{ig} \times Mode_{ij} \\
 & + \beta_7 Gender_{ig} \times Policy_{jt} \times Mode_{ij} + \phi X + \delta_j + \gamma_t + \varepsilon_{ijgt},
 \end{aligned} \tag{2}$$

where $Mode_{ij}$ is the migration mode of worker i employed in region j . β_7 represents the coefficient of the variable of interest, namely the effect of the two-child policy on employment opportunities of females by migration modes. Equation (2) thus reflects the difference-in-difference-in-differences setting for policy estimation.

The results reported in Panel A of Table 6 show that for cross-regional migration, female workers who move from west to east or from the western to the central region are vulnerable to policy shock. This negative impact is much stronger for workers moving from the west to the central region than those who move from the western to the eastern region. No significant policy impact is documented for female workers moving from the center to the eastern region. In terms of within-region migration, we found that the two-child pilot policy had a significant negative effect only for female workers moving within the central region.

Table 6. Further estimates on the policy impacts of employment opportunity

Panel A: Migration mode							
	WTE	WTC	CTE	ETE	CTC	WTW	NTN
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mode × Policy × Gender	−0.219*** (0.064)	−0.550** (0.216)	0.050 (0.055)	−0.051 (0.051)	−0.173*** (0.066)	0.054 (0.045)	0.124 (0.089)
Panel B: Peer effects							
	With year-based policy dummy		With month-based policy dummy				
	Type-I	Type-II	Type-I	Type-II			
Peer	1.069*** (0.138)	0.562*** (0.090)	1.009*** (0.125)	0.583*** (0.090)			
Peer × Policy	−0.428** (0.182)	0.082 (0.115)	−0.445** (0.194)	−0.187 (0.124)			
Peer × Gender	−0.585*** (0.180)	0.020 (0.117)	−0.583*** (0.163)	−0.115 (0.107)			
Peer × Policy × Gender	−0.341 (0.270)	−0.679*** (0.176)	−0.400 (0.2904)	−0.430** (0.192)			
Panel C: Persistency							
	2013	2014	2015	2016	2016		
Gender	−0.680*** (0.020)	−0.320*** (0.010)	−0.232*** (0.014)	0.076*** (0.022)	0.067*** (0.023)		
Pilot policy		0.017 (0.031)	0.200*** (0.029)		−0.047 (0.059)		
Pilot policy × Gender		−0.044* (0.025)	−0.067*** (0.022)		0.0852 (0.070)		
National policy				0.052 (0.105)	0.049 (0.105)		
National policy × Gender				−0.278** (0.140)	−0.269* (0.140)		
Observations	79,402	84,258	94,850	66,672	66,672		

Notes: ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively. We distinguish seven types of migration modes among regions: from the western to the eastern region (WTE), from the western to the central region (WTC), from the central to the eastern region (CTE), from the east to the eastern region (ETE), within the central region (CTC), within the eastern region (ETE), within the western region (WTW), and within the northeastern region (NTN). We also distinguish three types of peer effects: peer effects from the home regions of the workers (Type-I), peer effects from the destination locations of the workers (Type-II), and peer effects from workers within the same industry (Type-III). Policy refers to the two-child pilot policy, and national policy indicates the implementation of a two-child policy for the whole nation. The results have controlled all social characteristics and various fixed effects. The standard errors clustered at the industry level are in parentheses.

Will workers change their migration modes due to policy changes? Mulligan and Rubinstein (2008) found that growing wage inequality is the driving force of migration pattern changes for the female workforce. By calculating the share of migration modes over time, we found that the share of workers moving from the western to the eastern

region declined from 13 percent in 2013 to 12 percent in 2014. Similar declining trends were found for workers moving from the center to the eastern area and for workers moving within the central region. These numbers lend support to the argument that workers had avoided moving to regions most strongly affected by the pilot policy.

2. Peer effects

Although individual workers compete in the labor market, they are also affected by and learn from, the decisions of their peers. This phenomenon is known as peer effects. Migrant workers often follow their peers to seek new jobs. Will peer effects mitigate the negative effect of the two-child policy on employment opportunities? We answer this question with the following difference-in-difference-in-differences-type probit regression estimation:

$$\begin{aligned}
 Y_{ijgt}^* = & \beta_0 + \beta_1 Policy_{jt} + \beta_2 Gender_{ig} + \beta_3 Peer_{ij} + \beta_4 Policy_{jt} \times Gender_{ig} \\
 & + \beta_5 Policy_{jt} \times Peer_{ij} + \beta_6 Gender_{ig} \times Peer_{ij} \\
 & + \beta_7 Gender_{ig} \times Policy_{jt} \times Peer_{ij} + \varphi X + \delta_j + \gamma_t + \varepsilon_{ijgt},
 \end{aligned} \tag{3}$$

where $Peer_{ij}$ is a dummy variable indicating whether the peer employment opportunity for individual i in region j is higher than the employment opportunity for the individual per se. The value is set at 1 for yes; otherwise, it is set at 0. Migrant workers are commonly subject to two sources of peer effects: peer effects from the home regions of the workers (Type-I) and peer effects from the destination locations of the workers (Type-II). As shown in the appendix (Table A3), the estimated average peer effects are approximately 0.85 for both types. The coefficient of interest is β_7 .

In Panel B of Table 6, we find that the peer effect, regardless of its type, helps increase employment opportunities for workers in general. However, the Type-I peer effect significantly diminishes employment opportunities for females. On the other hand, the Type-II peer effect positively affects both males and females in the same manner. That is, there is no significant difference between male and female workers under the Type-II peer effect. The two-child pilot policy demonstrates almost no impact on female employment opportunities through Type-I peer effects. However, when considering Type-II peer effects, the two-child pilot policy makes a difference by lowering the employment opportunities for female workers.

3. Is the negative effect of birth control policy persistent?

We provide further analysis to determine the longevity of the negative effects of the two-child policy. By employing the 2015 dataset, we found that there was a significant negative policy effect on employment opportunities for the female workforce. The

magnitude was much higher in 2015 relative to that of 2014. A possible explanation for this is that the two-child pilot policy affected only a limited number of workers due to the short policy implementation timeframe.

The pilot two-child policy evolved into a national two-child policy in October 2015, which was then implemented in January 2016. This national two-child policy can thus be considered an exogenous policy shock, as it was almost impossible for individuals to manipulate it. The national two-child policy was also expected to shock the labor market strongly. We therefore used the data from 2016 to study the persistent effects of both the pilot and national two-child policies. The results are listed in Panel C of Table 6.

As can be seen from Table 6, the effects of the two-child pilot policy on female employment opportunities became insignificant in 2016. This can be explained by the fact that female migrant workers had returned to their home regions after failing to find a job in 2015 or had exited the labor market entirely due to pregnancy. However, the national two-child policy reduced employment opportunities for female workers in a statistically significant way, resembling the pilot policy effects in previous years.

We also performed a placebo test by assuming that the national two-child policy was in effect beginning in 2015 instead of 2016. The results show that the policy in this hypothetical circumstance exerts no significant effects on females. It is worth noting that these results remain consistent even after multiple changes to the starting year of the policy. We therefore conclude that the birth-control relaxation, regardless of its format and details, increases gender inequality by reducing the employment opportunities for female workers. This is a huge, albeit unintended, economic cost that we bear by adjusting the demographic structure of society.

4. Gender inequality and labor outcomes

As our results offer clear evidence of gender inequality in the areas of both employment opportunities and wage rates, this section discusses how these gender-based inequalities transform into labor outcomes. We apply the Oaxaca–Blinder method to analyze the factors contributing to the differences between male and female workers. Assuming that the following two equations represent the labor outcomes of male (with superscript M) and female (with superscript F) workers, $y^M = \beta^M x^M + \varepsilon$ and $y^F = \beta^F x^F + \varepsilon$, with y as the outcome variable representing either employment opportunity or wage (in log term), x as the control variables, and ε the error term, we can obtain $y^M - y^F = \Delta x \beta^F + \Delta \beta x^M$ by subtracting the two equations mentioned above, where $\Delta x = x^M - x^F$ and $\Delta \beta = \beta^M - \beta^F$. This could be further reduced to:

$$y^M - y^F = \Delta x \beta^F + \Delta \beta x^F + \Delta x \Delta \beta = E + C + CE, \quad (4)$$

where E indicates the differences in individual skill sets, C shows the estimated differences in coefficients that reflect the marginal effects of gender inequality, and CE represents the interaction effects.

In summary, we found that male workers, when compared to their female peers, had an 8.5 percent higher probability of finding a job (Table A4 in the appendix), owing primarily to their relatively advantageous skill sets. Variations in individual characteristics only marginally accounted for the differences in wage rates between genders. Nonetheless, gender inequality plays a decisive role in explaining the total wage differences, calling for distinctive policy interventions to mitigate gender discrimination in the labor market. Special measures that merit consideration include: (i) providing training programs for female workers so that their personal skill sets can be augmented, fundamentally increasing their competitiveness and employability in the job market; and (ii) promulgating policies to ensure that job candidates with equivalent credentials, irrespective of their gender, will be paid equally by their employing firms.

VII. Conclusions

Gender inequality has long been a grave concern in sustainable social development studies. Birth control policies affect the resource allocation between males and females directly, resulting in significant and consequential social changes. In light of a dynamic monitoring survey on the migrant population, this paper studied how China's two-child pilot policy impacted the employment prospects of female workers.

We ultimately found that the two-child pilot policy lowered the employment opportunities for female workers and enlarged the wage gap between male and female workers. This policy was also prone to affect the future regional labor market structure, as we have shown that the negative policy impacts differed by individual workers' migration modes and peer effects.⁵ Contrary to the conventional explanations in the existing literature, we found that the adverse impacts caused by the two-child pilot policy were mainly driven by increasing employer concerns over the uncertain productivity of females in the labor market.

⁵Arguably, migrant workers could be a self-selected sample with higher employment possibilities. Nonetheless, (i) during the migration of workers from western to central or eastern region, the increase in employment opportunities and the concomitant greater negative impact brought about by the policy helped to confirm the conclusion of our paper; (ii) while we considered two distinct ways to construct the *Peer* variable (one is based on the geographic origin, educational levels, and gender of the workers; the other is derived from their destinations, educational levels, and gender), the negative impact of the policy on employment still exists. Simply put, even if there might be a self-selection problem inherent in migration patterns and migration decisions, we can still ostensibly observe the negative impact of the policy on employment.

Nonetheless, our findings should be viewed somewhat cautiously. First, we did not consider how migrant workers make migration decisions. That is, we studied the impacts of the relaxed birth control policy under the assumption that the migration decisions of workers were given. Young females with better education are still preferred, particularly in high-end, collegial, and intellectually driven industries where the fulfillment of job duties depends less on physical effort and attendance. As mentioned earlier and also shown in the Mincer equation, (i) the willingness to give birth to a second child is extremely low among females with postgraduate degrees in China, and (ii) older couples with significantly higher earning capacities are more likely to have a second child. The pragmatic takeaways of our results, in this scenario, must be supplemented with a qualitative component so that more enlightening conclusions can be reached.

In short, the one-child policy in the last three decades has noticeably changed the demographic structure of the Chinese economy. One positive outcome is growing gender equality. By relaxing the one-child policy through the implementation of the two-child pilot policy, the gender inequality gap has unfortunately been enlarged, as evidenced by the reduction in employment opportunities for females. With the recent inception of the nationwide two-child policy, the traditional role of females in the family is destined to be magnified. It is safe to conclude that female workers in the future will face an ever-tougher trade-off between their careers and families. In this regard, future policies should pay significant attention to the growing gender inequality attributable to the two-child policy. The government ought to help women improve their education level and accumulate professional skills to offset the negative effects of the policy on the one hand, and institutionalize family-friendly policies and look to rectify employers' concerns regarding female worker productivity on the other hand.

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Appendix

Table A1. Policy impacts on wage rate by education levels

	All workers				New graduates			
	All graduates (1)	High school (2)	Associate degree (3)	Bachelor or above (4)	All graduates (5)	High school (6)	Associate degree (7)	Bachelor or above (8)
Gender	-0.243*** (0.003)	-0.219*** (0.007)	-0.200*** (0.010)	-0.201*** (0.014)	-0.092*** (0.027)	-0.069 (0.201)	-0.124*** (0.031)	-0.012 (0.071)
Policy	-0.025*** (0.007)	-0.026** (0.013)	-0.026 (0.019)	-0.051* (0.029)	-0.061 (0.043)	-0.253 (0.197)	-0.024 (0.048)	-0.003 (0.114)
Policy × Gender	0.039*** (0.005)	0.054*** (0.011)	0.021 (0.017)	0.040 (0.025)	0.065* (0.035)	0.153 (0.222)	0.053 (0.040)	0.028 (0.089)
Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Work experience	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Social characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spouse effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81,464	19,614	9,437	5,705	1,995	144	1,429	422

Notes: ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively. The results have controlled all the social characteristics and various fixed effects. The standard errors clustered at the industry level are in parentheses. FE, fixed effects.

Table A2. Placebo test of the policy impact on employment opportunity

	Policy year = 2012				Policy year = 2011			
	All graduates (1)	High school (2)	Associate degree (3)	Bachelor or above (4)	All graduates (5)	High school (6)	Associate degree (7)	Bachelor or above (8)
Panel A: All workers								
Policy × Gender	-0.037 (0.032)	-0.025 (0.065)	-0.076 (0.101)	0.146 (0.139)	0.058 (0.037)	-0.082 (0.078)	0.032 (0.121)	0.038 (0.158)
Observations	94,850	22,896	10,704	5,937	94,850	22,896	10,704	6,381
Panel B: Fresh graduates								
Policy × Gender	0.155 (0.187)	0.731 (0.582)	0.015 (0.234)	0.753 (0.523)	0.075 (0.241)	-0.917 (0.616)	0.113 (0.357)	0.373 (0.471)
Observations	2,723	345	1,791	457	2,723	345	1,791	577

Notes: The results have controlled all the social characteristics and various fixed effects. The standard errors clustered at the industry level are in parentheses.

Table A3. Estimated peer effects by sectors

Sector	Type-I	Type-II
Agricultural	0.8355	0.8174
Mining	0.8480	0.8192

(Continued on the next page)

(Table A3 continued)

Sector	Type-I	Type-II
Manufacture	0.8638	0.8977
Utility	0.8400	0.8322
Construction	0.8593	0.8440
Wholesale	0.8420	0.8381
Transportation	0.8623	0.8579
Hotel	0.8336	0.8313
Information	0.8727	0.8785
Finance	0.8543	0.8539
Real estate	0.8659	0.8577
Rental service	0.8442	0.8216
Research and development	0.8748	0.8754
Environment	0.8531	0.8493
Residential service	0.8463	0.8404
Education	0.8432	0.8441
Social work	0.8356	0.8319
Entertaining service	0.8458	0.8432
Public administration	0.8443	0.8385
International organization	0.8468	0.8387
Overall	0.8473	0.8480

Source: Authors' calculation based on the data from the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016.

Notes: The first level is calculated by taking the home regions, education levels, and gender of the workers into account (Type-I); another level is derived by using the destination locations, education levels, and gender of the workers (Type-II).

Table A4. Decomposition of difference in labor outcomes

	Effects	Standard deviation	95% confidence interval
Employment opportunity			
Total difference	0.085	0.003	[0.079, 0.091]
Endowments	0.073	0.003	[0.066, 0.079]
Coefficients	0.046	0.002	[0.041, 0.051]
Interaction	-0.033	0.003	[-0.039, -0.028]
Wage rate			
Total difference	0.350	0.007	[0.337, 0.363]
Endowments	0.004	0.008	[-0.011, 0.019]
Coefficients	0.330	0.007	[0.315, 0.345]
Interaction	0.015	0.008	[-0.001, 0.032]

Source: Obtained from the National Migrant Population Dynamic Monitoring Survey from 2014 to 2016.

Note: All the estimates shown in this table are calculated using Equation (4) in the main text.

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