

The Cost of Equality?

Gender Role Attitudes and Fertility Preferences in Contemporary China

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Abstract

As China experiences a continuous decline in fertility rates since the 1970s, understanding how evolving gender norms shape reproductive preferences has become increasingly important. Although public progress in education and labor force participation has accelerated, traditional gender expectations in private domain remain persistent. This study examines how gender role attitudes influence fertility desires using six waves of nationally representative data from the Chinese General Social Survey from 2010 to 2021. I develop a theoretical model in which egalitarian beliefs can increase the opportunity cost of childbearing, particularly for women. Regression results show that, after adjustment for demographic and socioeconomic factors, a one-unit increase in the gender role attitude index is associated with a 2 percent decline in women's fertility desire on average, and up to 3 percent in 2021. This association is especially pronounced in egalitarian communities, where the effect reaches 4 percent in 2021. For men, however, the relationship is weaker and less significant. To address endogeneity, I use high-speed rail expansion as an instrumental variable. While the instrument is weak, it supports a negative causal relationship between egalitarian attitudes and fertility desire, particularly among women. These findings show that fertility decisions are influenced by gender role attitudes and suggest that, without supportive policies, shifts toward more egalitarian beliefs may contribute to the continued decline in fertility in China.

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Gender Role Attitudes and Fertility Preferences in Contemporary China

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1 Introduction

The connection between people's attitudes toward gender equality and fertility behavior has been widely studied in demographic and family research (Esping-Andersen and Biliari, 2015; Goldscheider et al., 2015; Li et al., 2020; McDonald, 2013; Yuan and Zhang, 2023). Gender role attitudes, which show societal norms about appropriate roles and responsibilities for men and women, influence individual decision-making, the division of labor, and the structure of family life. These attitudes form a cultural framework that guides everyday decisions, including fertility preferences, and are deeply influenced by evolving economic, social, and institutional conditions (Simpson, 2004; Hudde and Engelhardt, 2020; Cano and Hofmeister, 2022).

Existing research demonstrates that the transition toward gender equality may initially suppress fertility rates, particularly when shifts in the public sphere are not accompanied by changes in the domestic sphere (Goldscheider et al., 2015; McDonald, 2013). Empirical studies across national contexts suggest that when gender norms evolve unevenly, particularly when women gain access to education and employment without the corresponding institutional support or male involvement in domestic labor, fertility desires may decline. However, when structural and cultural support for gender-equal family roles improves, fertility intentions may stabilize or rise again (Mills, 2010; Brinton and Lee, 2016). These dynamics are particularly pronounced among women, who often bear the opportunity costs of childbearing and caregiving in societies that main-

tain unequal domestic expectations.

China presents a compelling context to examine these dynamics. Over the past few decades, China has experienced rapid urbanization, expanded access to education, and increased participation of women in the labor force (Li et al., 2020). Despite these transformations in the public domain, traditional gender norms remain deeply embedded in private life. According to the World Economic Forum's 2024 Global Gender Gap Report, China ranked 106 out of 146 countries in overall gender equality (World Economic Forum, 2024). This tension between public progress and private conservatism creates a unique setting to explore how gender role attitudes influence fertility intentions.

Meanwhile, China is experiencing historically low fertility rates, despite the abolition of the One-Child Policy and subsequent policy measures to encourage childbirth (Chen, 2023). This demographic decline has prompted renewed interest in understanding the attitudinal and structural factors shaping reproductive behavior. A growing body of research has linked egalitarian gender role attitudes to lower fertility desires in China (Li et al., 2020; Yuan and Zhang, 2023). Modernization processes, such as economic development and internal migration, are changing traditional gender norms, particularly among younger and more educated individuals (Du et al., 2020). However, when these shifts in attitudes are not matched by institutional support (e.g., accessible childcare, flexible work arrangements), they may result in reduced fertility intentions.

Despite growing interest, few studies have utilized the multiple waves of the Chinese General Social Survey (CGSS) to examine how the relationship between gender role attitudes and fertility desires has evolved over time. As a result, there is limited empirical evidence on how these dynamics may differ across years or among different demographic subgroups in the Chinese context.

This study contributes to the existing literature by examining how gender role attitudes influence fertility intentions in contemporary China, using six waves of nationally representative data from the Chinese General Social Survey (CGSS: 2010, 2012,

2013, 2015, 2018, 2021). Specifically, I assess whether people with attitudes towards more egalitarian gender role report different fertility desires and whether this association varies by gender, time, and local social context. The central research questions of this study are (1) How do attitudes toward individual gender role affect fertility desires in China? (2) Do these effects differ by gender and over time? (3) Are these relationships moderated by the prevailing community-level norms in which individuals reside? This study combines descriptive and econometric analysis. After documenting trends in gender attitudes and fertility desires, I use multiple linear regression models to estimate the relationship between gender role attitudes and fertility intentions. To address potential endogeneity, I implement an instrumental variable (IV) strategy using exposure to high-speed rail (HSR) expansion as a plausibly exogenous source of variation. The instrument captures differences in gender role attitudes linked to regional exposure to modernization processes, such as urban connectivity and labor mobility, without directly affecting fertility preferences.

I find that more egalitarian gender role attitudes are associated with lower fertility desires among Chinese adults. Specifically, a one-unit increase in the gender role attitude index corresponds to an average 2 percent decline in women's fertility desire, rising to 3 percent in 2021 and reaching 4 percent among women in egalitarian communities. For men, the same one-unit increase is associated with an average 1.8 percent decline, though this relationship is weaker and generally not statistically significant. Instrumental variable estimates, while subject to weak instrument concerns, suggest a negative causal relationship between progressive gender views and fertility preferences. The effect is stronger and more statistically robust among women, consistent with the idea that women bear the primary burden of childbearing and caregiving in settings where institutional support remains limited. These results demonstrate the influence of gender norms on reproductive intentions and show how attitudinal change alone, without the corresponding changes in institutional or policy support, may contribute to the continued decline in fertility.

This study proceeds as follows. Section 2 reviews the relevant literature on gender role attitudes and fertility, including key theoretical frameworks and empirical findings, with particular attention to the Chinese context. Section 3 introduces economic models of fertility decision making which aim to explain how gender norms and attitudes can influence individual utility and fertility intentions. Section 4 describes the data and key variables used in the analysis. Section 5 presents the empirical results. It begins with multiple linear regression models to establish baseline associations and then implements two-stage least squares (2SLS) estimation to build the causality relationship. This section also includes robustness checks, subgroup analyses by gender, and weak instrument diagnostics. Finally, Section 6 concludes by summarizing the main findings, discussing their implications for gender equity and fertility policy in China, and suggesting directions for future research.

2 Literature Review

2.1 Fertility Background in China

China's fertility trends have undergone significant transformations since the 1970s, driven by a complex interaction of socio-economic, cultural, and policy factors. Understanding these trends is crucial for analyzing the relationship between gender role attitudes and fertility intentions.

2.1.1 Recent Fertility Trends in China

China has experienced a dramatic fertility transition since the 1970s, with the Total Fertility Rate (TFR)¹ dropping from approximately six births per woman in the early 1970s to below replacement level² in the early 1990s (Chen, 2023). The fertility decline in the 1970s was largely driven by the campaign *wan, xi, shao* (later marriage, longer birth spacing, fewer children) and the subsequent introduction of the One-Child Policy in 1980 (Zhai and Jin, 2023).

¹Total Fertility Rate (TFR) is the most common measure of fertility for a country, which represents the average number of children that the average woman would have if that woman passes through her entire reproductive period.

²Replacement level fertility refers to a TFR of around 2.1, where a childbearing couple only replaces themselves in the population.

The One-Child Policy, which is a nationwide mandate that limited most families to having only one child, was implemented to curb rapid population growth. It led to a steep decline in fertility, and TFR fell below the replacement level (approximately 1.6) in the early 1990s (Jiang et al., 2019). However, the policy also generated a number of unintended consequences, including a skewed sex ratio due to son preference and accelerated population aging. In an attempt to reverse these demographic trends, the government introduced the Two-Child Policy in 2016, which allows all couples to have up to two children, and later the Three-Child Policy in 2021, which further raised the legal limit to three children per family (Zhai and Jin, 2023).

Despite these changes, fertility rates have remained low (below 1.7), indicating that restrictive population policies are no longer the primary determinant of fertility levels. Instead, institutional structures, such as labor market conditions, family policies, and cultural shifts, play a significant role in shaping fertility intentions (Yang et al., 2022).

2.1.2 Socio-Economic Drivers of Declining Fertility Rates

Economic development and urbanization have played a central role in China's fertility decline by altering the social and economic conditions under which families make fertility decisions. Related factors such as postponement of marriage, rising costs of living, and changing gender norms have all contributed to this trend.

Specifically, marriage postponement and declining marriage rates reduce the number of reproductive years available to couples. The average age at first marriage has increased significantly in recent decades, rising from 24.89 years in 2010 to 28.67 years nationally by 2020. In urban areas, this trend is even more pronounced, with men marrying at an average age of 29.54 and women at 28.14 (Sixth Tone, 2023). This delay is driven by social and economic pressures, including prolonged education, career prioritization, and shifting family values (Lu et al., 2023). Additionally, rising housing, education, and healthcare costs discourage childbirth, especially in competitive urban

environments (Jiang et al., 2019). Financial constraints and a lack of affordable child-care further deter couples from having more children (Zhai and Jin, 2023).

Another important structural barrier is the tension between women's increased educational attainment and labor force participation and the persistently unequal gender expectations at home. As women face growing career opportunities, many also encounter work-family trade-offs that lower their fertility intentions (Li et al., 2020). Workplace discrimination, limited maternity leave, and traditional expectations that women bear the primary burden of childrearing compound these pressures (Shu and Zhu, 2012).

Despite recent policy changes that promote childbirth, such as easing the one-child policy and offering limited subsidies, deeply entrenched gender norms continue to limit the effectiveness of these efforts. Women with more egalitarian gender attitudes, particularly in urban areas, report lower fertility desires, reflecting the unresolved tension between professional aspirations and motherhood (Du et al., 2020). Cross-national research suggests that fertility rates tend to be higher in societies with greater gender equality, where women feel more supported in balancing work and family life (Goldscheider et al., 2015). However, in China, these institutional and social supports remain insufficient, especially in rural regions where traditional gender roles are deeply ingrained.

2.2 Theoretical Framework

2.2.1 Gender and Fertility Theories

Two influential frameworks help explain the relationship between gender equality and fertility behavior: gender revolution theory and gender equity theory.

Gender revolution theory, proposed by Goldscheider et al. (2015), describes a two-stage process through which changing gender roles influence family patterns. In the first stage, women enter the labor force in increasing numbers, while traditional do-

mestic expectations remain unchanged, leading to tensions and a decline in fertility. In the second stage, as men begin to take on more domestic responsibilities and gender equality becomes more balanced across both public and private spheres, fertility rates may stabilize or recover.

Gender equity theory further emphasizes the role of institutional structures in shaping fertility outcomes (McDonald, 2013). The theory posits that very low fertility arises when there is a gap between high gender equity in individual-oriented institutions, such as education and employment, and low equity in family-oriented institutions, such as caregiving responsibilities and household expectations. When this imbalance persists, women may perceive childbearing as incompatible with other life goals and therefore delay or forgo having children.

Both theories highlight the importance of consistency between changes in gender roles in the labor market and shifts within the household. Where such consistency is lacking, fertility rates often decline, even in societies with relatively high levels of development or opportunity.

Empirical research shows that in many highly developed countries, fertility decline has slowed or even reversed where gender equality is supported both in the workplace and at home. In particular, OECD countries that provide strong institutional support—such as subsidized childcare, extended parental leave, and flexible work schedules—have seen cohort fertility rates remain relatively stable (Frejka et al., 2018; LuciGreulich and Thévenon, 2014). These policies reduce the opportunity costs of childbearing by making it more feasible for women to remain in the workforce while raising children.

Cross-national studies further support this view by identifying a U-shaped relationship between gender equality and fertility: in early stages of gender equality, fertility often declines as women face heightened tensions between career aspirations and traditional domestic expectations. However, beyond a certain threshold, when both social norms and institutions begin to accommodate dual-earner, dual-caregiver models, ferti-

ity tends to rebound or stabilize (Mills, 2010; Myrskylä et al., 2011; Esping-Andersen and Billari, 2015; Arpino et al., 2015). This pattern shows the importance of simultaneous progress in both public and private spheres. Without adequate support in the domestic realm, the expansion of opportunities for women can paradoxically contribute to lower fertility rates.

2.2.2 The Two-Part Gender Revolution in East Asia

Although the Gender Revolution Theory has been validated in developed countries, its direct application to non-developed contexts, such as China, requires further consideration. Many East Asian societies, including China, appear to have stalled in the first stage of the Gender Revolution, where women enter the workforce but remain responsible for domestic labor (Kan et al., 2022). This incomplete transition might have contributed to persistently low fertility rates, as women struggle to reconcile career ambitions with family responsibilities (Shu and Zhu, 2012).

2.3 Determinants of Fertility Choices

A substantial body of demographic literature attempts to understand the determinants of fertility behavior, drawing from both structural and attitudinal explanations. Bongaarts proposes one of the most influential frameworks, identifying a set of proximate determinants, such as marriage, contraception, postpartum infecundability, and abortion, that directly influence fertility outcomes by mediating broader socioeconomic and cultural factors (Bongaarts, 1978). Complementing this micro-level model, McNicoll emphasizes the role of institutional factors, such as policies, social norms, and organizational structures, in shaping fertility decisions, suggesting that fertility patterns are embedded in the institutional context of everyday life (McNicoll, 1980).

While these foundational frameworks focus on observed fertility behavior, recent

research has turned to examining the discrepancy between fertility intentions and actual outcomes. Philipov (2009) argues that public policies designed to reconcile work and family life are essential to close the gap between intended and realized fertility, particularly in low-fertility societies. This perspective is particularly relevant in the context of contemporary China, where, despite recent efforts to loosen birth policies (e.g. universal two-child and three-child policies), fertility rates have continued to decline, suggesting a growing disconnect between preferences and behavior.

Recent empirical studies further emphasize the importance of gender-related factors in explaining this gap. Du and Dong (2019), for instance, find that in urban China, motherhood is associated with significant wage penalties for women, while fatherhood often improves the standing of men in the labor market. This “motherhood penalty” discourages women from realizing higher fertility desires, particularly among educated urban populations facing high opportunity costs. These gendered labor market dynamics reinforce traditional household divisions and increase the cost of childbearing for women, particularly in environments lacking supportive institutional arrangements.

Together, these studies support the central premise of this study: fertility intentions are not formed or realized in a vacuum, but are shaped by individual gender role attitudes and the broader social norms in which individuals lived. By integrating variables such as personal gender ideology and average attitudes of county-level communities, this study builds on the established literature by examining how both personal beliefs and normative environments jointly influence fertility preferences. This approach is particularly valuable in the Chinese context, where the gender revolution remains incomplete and institutional constraints continue to shape reproductive decision-making. Understanding the links between gender role attitudes and fertility intentions can help clarify why some individuals adjust their fertility goals downward and under what conditions egalitarian beliefs might promote or hinder fertility realization.

2.4 Past Research on Gender Role Attitudes and Fertility

A growing body of research has examined how gender role attitudes shape fertility preferences. Globally, studies suggest that more egalitarian gender role attitudes are often associated with lower fertility intentions, particularly among women. However, the strength and direction of this relationship vary across contexts, influenced by differences in institutional support, cultural norms, and gender-specific opportunity costs.

Empirical findings by [Lappegård et al. \(2021\)](#) demonstrate the importance of distinguishing between attitudes in the public sphere (e.g., work and education) and the private sphere (e.g., domestic responsibilities). Their cross-national analysis reveals that egalitarianism in the private sphere is more strongly associated with lower fertility intentions, especially among women. This suggests that women who anticipate limited support from partners or institutions in managing childcare can adjust their fertility goals accordingly.

In more developed countries in East Asia, including China, the tension between public and private gender equity is still pronounced. Although educational and labor market opportunities for women have expanded in recent decades, domestic expectations from the society's point of view have changed more slowly. As a result, gender inequality persists in labor markets and household responsibilities.

[Shu and Zhu \(2012\)](#) documents that despite a clear trend toward more egalitarian gender role attitudes, particularly among younger and more educated individuals, men's participation in domestic work has remained limited. This imbalance creates a persistent work–family conflict for women, who face high opportunity costs in balancing career and child-rearing responsibilities. Consequently, many women with egalitarian views express lower fertility desires, viewing motherhood as incompatible with personal and professional aspirations.

Using data from the Chinese General Social Survey (CGSS) in 2015, [Li et al. \(2020\)](#)

find a significant negative association between egalitarian gender role attitudes and fertility intentions. This effect is especially pronounced among highly educated urban women, who are more likely to encounter institutional and cultural barriers to reconciling work and family life. They also show that in communities with more progressive gender norms, this negative relationship is weakened. In such environments, they argue women may perceive greater institutional and social support for dual-earner, dual-caregiver models, making childbearing more feasible.

Educational expansion has also been identified as a key driver of shifting gender attitudes in China. [Du et al. \(2020\)](#) find that each additional year of schooling increases the likelihood of holding egalitarian views, especially among urban residents. However, even as attitudes shift, changes in actual behavior and institutional arrangements often lag behind. This growing gap between ideological and behavioral gender equality may explain the persistent low fertility rates observed despite the easing of family planning policies.

Taken together, these studies demonstrate that the relationship between gender role attitudes and fertility is not universal. Instead, it is mediated by broader social and institutional conditions. In contexts like China, where the gender revolution is uneven across domains, fertility decisions reflect both the aspirations enabled by modernization and the constraints imposed by traditional domestic expectations.

3 Theoretical Models for Fertility

In this section, I review past economic models of fertility and develop three theoretical models to explain how gender role attitudes may shape fertility intentions. I begin with a baseline utility maximization model in which a representative woman chooses fertility under time and budget constraints. Building on this, I incorporate gender role attitudes by modifying the utility function and caregiving costs based on questions from the CGSS survey, distinguishing between traditional and egalitarian households. Finally, I extend the analysis using a sequential game theory model to capture intra-household bargaining between partners. These models provide a structured framework for understanding fertility behavior and generate testable hypotheses that are explored in the empirical analysis that follows.

3.1 Past Literature on Economic Models of Fertility

The economic analysis of fertility begins with [Becker \(1960\)](#), who conceptualizes children as both consumption and investment goods. In this framework, families derive utility from the *quantity* and *quality* of children, subject to both budget and time constraints. Time is allocated between market work, leisure, and child-rearing, while income is spent on general consumption and child-related expenditures. Becker's for-

mulation allows fertility choices to be analyzed using standard economic tools, linking them to income, prices, and opportunity costs.

[Schultz \(1969\)](#) extends the model by introducing family planning as a rational economic choice. His model emphasizes how fertility decisions are shaped by desired family size, child mortality, and uncertainty. Specifically, this model emphasizes the role of female labor market opportunities, which increase the opportunity cost of childbearing and can lead to lower fertility.

[Barro and Becker \(1989\)](#) introduce an intergenerational model that links fertility to economic growth by embedding childbearing decisions within a dynastic framework. In this model, altruistic parents jointly determine fertility, consumption, and intergenerational transfers to maximize a utility function that spans across generations. By incorporating fertility into the optimization problem, the model includes population growth as endogenous within a macroeconomic context, in order to analyze how changes in economic conditions or policy parameters influence long-run outcomes such as capital accumulation, labor supply, and demographic trends.

One shortcoming of these early models is that they all assume a unitary household decision maker. [Chiappori's](#) collective household model formalizes the idea that family members have distinct preferences and that outcomes emerge from negotiated compromises ([Chiappori, 1992](#)). Expanding on this, [Doepke and Kindermann](#) develop a fertility bargaining model in which the division of childcare burdens plays a central role ([Doepke and Kindermann, 2019](#)). Their work demonstrates that disagreement between partners, particularly when the perceived costs of child care fall disproportionately on mothers, can reduce fertility. This introduces a direct link between gender norms, policy interventions (e.g., parental leave), and demographic outcomes.

All of these models follow closely with the idea that there is a negative relationship between income and fertility, and another negative relationship between women's labor force participation and fertility. However, recent models further develop this gendered perspective by focusing on the compatibility between family and career goals. [Doepke](#)

et al. (2022) argue that in high-income countries, fertility decisions are increasingly influenced by factors such as public childcare availability, flexible labor markets, social norms about working mothers and the extent of father involvement. These elements mediate the trade-off between employment and childrearing, helping explain the reversal of the traditional negative relationship between female labor force participation and fertility.

These evolving frameworks provide a basis for integrating gender role attitudes into a modern utility-maximization model of fertility.

3.2 Baseline Model for Fertility

For the sake of later analyzing the effect of gender role attitudes, I start with a simple model where a representative woman makes decisions regarding fertility in the household.

Assumptions: This model builds on the foundational frameworks of Becker (1960) and Schultz (1969), but simplifies the assumption that the utility is derived solely from the number of children (n) and the consumption of market goods (x). The woman is the sole decision maker and allocates her total available time between market labor and childrearing. Each child requires a fixed amount of caregiving time θ , which reduces the time available for paid labor. Income is earned at a constant wage rate w and may be supplemented by non-labor income m . There is no saving; all income is spent within the period. Preferences are modeled using a Cobb-Douglas utility function over x and n , with parameters α and γ .

Variables:

- T : total time available

- h : hours spent in paid labor
- θ : time required per child for rearing
- n : number of children (quantity)
- x : consumption of market goods
- w : wage rate (income per unit of labor time)
- m : non-labor income
- α, γ : Cobb-Douglas utility parameters, with $\alpha, \gamma \in [0, 1]$, and $\alpha + \gamma = 1$

Model: The household maximizes utility:

$$\max_{x,n} U(x, n) = x^\alpha n^\gamma$$

subject to the following constraints:

$$h + \theta n = T \quad (\text{Time constraint})$$

$$x = wh + m = w(T - \theta n) + m \quad (\text{Budget constraint})$$

Substituting the budget constraint into the utility function:

$$U(n) = [w(T - \theta n) + m]^\alpha n^\gamma$$

Optimal n^* : Taking the first-order condition with respect to n to obtain the optimal n^* , I obtain:

$$n^* = \frac{\gamma}{\theta} \cdot \left(T + \frac{m}{w}\right)$$

The full derivation is provided in Appendix [A.1](#)

Interpretation: The optimal number of children n^* increases with a higher utility weight on fertility γ , a greater total available time T , and a higher non-labor income m , while it decreases with increasing wage rates w and a higher time cost per child θ . As wages increase, the opportunity cost of time spent raising children increases, making fertility more costly in terms of lost income. Non-labor income, by relaxing the budget constraint, encourages higher fertility. This model illustrates the trade-off between time and income and provides a foundation for incorporating gender role attitudes in the sections that follow.

3.3 Incorporating Gender Role Attitudes into the Model

Assumptions and Variables To analyze the effect of gender role attitudes on fertility decisions, I extend the baseline model by introducing two types of households: traditional and egalitarian. The structure of the model remains unchanged in terms of time and budget constraints, but the utility function and time costs are modified to reflect differences in gender role attitudes.

In particular, I expand the utility function to include not only consumption x and fertility n , but also hours spent in paid labor h . This modification reflects the idea that women derive utility from market work not only through income but also through non-monetary channels such as personal fulfillment, autonomy, and social engagement. However, the degree to which labor participation is valued varies by gender role attitudes. These assumptions are created based on the survey questions that quantifying respondents' gender role attitudes, as discussed in Section 4.2.

Therefore, I define household type $H \in \{T, E\}$, where T denotes a traditional household and E an egalitarian one. Two key parameters differ by household type:

- Childrearing time cost: Traditional households are assumed to have a higher per-

child time burden due to less shared caregiving, such that $\theta_T > \theta_E$.

- **Valuation of labor time:** Egalitarian households are assumed to place a higher intrinsic value on paid labor, reflected in a larger utility weight on work hours, so that $\beta_E > \beta_T$.
- **Partner sorting:** Individuals who hold egalitarian beliefs are more likely to partner with others who share similar views, increasing the likelihood of equitable caregiving arrangements within egalitarian households.

Model The modified Cobb-Douglas utility function becomes:

$$U(x, n, h) = x^\alpha n^\gamma h^\beta \quad \text{with } \alpha + \gamma + \beta = 1 \text{ and } \alpha, \gamma, \beta \in [0, 1]$$

subject to the following constraints:

$$h + \theta n = T \quad (\text{Time constraint})$$

$$x = wh + m = w(T - \theta n) + m \quad (\text{Budget constraint})$$

Analyzing the Model Substituting both constraints into the utility function gives:

$$U(n) = [w(T - \theta n) + m]^\alpha \cdot n^\gamma \cdot (T - \theta n)^\beta$$

So, for the two type of households, the utility functions gives:

$$U_H(n) = \begin{cases} [w(T - \theta_T n) + m]^\alpha \cdot n^\gamma \cdot (T - \theta_T n)^{\beta_T}, & \text{if } H = T \text{ (Traditional household)} \\ [w(T - \theta_E n) + m]^\alpha \cdot n^\gamma \cdot (T - \theta_E n)^{\beta_E}, & \text{if } H = E \text{ (Egalitarian household)} \end{cases}$$

This model demonstrates that household utility depends on three components: (1) *Consumption*, which decreases as more time is allocated to children; (2) *Fertility*, which directly increases utility via the term n^γ ; and (3) *Paid labor*, which is reduced as child-rearing time rises.

Maximizing utility involves balancing these trade-offs:

- Increasing n raises utility directly through the fertility term n^γ .
- However, it also reduces both consumption x (by lowering labor income) and hours in paid work h , thereby reducing utility through x^α and h^β .

The solution for the optimal fertility choice n^* is derived algebraically and presented in the Appendix A.2. Since the result is very algebraically complicated, I directly compare traditional and egalitarian households to examine how gender role attitudes shape fertility choices.

Since $H \in \{T, E\}$ and $\theta_T > \theta_E$, $\beta_E > \beta_T$,

- A smaller θ_E eases the time burden, as the partner is sharing the childcare burden.
- But a higher β_E means that any loss in labor time has a larger utility cost.

Therefore, if the higher value of paid labor outweighs the reduction in caregiving time, the general trade-off shifts to fewer children, leading to $n_E^* < n_T^*$, which means that egalitarian households choose to have fewer children.

Interpretation This model suggests that egalitarian women may choose to have fewer children not because they place a lower value on family and raising children, but because childbearing imposes a greater utility cost by crowding out other personally meaningful activities. In the model, egalitarian women place greater value on paid work, so time spent away from the labor force on childrearing has a more significant effect on their overall utility. Although egalitarian households spend less time on caregiving per child because responsibilities are more equally shared, the greater importance placed on career, independence, and personal growth makes the trade-off with childbearing more difficult. The model thus explains why fertility intentions may be lower among women with more egalitarian gender role attitudes, even in households where caregiving responsibilities are more equitably shared.

3.4 Incorporating Intra-household Fertility Decision Making

So far, I modeled fertility decisions assuming that women, as the ones who physically give birth, act as the sole decision-makers. Women often bear the primary physical and time costs of childbearing and childrearing, and thus may have more at stake in fertility choices in reality. However, in practice, fertility decisions are typically made jointly by both partners. [Doepke and Kindermann \(2019\)](#), who argue that intra-household bargaining plays a critical role in determining fertility outcomes. Here, I extend the analysis to consider a two-player household sequential game framework where both the woman and the man contribute to the decision. Incorporating a game-theory-based perspective not only allows for a more realistic modeling of how gender role attitudes interact within households to shape fertility behavior, but also provides a theoretical framework to understand why these attitudes might influence fertility decisions differently for men and women. As a further simplification, this model is restricted to heterosexual couples, where one man and one woman partner jointly decide whether to have a child.

Players and Types There are two players in the household: the woman (W) and the man (M). Each has an exogenous type:

- $e_W \in (0, 1)$: the woman's degree of egalitarianism, representing how much she values shared childcare responsibility. A larger value indicates a more egalitarian attitude.
- $e_M \in (0, 1)$: the man's degree of egalitarianism, reflecting his willingness to contribute to childcare. A larger value indicates a stronger commitment to egalitarian caregiving.

Strategies The game is sequential. The man first chooses an effort level $s_M \in (0, 1)$, which is observed by the woman. The woman then decides whether to agree to have a child.

Assumptions

- Fertility occurs if and only if the woman's acceptance condition is satisfied:

$$s_M \geq \theta(e_W),$$

where $\theta(e_W)$ is an increasing function of e_W , which means that more egalitarian women require greater cooperation from their partners.

- If fertility occurs, both players receive utility from having a child (u_W for women and u_M for men), but pay the costs related to the division of childcare burden.
- The man observes e_W and knows the function $\theta(e_W)$, so he can choose his effort level strategically to meet or avoid the woman's threshold.

Payoffs The players' payoffs are summarized in Table 3.1.

	Fertility Occurs	Fertility Does Not Occur
Woman's Payoff	$u_W - \frac{1-s_M}{e_W}$	0
Man's Payoff	$u_M - \frac{s_M}{e_M}$	0

Table 3.1: Payoffs for the Woman and Man under Different Fertility Outcomes

Solving for the Threshold Optimal Value

The woman agrees to have a child if and only if:

$$s_M \geq 1 - u_W e_W,$$

where $u_W \in (0, 1)$ is the utility she receives from having a child. This condition captures that more egalitarian women (higher e_W) demand higher cooperation before agreeing to fertility.

The man receives utility $u_M \in (0, 1)$ from having a child and faces a cost of providing childcare effort, which is inversely proportional to his egalitarianism e_M . In equilibrium, he will offer the minimum effort required for fertility only if doing so is personally worthwhile. That is, the man provides effort

$$s_M^* = 1 - u_W e_W$$

if and only if

$$u_M \geq \frac{1 - u_W e_W}{e_M}.$$

The full derivation is provided in Appendix A.3.

Interpretation This model illustrates how fertility outcomes result from the interaction of the attitudes of both partners. On the woman's side, the decision to accept fertility depends on whether the man's effort s_M exceeds a threshold determined by her own preferences. Specifically, the woman requires at least $s_M \geq 1 - u_W e_W$ to accept. This threshold is shaped by two key factors:

- A higher level of egalitarianism e_W increases the man's effort required, as more egalitarian women place greater emphasis on fairness in domestic labor and are less willing to tolerate unequal burden sharing.
- A higher utility of having a child u_W reduces the required effort, as the woman is more willing to accept fertility even with fewer male contributions.

Thus, the minimum required childcare effort of the man s_M^* increases as the woman's egalitarianism e_W increases, and decreases as her utility of having a child u_W increases.

On the man's side, the decision to give effort is based on whether doing so is worthwhile, which means that the benefit of fertility u_M outweighs the cost of contributing

effort. The cost increases in effort level s_M , and decreases in the egalitarianism of the man e_M , since more egalitarian men are more comfortable with shared childcare. The man provides effort if and only if:

$$u_M \geq \frac{1 - u_W e_W}{e_M}$$

This condition shows that the man is more likely to meet the woman's demand when his own egalitarianism e_M is higher, or when the woman's threshold s_M^* is lower (either because e_W is low or u_W is high). If the cost exceeds the perceived benefit, he chooses not to provide effort and fertility does not occur.

In sum, this model suggests how higher egalitarianism among women raises the threshold for male cooperation, potentially making fertility less likely unless it is paired with a sufficiently egalitarian and motivated partner. In contrast, egalitarian men are more likely to provide the required effort, but their influence on the outcome depends on how demanding the woman is.

3.5 Discussion

In this section, I developed a series of theoretical models to examine how gender role attitudes influence fertility decisions. I start with a baseline utility maximization framework in which a woman makes fertility choices based on time and budget constraints.

To incorporate gender role attitudes, I introduced two types of households, traditional and egalitarian, and modified the utility function to reflect differences in how much women value paid labor. Although both types of households derive utility from consumption, children, and work, egalitarian women place greater weight on labor force participation, leading to a steeper trade-off between childbearing and other life goals. As a result, the model predicts that egalitarian women may choose to have fewer children even with a lower burden on childcare due to this valuation. This central hypothesis will be tested in the empirical section.

I then extend the analysis using a sequential game theory model to incorporate interactive decision-making on fertility between partners. This model suggests that fertility becomes less likely unless both partners are willing and able to meet higher standards of shared responsibility. In reality, for the context of China, where traditional gender norms and unequal division of domestic labor persist, this dynamic is particularly prominent. Women with higher egalitarianism are likely to delay or avoid childbearing unless their partner demonstrates willingness to share the childcare burden. In contrast, the effect of men's egalitarianism may be weaker. This difference on the relationship between gender role attitudes and fertility for men and women will also be tested in the empirical section.

Still, there are some limitations to these models. First, the models rely on simplifying assumptions, including unitary time periods, no savings, and static preferences. In reality, fertility decisions unfold over time and may be influenced by changing income, employment conditions, or life-stage considerations. Second, broader social norms, institutional structures, and peer effects are not explicitly modeled, though they may moderate or amplify the effect of individual attitudes.

Finally, I also consider an important component of the economic theory of fertility, which is the trade-off between the number of children and the investment in each child. Building on the baseline model, I consider an extension in which families derive utility not only from the quantity of children, but also from the quality of each child, captured through financial or time investments. This quality–quantity trade-off, originally formalized by [Becker \(1960\)](#), highlights how rising opportunity costs and aspirations for child well-being can lead parents to favor fewer children with higher investments. Although this mechanism is not the primary focus of the empirical section, it provides an important theoretical foundation and is included in [Appendix A.4](#) for reference.

Together, these models provide a theoretical foundation for interpreting observed fertility patterns and generate clear and testable implications about the role of gender attitudes in shaping reproductive decisions.

4 Data and Measure

4.1 Data Source

This study uses data from the Chinese General Social Survey (CGSS), a nationally representative cross-sectional survey that captures social, economic, and attitudinal trends in China. The CGSS provides rich information on individuals' demographics, employment, family life, and gender role attitudes. The survey covers 478 villages across 28 provinces, municipalities, and autonomous regions, with each observation representing one individual from a distinct household.

There are 13 waves of CGSS data available from 2003 to 2021. This analysis uses six of those waves that include key questions related to gender role attitudes, which are 2010, 2012, 2013, 2015, 2018, and 2021. These datasets enable a longitudinal view of how gender norms have evolved over time and how they relate to fertility preferences. After restricting the sample to respondents who provided valid responses to both the fertility desire and the gender attitude questions, the dataset includes 9,752 observations from 2010, 10,638 from 2012, 9,980 from 2013, 9,512 from 2015, 11,786 from 2018, and 7,807 from 2021. The final sample yields 59,475 observations.

4.2 Variable Construction

Independent Variable

The independent variable of this study aims to quantify the respondents' view on gender roles, which includes attitudinal questions across both workplace and family sphere. To measure individuals' attitudes toward gender roles, this study constructs a gender role attitude index based on five survey questions in the CGSS related to traditional and egalitarian views on gender. The questions measure respondents' agreement with the following statements on a scale of one to five on a five-point Likert scale (totally disagree = 1 to total agree =5), where one means totally disagree and five means totally agree:

- Career: *Men should focus on their careers, whereas women should focus on family.*
- Competency: *Men are naturally more competent than women.*
- Marriage: *Getting married to a good man is more important than having a good job.*
- Dismissal: *Female workers should be dismissed first during a recession.*
- Housework: *Husbands and wives should equally share household chores.*

For each respondent, the answers to the five gender role attitude questions were recoded into binary values, where 1 indicates an egalitarian response and 0 indicates a traditional one. For the first four questions, stronger agreement reflects more egalitarian views, while for the fifth question, the scale is reversed: greater disagreement indicates a more egalitarian attitude. By aggregating these individual binary variables, I create a gender role attitude index ranging from 0 to 5 for each respondent, where 0 represents

the most traditional beliefs and 5 represents the most egalitarian gender role attitudes. This index serves as the primary measure of gender role attitudes in the analysis.

As illustrated in Figure 4.1, gender role attitudes in China have become increasingly egalitarian over time. The total attitude index remained relatively stable from 2010 to 2013, followed by a noticeable upward trend from 2015 to 2021. This trend suggests a progressive shift in societal norms, aligning with broader modernization and policy changes that promote gender equality.

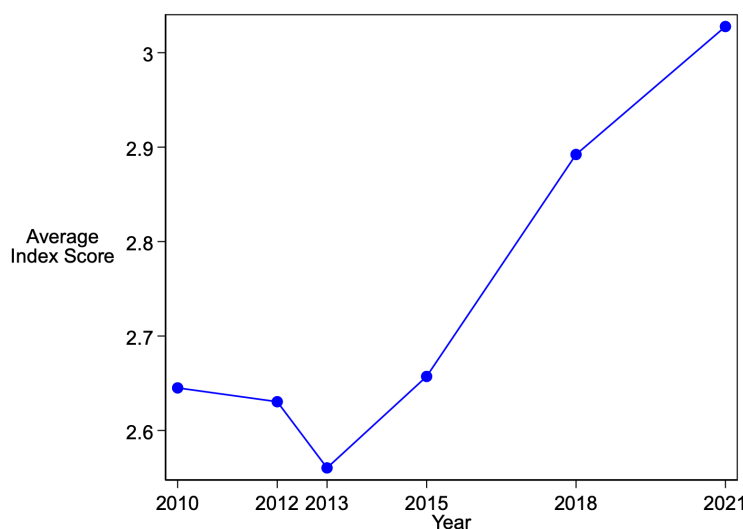


Figure 4.1: Average Gender Attitude Index Over Time

Since there are very likely to be gender differences around these questions, Figure 4.2 presents a comparison of the Gender Role Attitude Index by gender over time. The results show a consistent gender gap in attitudes, with women reporting more egalitarian views than men in all survey waves. However, both genders exhibit an upward trend in gender equality attitudes.

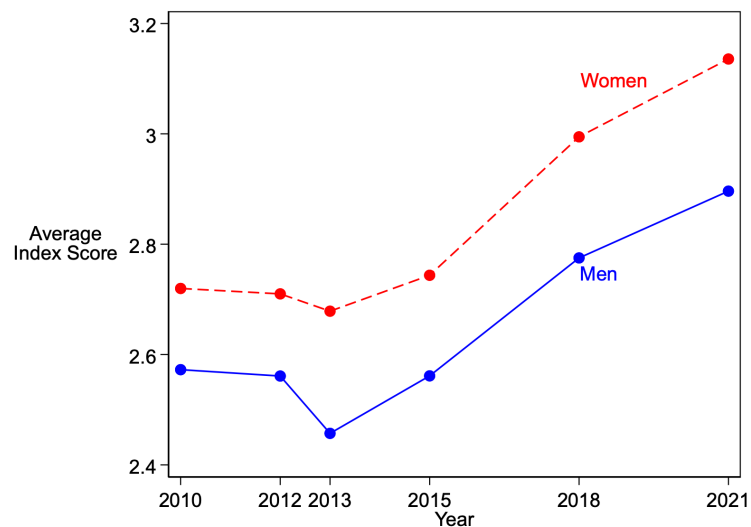


Figure 4.2: Comparison by Gender: Average Gender Attitude Index Over Time

Dependent Variable

The Chinese General Social Survey (CGSS) includes a direct question on fertility preferences, asking respondents: *"If there were no policy restrictions, how many children would you like to have?"*³ Based on the responses to this question, I construct two measures of the intention of fertility. The first is a continuous variable that directly records the number of children each respondent desires. The second is a binary variable that categorizes individuals into two groups based on their fertility preferences. Respondents who express a desire for fewer than two children are classified as part of the low-fertility group, while those who indicate a preference for two or more children are assigned to the high-fertility group.

Fertility desires remain relatively stable across the six survey waves, with most of the respondents preferring two children. As shown in Table 4.1, the average number

³Policy restriction refers to China's historical family planning policies, including the One-Child and Two-Child Policies. By framing the question as hypothetical, the respondents are more likely to report their true fertility preferences rather than adjust their answers out of fear of social or legal repercussions.

of desired children increased slightly over time—from 2.01 to 2.04 for women and from 2.03 to 2.07 for men. This modest increase coincides with the introduction of the universal two-child policy in 2016 but suggests only limited changes in fertility preferences.

Two notable patterns emerge. First, the proportion of respondents who expressed a desire for zero children more than doubled: from 1.7 percent to 3.9 percent for women and from 1.9 percent to 3.6 percent for men, indicating a small but growing trend toward child-free preferences. Second, the share of respondents who wanted exactly one child declined steadily, particularly among women (from 23.8 percent to 16.8 percent). Despite these changes, the two-child norm remains dominant.

Table 4.1: Fertility Desire by Year and Gender

Year	Gender	Desire Distribution (%)					Mean FD	Low (0-1)	High (2+)
		0	1	2	3	4+			
2010	Men	1.9	22.7	58.4	9.7	7.3	2.03	24.6	75.4
	Women	1.7	23.8	58.3	8.8	7.3	2.01	25.5	74.4
2012	Men	1.1	20.4	63.3	9.1	6.2	2.03	21.5	78.6
	Women	1.4	20.9	62.4	8.5	6.8	2.03	22.3	77.7
2013	Men	1.4	19.9	62.2	9.6	6.9	2.05	21.3	78.7
	Women	1.6	21.2	60.5	9.8	6.9	2.02	22.8	77.2
2015	Men	1.7	17.1	65.4	9.0	6.9	2.06	18.8	81.3
	Women	1.6	16.4	64.5	10.2	7.3	2.10	18.0	82.0
2018	Men	3.1	18.2	61.7	11.0	6.0	2.02	21.3	78.7
	Women	3.1	18.3	60.7	10.9	6.9	2.04	21.4	78.5
2021	Men	3.6	16.6	59.9	12.9	7.0	2.07	20.2	79.8
	Women	3.9	16.8	60.7	11.5	7.0	2.04	20.7	79.2

Note: FD = Numerical Fertility Desire. Low fertility refers to desire for 0–1 children. High fertility refers to desire for 2+ children. Percentages may not sum to 100 due to rounding.

Figure 4.3 provides a closer look at the differences between men and women in desire for fertility. Both men and women exhibit minimal fluctuation, with means clustering just above the two-child ideal.

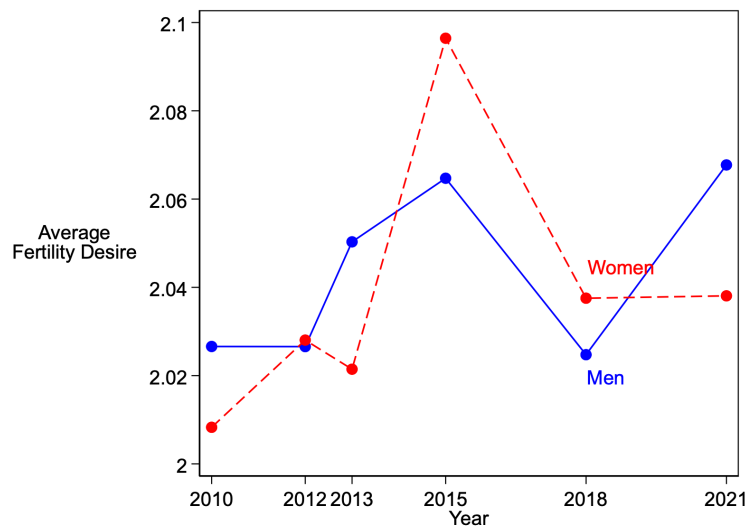


Figure 4.3: Fertility Desire by Gender Over Time

Figure 4.4 shows trends in mean fertility desire by household registration status (hukou), which generally reflects whether a person resides in an urban or rural area. The analysis shows that the difference between urban and rural hukou is consistent over the years, and rural respondents consistently report a higher desire for fertility.

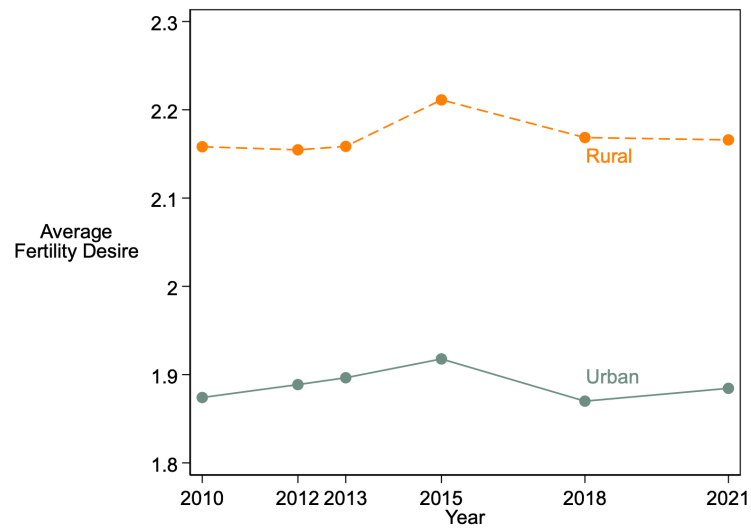


Figure 4.4: Fertility Desire by Household Registration Status (Urban/Rural) Over Time

Control Variables

I identify seven control variables to account for demographic and socioeconomic characteristics at the individual and community levels. These include gender (as reported by the survey, which does not distinguish between gender and sex), age at the time of the survey, type of household registration (hukou), the natural log of personal income from the previous year, marital status, affiliation with the Chinese Communist Party (CCP) and religious beliefs.

5 Identification Strategy

5.1 Multiple Linear Regression

To examine the relationship between gender role attitudes and fertility desire, I use multiple linear regression. I adopt a stepwise approach, beginning with a baseline specification and gradually adding control variables and interaction terms. This allows me to better understand the relationship between fertility desire and key predictors.

5.1.1 Models

M1: Baseline Model

The first model is a simple linear regression of fertility desire (*FertilityDesire*) on gender role attitude index (*AttitudeIndex*) without controlling for any other factors:

$$\text{M1} : \textit{FertilityDesire} = \beta_0 + \beta_1 \cdot \textit{AttitudeIndex} + \epsilon$$

The coefficient β_1 quantifies the average marginal effect of gender role attitudes on fertility desire. Specifically, it estimates how much the expected value of fertility desire changes for a one-unit increase in the attitude index, holding all else constant. The error term ϵ captures all unobserved factors influencing fertility desire that are not accounted

for in this parsimonious model, which might include individual-level heterogeneity, omitted variables, and measurement errors.

The association between gender attitudes and fertility desires among women is likely to be different from that of men. First, since women bear disproportionate physical and opportunity costs of childbearing like career interruption and increased domestic labor burdens (Bianchi, 2000), their fertility decisions could be more sensitive to normative constraints. Second, cultural scripts emphasize women’s maternal roles more strictly than men’s paternal roles, creating stronger social sanctions against deviating from traditional family models. Third, men may overreport fertility desires due to social desirability bias (Philipov, 2009), while women’s reports better reflect actual intentions. These gender dynamics are pronounced in contexts like China, where traditional gender norms interact with rapid socioeconomic change (Yu and Xie, 2015). Therefore, the baseline model might contain substantial heterogeneity in how gender role attitudes correlate with fertility desires between men and women.

Table 5.1: Gender-Specific Baseline Regression Results

	Women (M1)	Men (M1)
<i>Attitude Index</i>	-0.126*** (0.004)	-0.055*** (0.004)
<i>Constant</i>	2.392*** (0.012)	2.185*** (0.012)
Observations	29,958	29,517
R-squared	0.034	0.006

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 5.1 provides a comparison of the baseline regression results with the separated gender regression results. It is clear that the negative association between gender role attitude index and fertility desire is 2.3 times stronger for women ($\beta_1 = -0.126$) than

for men ($\beta_1 = -0.055$). This pattern suggests that women's fertility intentions are more sensitive to gender role attitudes. Furthermore, the higher R^2 (0.034 vs 0.006) suggests that gender attitudes explain more variance in women's fertility intentions.

This gender difference is especially notable given the similarity in average fertility desire across men and women. As shown in Figure 4.3 in the earlier section, both genders consistently report mean fertility desires clustered around the two-child norm, with minimal divergence over time. However, the influence of gender role attitudes differs significantly between them. This shows the importance of looking beyond descriptive averages to understand the deeper factors shaping individual intentions.

Given the evident gender differences in how gender role attitudes relate to fertility desire, the following regressions are estimated separately for men and women.

M2: Year Differences and Interaction Model

Next, in order to understand the possible different relationships between the relationship between fertility desire and gender role attitude over the six years of the survey, the second model introduces fixed effects of the year and an interaction term between the gender role attitude index and the year of which the survey is conducted:

$$\text{M2 : FertilityDesire} = \beta_0 + \beta_1 \cdot \text{AttitudeIndex} + \sum_{t \in Y} \mu_t \cdot \text{Year}_t + \sum_{t \in Y} \gamma_t \cdot (\text{AttitudeIndex} \times \text{Year}_t) + \epsilon,$$

where $Y = \{2012, 2013, 2015, 2018, 2021\}$ and year 2010 is the baseline year that is omitted.

Here, μ_t captures the year-specific effects, and γ_t captures the interaction effects between gender role attitude index and each year.

M3: Incorporating Controls

The third model adds a set of control variables, including demographic and socio-economic factors such as gender, education, age group, hukou status, marital status, CCP party affiliation, religious beliefs, and log income. This model aims to isolate the association of the gender role attitude index and fertility desire while controlling for potential confounders. The equation for this model is:

$$\begin{aligned} \text{M3 : FertilityDesire} = & \beta_0 + \beta_1 \cdot \text{AttitudeIndex} + \sum_{t \in Y} \mu_t \cdot \text{Year}_t + \sum_{t \in Y} \gamma_t \cdot (\text{AttitudeIndex} \times \text{Year}_t) \\ & + \sum_k \delta_k \cdot \text{Control}_k + \epsilon, \end{aligned}$$

Here, δ_k represents the coefficients for the control variables.

M4: Incorporating Social Norms

Beyond individual attitudes, individual beliefs could be shaped by community norms. According to the social conformity theory [Cialdini and Goldstein \(2004\)](#), individuals often align their fertility decisions with perceived societal expectations, even when personal attitudes differ. In the context of fertility decisions, individuals residing in more egalitarian communities may feel greater social acceptance of dual-earner households and shared domestic responsibilities, potentially reducing perceived work-family conflicts and influencing fertility preferences.

Following the strategy of [Li et al. \(2020\)](#), this study constructs a community-level measure of gender role norms (*AttitudeNorm*), defined as the average gender role attitude index for all respondents within the same county in a given survey year, which also range from 0-5. This variable captures the prevailing gender norms at the local community level.

To distinguish between traditional and egalitarian communities, I split the sample based on the mean value of community gender role attitude norm within each survey

year. Communities with a norm value above the average are classified as more egalitarian, while those below the average are classified as more traditional. I then estimate separate models for each normative context:

$$\begin{aligned} \text{M4: Traditional: FertilityDesire} &= \beta_0^T + \beta_1^T \cdot \text{AttitudeIndex} + \sum \gamma_t^T \cdot (\text{AttitudeIndex} \times \text{Year}_t) \\ &+ \sum \delta_k^T \cdot \text{Controls} + \epsilon^T \end{aligned}$$

$$\begin{aligned} \text{M4: Egalitarian: FertilityDesire} &= \beta_0^E + \beta_1^E \cdot \text{AttitudeIndex} + \sum \gamma_t^E \cdot (\text{AttitudeIndex} \times \text{Year}_t) \\ &+ \sum \delta_k^E \cdot \text{Controls} + \epsilon^E \end{aligned}$$

Again, each specification is then estimated separately for men and women.

5.1.2 Regression Results

The above regression results are presented in Table 5.2 and Table 5.3.

Table 5.2: Regression Results by Gender for Model 1, 2, 3

Variable	Model 1		Model 2		Model 3	
	Women	Men	Women	Men	Women	Men
Attitude Index	-0.126*** (0.004)	-0.055*** (0.004)	-0.119*** (0.011)	-0.032*** (0.011)	-0.028** (0.010)	-0.008 (0.010)
Year Effects (ref: 2010)						
2012			0.029 (0.048)	0.080* (0.043)	0.073 (0.046)	-0.003 (0.041)
2013			-0.023 (0.047)	0.057 (0.042)	-0.010 (0.044)	0.052 (0.040)
2015			0.076* (0.048)	0.087* (0.045)	0.037 (0.045)	0.031 (0.043)
2018			0.089* (0.046)	0.077* (0.042)	0.060 (0.044)	-0.034 (0.041)
2021			0.231*** (0.051)	0.240*** (0.052)	0.084 (0.049)	0.105** (0.050)
Attitude × Year						
2012			-0.004 (0.015)	-0.031** (0.015)	-0.017 (0.014)	-0.024* (0.014)
2013			0.012 (0.014)	-0.015 (0.014)	-0.003 (0.013)	-0.018 (0.014)
2015			0.006 (0.015)	-0.019 (0.015)	-0.000 (0.014)	-0.008 (0.014)
2018			-0.009 (0.014)	-0.026* (0.014)	-0.016 (0.013)	-0.008 (0.013)
2021			-0.057*** (0.015)	-0.068*** (0.016)	-0.032** (0.014)	-0.032** (0.015)
Controls	No	No	No	No	Yes	Yes
Constant	2.391*** (0.012)	2.108*** (0.031)	2.333*** (0.035)	2.108*** (0.031)	1.988*** (0.050)	1.827*** (0.057)
Observations	29,958	29,517	29,958	29,517	29,928	29,471
R-squared	0.034	0.007	0.036	0.007	0.144	0.094

Robust standard errors in parentheses. Reference categories: Year 2010, Illiterate, Age 18-25, Rural Hukou, Single, Non-party, Non-religious.

*** p<0.01, ** p<0.05, * p<0.1

Table 5.3: Regression Results by Norm Context (M4)

	Women (Traditional Community)	Women (Egalitarian Community)	Men (Traditional Community)	Men (Egalitarian Community)
Attitude Index	-0.025 (0.016)	-0.034* (0.016)	-0.001 (0.014)	-0.0003 (0.015)
Year Effects (ref: 2010)				
2012	0.091 (0.058)	0.010 (0.080)	0.014 (0.054)	0.005 (0.067)
2013	-0.007 (0.055)	-0.032 (0.078)	0.029 (0.051)	0.057 (0.064)
2015	0.008 (0.054)	0.065 (0.081)	0.013 (0.055)	0.068 (0.068)
2018	0.055 (0.057)	-0.019 (0.076)	-0.045 (0.053)	-0.025 (0.065)
2021	0.022 (0.064)	0.132 (0.084)	0.085 (0.064)	0.090 (0.079)
Attitude Index × Year				
2012	-0.018 (0.021)	-0.004 (0.022)	-0.045* (0.020)	-0.018 (0.021)
2013	-0.004 (0.021)	0.001 (0.021)	-0.008 (0.020)	-0.020 (0.020)
2015	0.011 (0.021)	-0.008 (0.022)	-0.007 (0.020)	-0.016 (0.021)
2018	-0.001 (0.020)	-0.005 (0.020)	0.002 (0.020)	-0.015 (0.019)
2021	-0.010 (0.022)	-0.046** (0.022)	-0.023 (0.023)	-0.034 (0.023)
Controls	Yes	Yes	Yes	Yes
Constant	1.963 (0.067)	2.104 (0.081)	1.696 (0.076)	1.941 (0.089)
Observations	14,872	15,056	15,072	14,399
R-squared	0.143	0.124	0.095	0.078

Robust standard errors in parentheses. Reference categories: Year 2010, Illiterate, Age 18–25, Rural Hukou, Single, Non-party, Non-religious.

*** p<0.01, ** p<0.05, * p<0.1

5.1.3 Analysis and Interpretation

These regression models reveal significant gendered patterns in the relationship between gender role attitudes and fertility desire. In Model 1, women show a 2.3 times stronger negative association between egalitarian attitudes and fertility desire than men ($\beta_{\text{women}} = -0.126$ vs. $\beta_{\text{men}} = -0.055$). For better interpretation, I calculate the percentage change in fertility desire associated with a one-unit increase in the attitude index by dividing each coefficient by the mean fertility desire (approximately 2.0) and multiplying by 100. This yields a 6.3 percent decrease in fertility desire for women, compared to a 2.75 percent decrease for men. These results suggest that women's fertility intentions are more sensitive to gender role norms, consistent with theories emphasizing women's greater exposure to the physical, emotional, and opportunity costs of childbearing (Bianchi, 2000).

Model 2 introduces year fixed effects and interactions between gender role attitude index and survey year to capture temporal variation in the relationship between gender attitudes and fertility desire. The interaction term reveals that the negative association between egalitarian attitudes and fertility desire is strongest in 2021 for both men and women. This pattern aligns with the broader social shifts in gender norms and the increasing opportunity costs of childbearing over the past decade.

Once controls are included in Model 3, many year-specific interactions become weaker or insignificant, especially for men. This comparison suggests that some of the year-to-year variation captured in Model 2 may be confounded by compositional changes in the population. Model 3 therefore provides a more conservative estimate, isolating the effect of gender attitudes net of demographic trends.

Model 3 incorporates demographic and socioeconomic controls, providing a more robust assessment of the relationship between gender role attitudes and fertility desire. As shown in Table 5.2, results remain consistent with previous findings in Model 1 and Model 2: women continue to show a stronger negative association between egalitarian

attitudes and fertility desire than men.

For women, the coefficient of the gender role attitude index remains statistically significant and negative ($\beta = -0.028$, $p < 0.05$), indicating that after adjusting for demographic and socioeconomic factors, egalitarian beliefs are associated with lower fertility desire. Using the same interpretation method as in Model 1, this effect corresponds to a 1.4 percent decrease in fertility desire for each one-unit increase in the gender role attitude index before adding the year-interaction coefficient. When year-specific interaction terms are taken into account, this effect becomes more pronounced in certain years, especially in 2021, where the total estimated effect implies a reduction of 3 percent in the desire for fertility. This suggests that egalitarian women may be increasingly sensitive to the opportunity costs of childbearing in recent years.

In contrast, for men, the coefficient on the gender role attitude index becomes statistically insignificant in Model 3, and the interaction terms are generally weaker. On average across years, a one-unit increase in gender role attitudes corresponds to only a 1.8 percent decrease in fertility desire. This implies that once controls are included, men's fertility desires appear less shaped by their gender role attitudes, pointing to a gendered asymmetry in how normative beliefs influence fertility planning.

The comparison plots below reinforce these findings. Figures 5.1 and 5.2 display the predicted fertility desire across the values of the gender role attitude index, based on Model 3, which incorporates an interaction term between gender role attitudes and the survey year. Results are shown separately for women and men. In each panel, one survey year is highlighted in color, while the remaining years are displayed in gray for reference.

For men (Figure 5.1), the slope of predicted fertility desire, which is the predicted marginal effect of a one-unit increase in the gender role attitude index on fertility desire, is relatively flat throughout all years, with only a modest decline in 2021. This indicates that men's fertility preferences remained generally stable and less responsive to shifting gender role attitudes across time. In contrast, women's plots (Figure 5.2)

show a consistently steeper negative slope in later years, particularly in 2018 and 2021. This suggests that the impact of egalitarian attitudes on lowering fertility desire among women has become stronger in more recent survey waves.

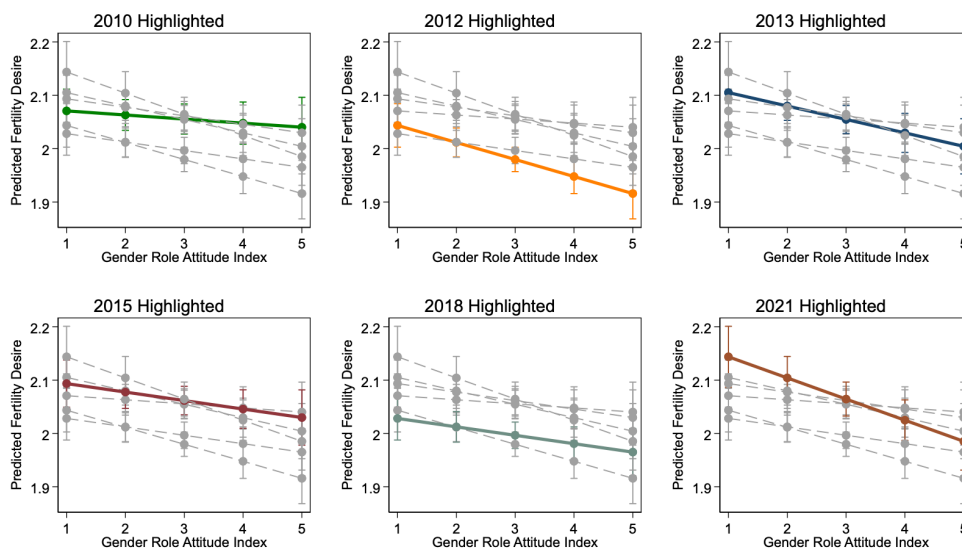


Figure 5.1: M3: Marginal Effects of Attitude Index on Fertility Desire (Men)

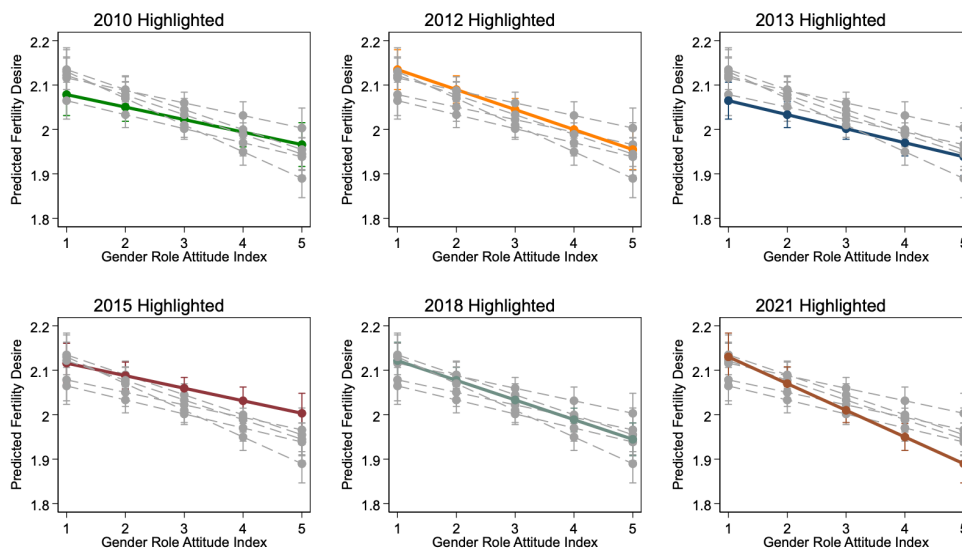


Figure 5.2: M3: Marginal Effects of Attitude Index on Fertility Desire (Women)

These findings reinforce the pattern that men's fertility preferences remain relatively stable in response to attitudinal shifts, while women's preferences have become increasingly sensitive to gender role beliefs. The widening gender gap in the attitude-fertility relationship over time confirm the necessity of examining fertility preferences through a gendered lens.

To better understand how the relationship between individual gender role attitudes and fertility desire varies across social contexts, Model 4 is estimated separately for men and women in more traditional versus more egalitarian communities. This allows for a nuanced exploration of whether prevailing community norms moderate how individual beliefs shape fertility preferences.

Among women, the effect of gender role attitudes on fertility desire remains negative and statistically significant only in egalitarian communities, as shown in Table 5.3. Specifically, in egalitarian contexts, a one-unit increase in the gender role attitude index is associated with a 0.034-point decline in fertility desire, while the same coefficient in traditional communities is slightly smaller in magnitude and is not statistically significant. Furthermore, the year-by-attitude interaction term is particularly notable in 2021 for egalitarian communities ($\beta = -0.046$, $p < 0.05$). This translates to a 4 percent decline in fertility desire per unit increase in the gender role attitude index, indicating that in recent years, egalitarian-minded women in progressive communities express especially low fertility intentions. These dynamics are illustrated in Figure 5.3, which presents the predicted marginal effect of a one-unit increase in the gender role attitude index on fertility desire, estimated separately for more egalitarian and more traditional communities across survey years. Although predicted fertility desire has remained relatively stable over time in traditional communities, the gap between traditional and egalitarian communities has widened in recent years. In particular, in 2018 and 2021, women in egalitarian settings with higher gender role attitude index scores report the lowest predicted fertility desires throughout the time series. The slopes for egalitarian communities also steepen in later years, suggesting an amplification effect, where

egalitarian gender norms intensify the influence of individual attitudes.

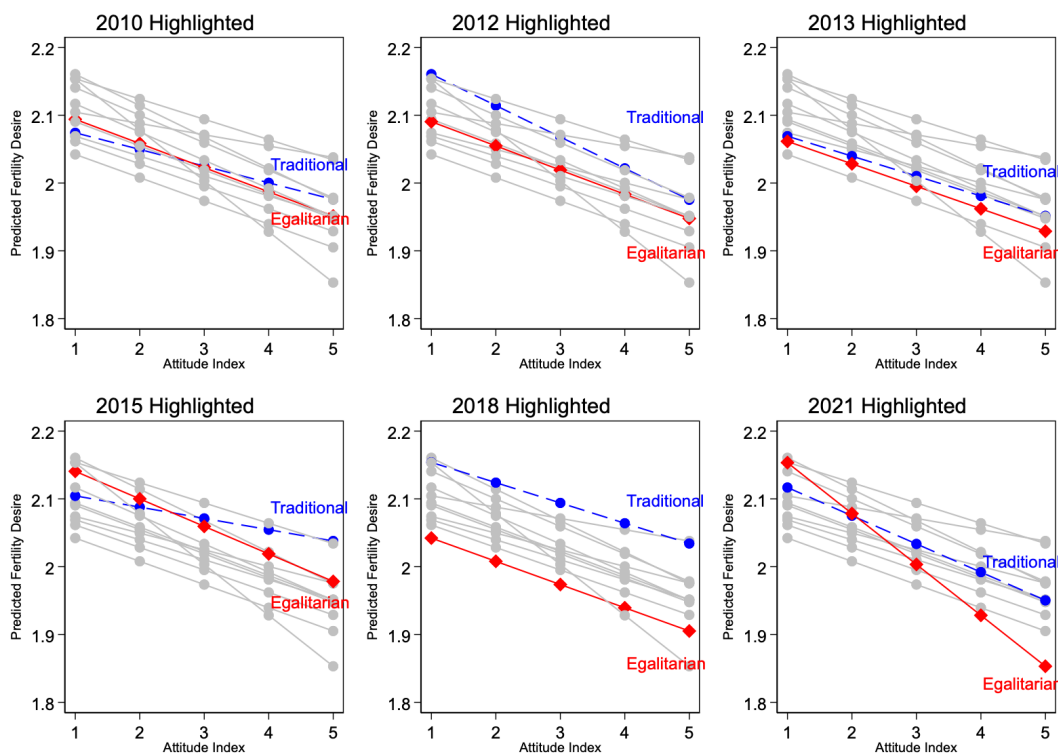


Figure 5.3: M4: Marginal Effect of Gender Role Attitudes on Fertility Desire by Year and Norm Context (Women)

In contrast, the pattern is less consistent for men. Neither the main effect of the gender role attitude index nor most of the interaction terms are statistically significant between communities. However, for men in traditional communities, the direction of the attitude coefficient is slightly negative, while it is essentially null in egalitarian communities. These findings suggest that men's fertility preferences are generally less responsive to their gender role beliefs, and that community-level gender norms do not significantly alter this pattern. The only marginally significant result appears in 2012 for men in traditional areas, but this does not indicate a consistent trend.

These results highlight that women's fertility preferences are more sensitive to their personal gender role beliefs and more sensitive to the surrounding normative environ-

ment. In egalitarian communities, where more gender-equal roles are socially endorsed, women who personally hold egalitarian views may feel greater freedom to express lower fertility intentions. Meanwhile, in traditional settings, social expectations can inhibit such expression, weakening the observed relationship. However, for men, regardless of the type of community, gender role attitudes do not appear to be a strong driver of fertility preferences.

The baseline and extended models reveal that women's fertility intentions are more strongly influenced by their beliefs about gender roles, while men's fertility preferences appear comparatively less responsive. Moreover, it is important to note that although the individual coefficients appear modest, the clustered distribution of fertility desire around 2 magnifies the practical significance of even small changes. This gender gap persists after adjusting for year effects and a comprehensive set of demographic controls, reinforcing the idea that normative expectations and structural barriers might weigh more heavily on women when making fertility decisions.

5.1.4 Limitations

While multiple linear regression serves as a powerful tool for estimating the association between gender role attitudes and fertility desire, several limitations constrain the strength and interpretation of the results. Most importantly, the models presented here are observational and cross-sectional in nature. As such, they estimate associations rather than causal relationships.

Secondly, the construction of the key independent variable, the gender role attitude index, involves binarization of responses to five survey items and summing them into a discrete index ranging from 0 to 5. Although this approach simplifies interpretation and ensures comparability among survey waves, it introduces limitations. Treating inherently ordinal responses as binary can prevent important variation in attitudes and reduce measurement precision. Furthermore, the index's discrete nature creates a limited range

of possible values, which may flatten subtle patterns or underestimate heterogeneity in the population.

In addition, the models assume a linear relationship between gender attitudes and fertility desire, which may not hold across all ranges of the gender role attitude index. It is possible that the influence of more egalitarian beliefs operates differently at the extremes than in the middle of the distribution, or that threshold effects exist, where only particularly strong egalitarianism or traditionalism meaningfully affects fertility preferences. Exploring potential non-linearity or segmenting by attitudinal type could reveal richer patterns that the current specification does not capture.

Additional limitations include measurement and omitted variable bias. Fertility preferences are self-reported and can be influenced by social desirability pressures or aspirational thinking, particularly in cultures where family size is linked to social expectations. In addition, important determinants of fertility desire, including partner preferences, quality of relationship, family support networks, job security, or access to affordable childcare, are not observed in the data set. If these omitted variables are correlated with gender attitudes and fertility preferences, they could bias the estimated associations.

5.2 Exploring Instrumental Variables

While the preceding multiple linear regression models estimate associations between gender role attitudes and fertility desire, interpreting the estimates as causal relies on the assumption that gender role attitudes are exogenous. This assumption is likely violated due to potential endogeneity from reverse causality, omitted variable bias, or measurement error. For example, individuals' fertility intentions may themselves influence their attitudes (reverse causality), or unobserved personality traits, family background, or cultural norms might affect both variables simultaneously (omitted variables). In such cases, the estimated coefficient on gender role attitudes is biased and cannot be interpreted causally.

To find causality, I implement a standard two-stage least squares (2SLS) estimation strategy using instrumental variables (IV). The IV approach is a widely used econometric technique to estimate causal effects in the presence of endogeneity (Angrist and Krueger, 2001; Angrist and Pischke, 2008). The core idea is to use external sources of variation, which affect the endogenous regressor (gender role attitudes), but are otherwise unrelated to the outcome (fertility desire), to isolate exogenous variation in the variable of interest. Specifically, the assumptions required for a strong instrumental variable include:

1. Relevance, where the instruments must be correlated with the endogenous regressor, gender role attitudes. In this case, the instrument must be correlated with individuals' gender role attitudes.
2. Exogeneity, where the instruments should be independent of unobserved confounders that affect the desire for fertility.
3. Monotonicity, where the instruments should influence the treatment variable in a consistent direction among individuals. In this case, it means increased IV exposure does not lead to less egalitarian attitudes.

4. Exclusion Restriction, where the instruments should affect fertility desire solely through their impact on gender role attitudes.

5.2.1 Choice and Justification of Instrument

To address potential endogeneity in the relationship between gender role attitudes and fertility preferences, I use the staggered roll out of China's high-speed rail (HSR) network as an instrumental variable (IV) for individual gender role attitudes. The rationale for this instrument is grounded in both the exogenous nature of infrastructure planning and the hypothesized social effects of HSR exposure, which include increased regional integration, mobility, and access to modern, often more gender-egalitarian urban centers.

Since the mid-2000s, China has undertaken an ambitious expansion of its national high-speed railway system. In 2024, it had become the largest in the world, covering more than 48,000 kilometers (Zhang, 2024). HSR refers to passenger train systems designed to operate at speeds above 250 kilometers per hour. The planning and implementation of the HSR network were coordinated centrally by the national government, with the aim of promoting regional development, improving labor mobility, and strengthening national integration. The decision-making process prioritized engineering feasibility, geographic coverage, and strategic interregional connectivity, rather than localized social or demographic characteristics such as fertility rates or traditional gender norms (Chen and Haynes, 2015; Lawrence et al., 2019; Lin, 2017).

Importantly, while major economic centers were the primary anchors of the network, many intermediate and smaller cities were selected largely based on their geographic position between major centers (Chen and Haynes, 2015). The inclusion of these non-major cities was often driven by route continuity and the need for efficient rail logistics, rather than by targeted efforts to stimulate specific local economies or address local demographic profiles. According to Lin (2017), the location of the HSR

stations reflected national spatial planning goals rather than localized social demand. Furthermore, the overall sequencing and timing of HSR exposure in cities were determined by multi-decade infrastructure blueprints and construction feasibility factors (Lawrence et al., 2019; Xu and Wu, 2019).

On the other hand, exposure to HSR is expected to influence gender role attitudes through several channels. First, by dramatically lowering travel times, HSR increases interregional labor migration and everyday mobility, exposing individuals to new environments and more progressive social norms. Second, the connection to major urban centers often accelerates local urbanization and economic development (Zhang et al., 2024), expanding educational and employment opportunities, especially for women, which are empirically linked to more egalitarian gender attitudes. Third, enhanced physical connectivity facilitates the diffusion of information and ideas from larger and more modern urban areas, contributing to attitudinal change.

Thus, the roll out of HSR satisfies the two key conditions for a valid instrumental variable. First, the *relevance* condition is supported by the theoretical expectation that exposure to HSR increases the likelihood of adopting attitudes toward a more egalitarian gender role attitude. Second, the *exclusion restriction* is plausible given the institutional context: the selection and timing of HSR connections, particularly in small and medium cities, were driven by national development goals rather than local social characteristics.

5.2.2 Data and Variables

Due to the staggered nature of HSR expansion across China, I use only the 2021 wave to enable meaningful cross-sectional variation in HSR exposure at the time of observation. In the 2021 wave, a total of 67 distinct cities at prefecture level contain valid respondent data. Figure 5.4 is a visual graph on the HSR distribution and the cities covered in CGSS 2021.



Figure 5.4: China Railway Map as of 2025 and HSR Station Coverage relating to CGSS 2021. The base map is adapted from (Peng, 2021), with CGSS 2021 city points and annotations added.

To construct the instrument variable, I collect city-level data on the presence and opening year of the HSR service from publicly available sources. Specifically, the information is compiled from a geographic information system map of China’s rail network maintained by the CNRail project, as well as Wikipedia’s curated list of high-speed railway lines and opening dates across Chinese cities, which each piece of information is gathered by news reports documenting the opening of that specific route (Peng, 2021; Wikipedia contributors, 2024). For each of the 67 cities included in the CGSS, I identify whether an HSR station was operational by 2021 and, if so, the year it first opened.

After manually matching the year of initial HSR operation for each city, these data

are merged with the CGSS individual-level dataset based on the city code. Using this merged data, I construct a continuous instrumental variable, *HSRyears*, which measures the number of years since the HSR service began in the respondent's city at the time of the 2021 survey. The variable is defined as:

$$HSRyears_i = \begin{cases} 2021 - HSR_opening_year_i, & \text{if HSR exists in city } i \text{ by 2021} \\ 0, & \text{otherwise} \end{cases}$$

This variable measures the number of years of potential exposure to HSR that an individual has experienced. Longer exposure is hypothesized to lead to greater assimilation into urban and progressive social environments, thereby affecting gender role attitudes.

The final IV analysis sample includes 7,336 individuals across 67 cities. Control variables include gender, education, age group, marital status, party affiliation, religious beliefs, and log income to address observable confounding factors that could simultaneously influence attitudes and fertility preferences. These controls are consistent with those used in the multiple linear regression models.

Exclusion Restriction and Pre-Trend Validation

The validity of the instrumental variable strategy relies on the exclusion restriction, which requires that HSR exposure affects fertility desires only through its impact on gender role attitudes, and not through any direct or confounding pathways.

To further assess the validity of the exclusion restriction in my instrumental variable strategy, I conduct a pre-trend analysis using earlier CGSS data. The key concern addressed here is whether cities that eventually received high-speed rail (HSR) access were already on a different trajectory in terms of fertility desire prior to the HSR rollout. If fertility desires in these cities were already lower (or higher) before gaining access to HSR, this would suggest potential endogeneity and weaken the credibility of the exclusion restriction.

To test this, I restrict the sample to cities that appear in both the 2010 and 2021 waves of the CGSS (a total of 51 cities). Then, I construct the variable *HSRyears*, which represents the number of years a city had access to HSR as of 2021, and assign this variable retrospectively to the 2010 data. This approach allows me to test whether individuals in cities that would later gain HSR access already exhibited different fertility desires in 2010, compared to those in cities that never received HSR exposure or received it much later.

Figure 5.5 shows average fertility desires in 2010 by future HSR exposure. There is no clear relationship between future HSR access and fertility desires, supporting the assumption that HSR placement was not driven by pre-existing attitudes. In contrast, Figure 5.6 shows that by 2021, longer HSR exposure is associated with lower fertility desires, consistent with the hypothesized mechanism linking HSR access to gender attitudes and fertility preferences.

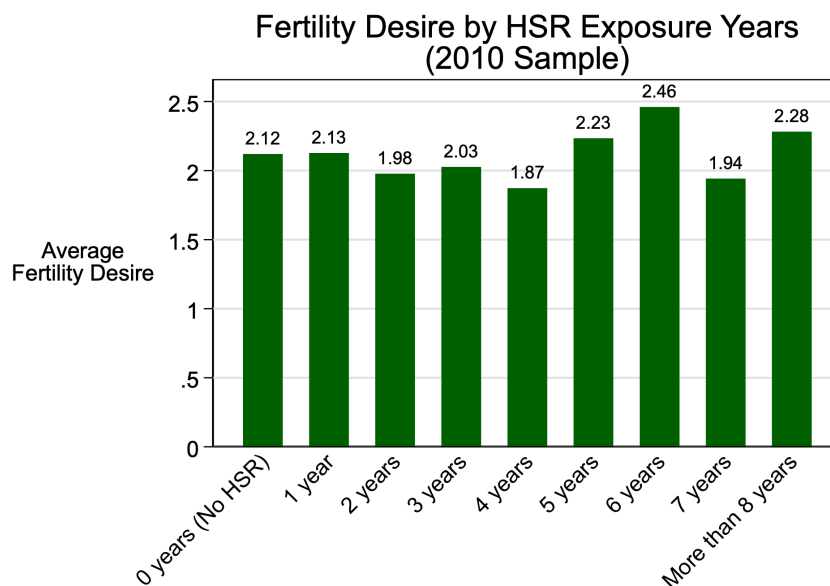


Figure 5.5: Fertility Desire by HSR Exposure Years (2010 Sample)

Note: In Figure 5.5, the “More than 8 years” category is broader than others because no cities in the 2010 CGSS sample (among the 51 matched cities) fall into the 8 or 9 year exposure groups based on the 2021 data.

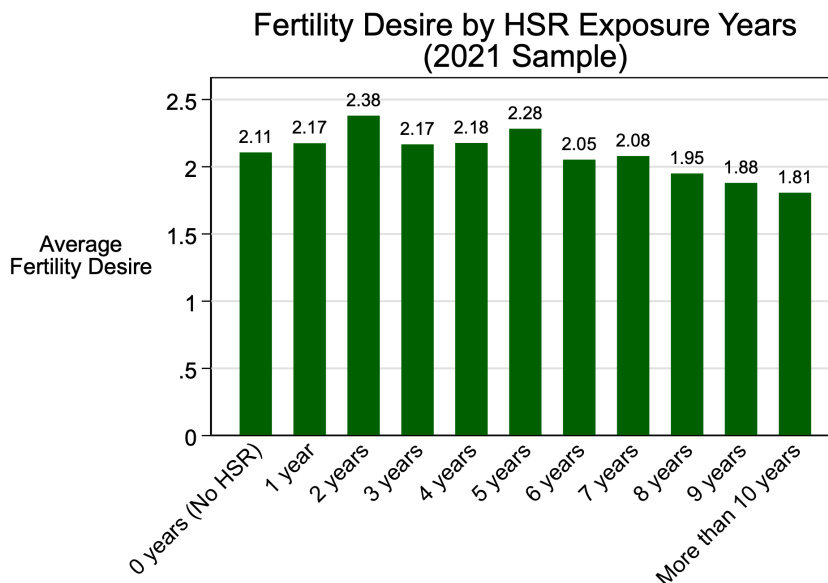


Figure 5.6: Fertility Desire by HSR Exposure Years (2021 Sample)

Together, these figures provide reassuring evidence that the HSR rollout satisfies the exclusion restriction necessary for valid instrumental variable estimation.

Monotonicity

The monotonicity condition requires that increased HSR exposure either moves individuals toward more egalitarian gender attitudes or has no effect, but not the opposite. This assumption is supported by prior research showing that internal migration and greater urban exposure in China are associated with more progressive gender norms, particularly for women and younger cohorts (Yuan and Zhang, 2023). Since HSR enhances access to urban centers without requiring permanent relocation, it plausibly reinforces similar patterns of attitudinal change, as a result, satisfying the monotonicity assumption.

5.2.3 Estimation

To estimate the causal effect of gender role attitudes (*AttitudeIndex*) on fertility desire (*FertilityDesire*), I employ a two-stage least squares regression, using the continuous variable of the number of years since the HSR service began *HSRyears* as an instrumental variable. This IV captures the number of years since a high-speed rail (HSR) station first began operating in the respondent's city in the year 2021.

The 2SLS model is specified as follows:

$$\text{First stage: } \textit{AttitudeIndex}_i = \pi_0 + \pi_1 \cdot \textit{HSRyears}_i + \pi_2 \cdot \mathbf{X}_i + u_i$$

$$\text{Second stage: } \textit{FertilityDesire}_i = \beta_0 + \beta_1 \cdot \widehat{\textit{AttitudeIndex}}_i + \beta_2 \cdot \mathbf{X}_i + \epsilon_i$$

Here, \mathbf{X}_i denotes a vector of individual-level control variables, including sex, education, marital status, party affiliation, religious beliefs, age group, and log income.

The first-stage regression assesses whether HSR exposure significantly predicts variation in gender role attitudes, while the second stage uses predicted values from the first stage to estimate the causal effect on fertility desire.

5.2.4 Results

As shown in Table 5.4, the first-stage regression in the 2SLS model confirms that the IV variable (number of years since the HSR service began) is positively associated with gender role attitudes. However, the strength of this instrument is limited. The Kleibergen-Paap Wald F statistic is 4.95, falling below the conventional threshold of 10, which is the typically recommended for reliable inference using 2SLS in the presence of a single endogenous regressor (Mikusheva, 2007). Also, according to the Stock-Yogo critical values, this suggests potential weak instrument bias, meaning that standard 2SLS estimates and confidence intervals may be unreliable due to the high sampling variability of the first-stage relationship.

Table 5.4: Summary Statistics from IV Regression

Statistic	Value
2SLS Coefficient on Attitude Index	-2.922
Robust Standard Error	1.354
p -value (2SLS)	0.031
2SLS 95% CI	[-5.543, -0.301]
First-Stage Coefficient on <i>hsr_years</i>	0.00705
First-Stage Robust Standard Error	0.00317
First-Stage p -value	0.026
Kleibergen-Paap rk Wald F	4.95
Stock-Yogo Critical Value (25%)	5.53
Anderson-Rubin Wald F	43.05
Anderson-Rubin p -value	< 0.001
Anderson-Rubin 95% CI	[-22.68, -1.46]
Stock-Wright LM S Statistic	75.36
Stock-Wright p -value	< 0.001
Number of Observations	7336

AR Test and Confidence Set Given the relatively low first-stage F statistic, I employ the Anderson-Rubin (AR) method to make valid inference under potential weak instrument conditions (Andrews et al., 2019; Mikusheva, 2007). The AR method provides both a hypothesis test and a confidence interval that do not rely on the instrument strength. Specifically, the AR test evaluates whether the endogenous regressor (gender role attitude index) has a causal effect on the outcome variable (fertility desire) by testing the null hypothesis that the coefficient on *AttitudeIndex* is zero and that the moment conditions are satisfied. In this study, the AR test yields an F -statistic of 43.05 with a p -value less than 0.001, strongly rejecting the null hypothesis and provides credible evidence of a causal relationship between gender role attitudes and fertility desire, even

in the presence of weak instruments.

Moreover, the AR test can be inverted to construct a confidence interval for the causal effect, known as the AR confidence set. This interval includes all values of the gender role attitude index coefficient not rejected by the AR test and remains valid regardless of instrument strength (Andrews et al., 2019; Mikusheva, 2007). In this study, the AR procedure yields a 95% confidence interval of approximately $[-22.68, -1.46]$, which excludes zero and confirms a significant negative effect of gender role attitudes on fertility desire.

As emphasized by Mikusheva (2010), AR-based intervals retain correct coverage even under weak identification, unlike conventional 2SLS intervals that may be misleading. Although AR intervals can sometimes be wide or unbounded, the present result is both finite and informative, reinforcing the robustness of the causal inference.

LM Test The Score test, also known as the Lagrange Multiplier (LM) test or Stock-Wright LM S test, offers a robust alternative for inference in the presence of weak instruments. Like the Anderson-Rubin (AR) test, the LM test maintains correct size even when the instrument has limited explanatory power for the endogenous regressor, and does not rely on the consistency of the 2SLS estimator. It evaluates the same null hypothesis as the AR test but constructs its test statistic differently. The resulting test statistic follows a chi-squared distribution in large samples (Andrews et al., 2019; Mikusheva, 2007).

In this study, the Stock-Wright LM statistic is 75.36 with a corresponding p -value less than 0.001, providing strong evidence against the null hypothesis of no causal effect of gender role attitudes on fertility desire. This result is consistent with the AR test and reinforces the robustness of the inference.

Overall, these weak-instrument-robust inference methods provide strong evidence that more egalitarian gender role attitudes causally reduce fertility desires, even though

the exact magnitude of the effect estimated by 2SLS should be interpreted with caution due to instrument weakness.

5.2.5 Sub-group Analysis for Women and Men

To examine potential gender heterogeneity, I estimate the model separately for women and men. The comparison results are shown in Table 5.5.

For women, the 2SLS estimate indicates that a one-unit increase in the attitude index, which represent more egalitarian gender role attitudes, is associated with a statistically significant decrease of 1.81 points in fertility desire ($p = 0.040$). Still, women sub-group faces same problem with the pulled analysis which is the first-stage F statistic is below conventional thresholds ($F = 4.64$), suggesting weak instrument concerns. So, the Anderson-Rubin (AR) test here provides the support for the causal interpretation with a weak instrument. The AR test rejects the null of no causal effect at the 1 percent level ($F = 30.21, p < 0.001$), and the AR confidence interval $[-16.39, -0.85]$ excludes zero. These results are further supported by the Lagrange Multiplier (LM) test, which also rejects the null, although the AR method remains the more conservative and reliable approach when instruments are weak (Mikusheva, 2010).

In contrast, the results for men are more inconsistent. The 2SLS estimate suggests a stronger negative association (-3.98), but it is not statistically significant ($p = 0.195$), and the first-stage relationship between HSR exposure and attitudes is substantially weaker ($F = 1.77, p = 0.184$). However, the Anderson-Rubin test still rejects the null of no effect at the 1% level ($F = 16.92, p < 0.001$). In particular, the AR confidence interval for men is discontinuous and consists of two disjoint regions: $(-\infty, -1.44] \cup [8.07, \infty)$. This two-part interval is a possible form of the AR set, according to Mikusheva (2010). While the test technically rejects the null hypothesis, the imprecise estimates and the wide, disjointed confidence interval make the results for the male subgroup difficult to interpret and of limited policy relevance.

Table 5.5: Summary Statistics from IV Regression by Gender

Statistic	Women	Men
2SLS Coefficient on Attitude Index	-1.812	-3.977
Robust Standard Error	0.882	3.068
<i>p</i> -value (2SLS)	0.040	0.195
2SLS 95% CI	[-3.52, -0.11]	[-9.90, 1.95]
First-Stage Coefficient on <i>hsr_years</i>	0.0103	0.0056
First-Stage Robust Standard Error	0.0048	0.0042
First-Stage <i>p</i> -value	0.031	0.184
Kleibergen-Paap rk Wald <i>F</i>	4.64	1.77
Stock-Yogo Critical Value (25%)	5.53	5.53
Anderson-Rubin Wald <i>F</i>	30.21	16.92
Anderson-Rubin <i>p</i> -value	< 0.001	< 0.001
Anderson-Rubin 95% CI	[-16.39, -0.85]	$(-\infty, -1.44] \cup [8.07, \infty)$
Stock-Wright LM <i>S</i> Statistic	29.86	48.70
Stock-Wright <i>p</i> -value	< 0.001	< 0.001
Number of Observations	3,303	4,033

Taken together, the results demonstrate a clear and robust negative causal effect of egalitarian gender attitudes on fertility desire for women. In contrast, for men, the causal relationship is statistically detectable under weak-instrument robust procedures but remains imprecisely estimated. These gender-specific differences show the importance of considering heterogeneous responses to social norms. These findings are consistent with theoretical models of fertility behavior and highlight the critical role of gender equality in shaping demographic outcomes in contemporary China.

5.2.6 Comparison with Multiple Linear Regression Results

As shown in Table 5.6, the instrumental variable estimates are directionally consistent with the multiple linear regression results. In both approaches, the coefficient of the gender role attitude index is negative, suggesting that individuals with more egalitarian gender role views tend to express lower fertility desires. However, the IV estimates yield substantially larger and unrealistic coefficient magnitudes compared to the MLR model. This likely reflects the influence of weak instrument bias, which can inflate point estimates and reduce precision. Despite this limitation, the IV coefficient for women remains statistically significant under the AR test, and the corresponding 95% AR confidence interval is bounded below by zero, supporting a negative causal relationship. The larger standard errors in the IV model reflect the difficulty of estimation with a weak instrument, but the consistently negative direction suggests that the true causal effect of gender role attitudes on fertility desire for women may be stronger than what the MLR results imply. In contrast, the IV estimates for men are noisier and statistically insignificant, suggesting weaker or less reliable evidence of a causal effect in this subgroup.

Table 5.6: Comparison of Coefficients on Attitude Index by Gender and Estimation Method

Group	Method	Coef. on Attitude Index	Std. Error	<i>p</i> -value
Pooled	MLR	-0.056	0.011	< 0.001
Pooled	IV	-2.922	1.354	0.031
Women	MLR	-0.065	0.013	< 0.001
Women	IV	-1.812	0.882	0.040
Men	MLR	-0.041	0.015	0.006
Men	IV	-3.977	3.068	0.195

Furthermore, both the MLR and the IV models show consistent patterns when the sample is split by gender. In both cases, the effect of gender role attitudes on fertility

desire is stronger and more significant among women than among men. This aligns with the broader literature and the theoretical model, which argues that women are more directly impacted by the trade-offs between childbearing and other life opportunities, such as work or education. In the male subgroup, the estimates are weaker and less precise, particularly in the IV analysis, which is partly due to a weaker first-stage relationship. This suggests that men's fertility intentions are less sensitive to changes in gender role attitudes, or that the instrument is less effective in explaining the attitudinal variation among men.

5.2.7 Discussion of Validity and Limitations

Although the IV strategy improves the analysis by adding the causal pathway, several limitations remain. Firstly, the instrument *HSRyears* is not very strong. The Kleibergen-Paap F statistic is only 4.95 in the full sample, which is below the common threshold value of 10. This means that standard 2SLS results might not be reliable. However, I also use the Anderson-Rubin test, which is valid even when the instrument is weak. This test shows that the causal effect of gender attitudes on fertility desire is still significant.

Second, the IV strategy relies on an important assumption of exclusionary restrictions. It assumes that HSR exposure affects fertility only by changing gender role attitudes. This is possible because HSR increases mobility and access to cities with more modern values. But there may be other ways HSR influences fertility, such as changing job access or local housing markets.

In addition, this study uses data from just one year, 2021 CGSS. Because the HSR system was built gradually, this one-year snapshot may miss longer-term changes. In addition, attitudes and fertility intentions can change over time, but this analysis cannot track those changes.

Another important assumption is homoskedasticity, which implies that the variance

of the error term is constant across observations. To address this, all regressions in this study employ heteroskedasticity-robust standard errors. Nonetheless, if the error structure is more complex—for example, if there is clustering or serial correlation—then more advanced corrections may be necessary.

Overall, the IV approach gives stronger evidence for a causal relationship than the MLR model. But the results should still be interpreted with caution, especially because the instrument is not very strong.

5.3 Robustness Checks

In this section, I conduct two robustness checks to test the validity of the results and to test the validity of the proposed theoretical model.

5.3.1 Separate Effects of Gender Role Attitudes

As a robustness check, I separate the effects of different dimensions of gender role attitudes to assess the stability of the overall relationship with fertility desires and to further validate the underlying theoretical model in Section 3.3. Rather than relying on a single aggregated index, I included individual indicators from the five questions in the survey, namely: career orientation, competence, marriage views, dismissal of women from the workplace, and attitudes toward equal division of housework.

The results, presented in Table 5.7, show that in both 2010 and 2021, and for both women and men, agreement with the idea that husbands and wives should equally share housework was associated with slightly lower fertility desires.

Table 5.7: Robustness Check: Separate Effects of Gender Role Attitudes (2010 and 2021)

	Women 2010	Men 2010	Women 2021	Men 2021
Attitude: Career	-0.059 (0.034)	-0.063 (0.038)	-0.141*** (0.050)	-0.054 (0.038)
Attitude: Competency	-0.005 (0.031)	-0.033 (0.033)	-0.074 (0.048)	-0.057 (0.037)
Attitude: Marriage	0.032 (0.030)	0.048 (0.032)	-0.057 (0.046)	0.039 (0.035)
Attitude: Dismissal	-0.067** (0.033)	0.048 (0.033)	-0.034 (0.055)	-0.088** (0.040)
Attitude: Housework	-0.030 (0.041)	-0.005 (0.039)	-0.024 (0.070)	-0.039 (0.047)
Controls	Yes	Yes	Yes	Yes
Observations	5,060	5,214	4,033	3,303
R-squared	0.154	0.099	0.091	0.128

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: This robustness check uses the full Model 3 specification and tests separate components of gender role attitudes.

In relation to the theoretical model in Section 3.3, gender role attitudes influence fertility intentions through two main channels: (1) the perceived time cost of childrearing (θ), and (2) the value placed on labor force participation (β). The results in Table 5.7 suggest that the second channel, career orientation, has a stronger and more consistent negative association with fertility desires, particularly for women in 2021. This finding aligns with the model's prediction that egalitarian women, who place a higher utility weight on paid labor, experience a steeper utility trade-off considering childbearing.

In contrast, attitudes toward equal division of housework, which conceptually correspond to reductions in the per-child time burden (θ) in the model, do not increase fertility desire, as shown by the negative and statistically insignificant coefficients. This does not directly contradict the theoretical expectation that more equitable domestic la-

bor could reduce the cost of childbearing and thus encourage fertility. Rather, it likely reflects the persistent reality that even in households with egalitarian beliefs, women continue to carry a disproportionate share of domestic responsibilities. Another contributing factor to the observed negative coefficients may be the gap in the extent of egalitarianism between men and women. In China, women are generally more egalitarian than men, which can create a mismatch in expectations and reality. Egalitarian women may anticipate greater support from partners in domestic labor, but find those expectations unmet, leading to more reluctance toward childbearing despite progressive attitudes.

On the other hand, the data lack direct measures of actual intra-household labor division, making it difficult to determine whether egalitarian attitudes are matched by lived experiences. For men, support for egalitarian ideals may signal shifting norms but does not necessarily lead to a meaningful reduction in perceived or actual childrearing burdens, resulting in a limited impact on fertility preferences.

5.3.2 Instrumental Variable Robustness Check Using 2010 Data

To assess the validity of the instrumental variable strategy, I conduct a robustness check using the 2010 CGSS data. Specifically, I also use the subsample of the 2010 CGSS that have the same cities included in the 2021 CGSS IV analysis. The subsample includes 51 cities and a total of 5744 observations. The purpose of this check is to examine whether the High-Speed Rail exposure variable, which serves as the instrument in the main 2021 analysis, is artificially correlated with fertility desires prior to the actual expansion of the HSR network.

Since the majority of HSR lines were either not yet operational or only in their early stages by 2010, any strong relationship between HSR presence and fertility preferences at that time would raise concerns about the exclusion restriction. Ideally, the HSR instrument here should exhibit no significant predictive power over gender role attitudes

or fertility intentions in 2010, confirming that the observed causal effects in 2021 are driven by the later HSR expansion rather than pre-existing city characteristics.

Table 5.8 summarizes and compares the IV results between the 2021 analysis and this 2010 robustness test.

Table 5.8: Comparison of IV Estimates: 2021 Analysis vs. 2010 Robustness Check

	2021 (Main Analysis)	2010 (Robustness Check)
2SLS Coefficient on Attitude Index	-2.922	6.619
Robust Standard Error	1.354	11.728
<i>p</i> -value (2SLS)	0.031	0.572
First-Stage Coefficient on <i>hsr_years</i>	0.00705	-0.00281
First-Stage <i>p</i> -value	0.026	0.569
Kleibergen-Paap rk Wald <i>F</i>	4.95	0.32
Stock-Yogo Critical Value (25%)	5.53	5.53
Number of Observations	7,336	5,744

The 2010 robustness check confirms that the HSR variable is a weak instrument in this earlier period. The first-stage coefficient is statistically insignificant ($p = 0.569$), and the Kleibergen-Paap F -statistic is only 0.32. In the second stage, the 2SLS estimate of the relationship between gender role attitudes and fertility desires is positive but highly imprecise (coefficient = 6.619, robust standard error = 11.728, $p = 0.572$), which is highly unrealistic coefficient as well as the non-significant p -value. These findings support that there is no pre-trend correlation and support the validity of the HSR instrument for 2021 CGSS.

6 Discussion and Conclusion

This study examines how gender role attitudes shape fertility intentions in contemporary China, a country where rapid economic development coexists with enduring traditional norms. Drawing on six waves of data from the Chinese General Social Survey (CGSS), I combine empirical methods with a utility-based theoretical model to explore how individual beliefs and gender expectations interact in shaping fertility preferences.

The results consistently suggest that egalitarian gender role attitudes, particularly among women, are associated with lower fertility desires. This relationship is especially pronounced among urban, highly educated women and is further strengthened in communities where egalitarian norms are more widely shared. Using multiple linear regression, I find that, after adjusting for demographic and socioeconomic factors, a one-unit increase in the gender role attitude index is associated with a 2 percent decline in women's fertility desire on average, rising to 3 percent in 2021. In egalitarian communities, the effect reaches 4 percent. For men, however, the relationship is weaker and generally not significant. I also implement an instrumental variable strategy using high-speed rail roll out as instruments. The IV estimates, while less precise, confirm the negative relationship and provide stronger evidence that the association is at least partially causal for women. These findings suggest that it is not only correlational preferences, but also shifts in underlying attitudes that contribute to lower fertility intentions.

The fertility model, which is based on utility maximization, offers an explanation for this trend. In households where women value their time more highly or bear a disproportionate share of caregiving, the opportunity cost of childbearing increases. Even when caregiving is shared to some extent, as modeled in egalitarian households, the overall perceived burden can still increase if women's aspirations expand without accompanying social support. This aligns with the first stage of gender revolution theory, where women's public participation rises faster than men's private sphere involvement. The result is a widening gap between expectations and lived realities, particularly for egalitarian women. In China, where women face increasing opportunity costs without commensurate institutional or familial support, more progressive views on gender roles can intensify the perceived burden of childbearing.

These findings suggest that China is currently still in the first stage of the gender revolution, where women's participation in the public sphere has expanded through education and employment, but men's involvement in domestic life has not kept pace. This imbalance results in a double burden for women, who are expected to succeed professionally while still managing most household and caregiving responsibilities.

In addition, the relationship between gender role attitudes and fertility is not confined to women. Although the effect is weaker, I also find that men with more egalitarian views report slightly lower fertility intentions. This suggests that shifting norms around gender and caregiving are beginning to influence men's perspectives as well.

These insights also have direct implications for policy. In a context where fertility decline has become a national concern, promoting childbirth through incentives or ideological campaigns alone is unlikely to succeed. Instead, structural reforms are needed to make parenthood more accessible, particularly for women. According to gender revolution theory, countries that successfully transition into the second stage, where men increasingly participate in caregiving and domestic responsibilities, are more likely to stabilize or even reverse fertility decline. Empirical evidence supports this view: in contexts where strong social policies and a cultural shift toward shared caregiving

have been implemented, fertility rates have rebounded or remained comparatively high (Lappegård et al., 2021). For China, this suggests that expanding access to affordable childcare, improving parental leave policies, and promoting more equitable divisions of labor within households are not just matters of gender equality—they are also critical steps toward restoring fertility levels in a sustainable and socially supportive way.

Although this study focuses on fertility intentions rather than outcomes, past research indicates that intentions are strong predictors of actual behavior, especially in the short term (Quesnel-Vallée and Morgan, 2004; Schoen et al., 1999). As more longitudinal or retrospective data become available, future work can assess how these intentions evolve and whether they are ultimately realized. Understanding this gap between desire and action will be crucial for both scholars and policy makers.

In conclusion, this study shows that fertility decisions are not purely economic calculations, nor are they purely cultural expressions. Rather, they are embedded in a broader set of structural and normative conditions that influence how individuals weigh the costs and benefits of family formation. Understanding this intersection is essential for designing policies that are not only demographically effective but also socially equitable.

Future Research

Future research could explore how fertility intentions translate into actual outcomes, especially as more longitudinal data become available. Since many respondents in the current dataset have not completed their fertility cycles, tracking them over time would provide clearer insights into the intention–behavior gap.

Incorporating couple-level data would also be valuable for analyzing fertility as a joint decision, capturing how gender role attitudes interact within partnerships. Extending this analysis across different life stages could shed light on how fertility preferences evolve and how intergenerational transmission of gender norms shapes long-term

reproductive behavior.

In addition, future studies could examine how policy environments, such as access to childcare or parental leave, influence the relationship between gender attitudes and fertility intentions. Richer policy variation and more detailed data could help identify which institutional supports most effectively enable gender-equitable reproductive decision-making.

A Appendix

A.1 Derivation of First-Order Condition for Baseline Model

This appendix provides the detailed derivation of the optimal number of children n^* for the baseline fertility model in which utility is derived from the number of children and market consumption.

Setup The household maximizes utility:

$$U(x, n) = x^\alpha n^\gamma, \alpha + \gamma = 1$$

subject to the time and budget constraints:

$$\begin{aligned} h + \theta n &= T \quad \Rightarrow \quad h = T - \theta n \\ x &= wh + m = w(T - \theta n) + m \end{aligned}$$

Substituting the budget constraint into the utility function:

$$U(n) = [w(T - \theta n) + m]^\alpha n^\gamma$$

First-Order Condition Take the derivative with respect to n :

$$\begin{aligned}\frac{dU}{dn} &= \alpha [w(T - \theta n) + m]^{\alpha-1} (-w\theta)n^\gamma + [w(T - \theta n) + m]^\alpha \gamma n^{\gamma-1} \\ &= [w(T - \theta n) + m]^{\alpha-1} n^{\gamma-1} (-\alpha w\theta n + \gamma [w(T - \theta n) + m])\end{aligned}$$

Simplify and Set the FOC to zero:

$$-\alpha w\theta n + \gamma [w(T - \theta n) + m] = 0$$

Solving for n^* Simplify:

$$\begin{aligned}\alpha w\theta n + \gamma w\theta n &= \gamma wT + \gamma m \\ (\alpha + \gamma)w\theta n &= \gamma(wT + m)\end{aligned}$$

Since $\alpha + \gamma = 1$:

$$w\theta n = \gamma(wT + m) \Rightarrow n^* = \frac{\gamma}{w\theta}(wT + m)$$

Expanding and simplifying:

$$n^* = \frac{\gamma wT}{w\theta} + \frac{\gamma m}{w\theta} = \frac{\gamma T}{\theta} + \frac{\gamma m}{w\theta}$$

This is the optimal number of children under the assumptions of the baseline model.

A.2 Appendix: Derivation of the Optimal Fertility Level for Model Incorporating Gender Role Attitudes

Setup Begin with the Cobb-Douglas utility function:

$$U(x, n, h) = x^\alpha n^\gamma h^\beta \quad \text{with} \quad \alpha + \gamma + \beta = 1$$

subject to the constraints:

$$h + \theta n = T \quad (\text{Time constraint})$$

$$x = wh + m = w(T - \theta n) + m \quad (\text{Budget constraint})$$

Solving for Optimal n^* Substituting both constraints into the utility function gives:

$$U(n) = [w(T - \theta n) + m]^\alpha \cdot n^\gamma \cdot (T - \theta n)^\beta$$

Taking the natural log:

$$\ln U(n) = \alpha \ln [w(T - \theta n) + m] + \gamma \ln n + \beta \ln(T - \theta n)$$

Differentiating with respect to n and setting the derivative to zero yields the first-order condition (FOC):

$$\frac{d}{dn} \ln U(n) = -\alpha \cdot \frac{w\theta}{w(T - \theta n) + m} + \frac{\gamma}{n} - \beta \cdot \frac{\theta}{T - \theta n} = 0$$

Multiplying through by $n(w(T - \theta n) + m)(T - \theta n)$ and simplifying:

$$\gamma = n \left[\frac{\alpha w \theta}{w(T - \theta n) + m} + \frac{\beta \theta}{T - \theta n} \right]$$

Multiplying both sides by $(w(T - \theta n) + m)(T - \theta n)$ gives:

$$\gamma [w(T - \theta n) + m] (T - \theta n) = n [\alpha w \theta (T - \theta n) + \beta \theta (w(T - \theta n) + m)]$$

Expanding both sides and rearranging leads to the quadratic form where:

$$a = \theta^2 w$$

$$b = -[2\gamma w T \theta + \gamma m \theta + \theta w T(1 - \gamma) + \beta \theta m]$$

$$c = \gamma w T^2 + \gamma m T$$

Solving for the optimal fertility level n^* , substituting the expressions for a , b , and c :

$$n^* = \frac{wT(\gamma + 1) + m(\gamma + \beta) \pm \sqrt{(wT(\gamma + 1) + m(\gamma + \beta))^2 - 4w\gamma T(wT + m)}}{2\theta w}$$

This is the optimal number of children under the assumptions of the model taken into account with the updated utility function.

A.3 Solving the Intra-household Fertility Game

I solve a sequential game where the man chooses an effort level $s_M \in (0, 1)$, and the woman decides whether to agree to fertility.

Woman's Decision The woman accepts fertility if and only if the utility gain exceeds the cost:

$$u_W \geq \frac{1 - s_M}{e_W} \Rightarrow s_M \geq 1 - u_W e_W.$$

Thus, the woman requires a minimum level of effort:

$$s_M^{\min} = 1 - u_W e_W.$$

Man's Decision The man receives utility u_M from fertility and pays a cost of s_M/e_M for contributing effort. He solves:

$$\max_{s_M} \left\{ u_M - \frac{s_M}{e_M} \right\} \quad \text{subject to } s_M \geq s_M^{\min}.$$

Because effort is costly, the man will only offer exactly the minimum effort required for fertility if it yields non-negative payoff:

$$u_M \geq \frac{1 - u_W e_W}{e_M}.$$

Equilibrium The equilibrium effort s_M^* and fertility outcome are:

$$s_M^* = \begin{cases} 1 - u_W e_W & \text{if } u_M \geq \frac{1 - u_W e_W}{e_M}, \\ 0 & \text{otherwise.} \end{cases}$$

Fertility occurs if and only if both the woman's and man's constraints are satisfied.

Interpretation

- Higher e_W : woman demands more effort, so fertility is less likely unless the man is highly cooperative.
- Higher e_M : man's cost is lower, so he is more likely to meet the woman's demand.

A.4 Quantity–Quality Trade-off in Fertility Decisions

This appendix presents an extension of the baseline fertility model by incorporating child quality into the household's utility function. While the main model used in the analysis assumes utility depends on consumption and the number of children, this extension introduces quality investment per child into the utility function.

This extension is not directly estimated in the empirical section, but helps in understanding how rising opportunity costs and aspirations for child investment can shape fertility decisions.

Model Setup The household derives utility from:

- Consumption of market goods (x),
- Number of children (n),
- Quality investment per child (q),

modeled as a Cobb-Douglas function:

$$U(x, n, q) = x^\alpha n^\gamma q^\delta \quad \text{with } \alpha + \gamma + \delta = 1$$

The household faces both time and budget constraints:

1. Time constraint: $h + \theta n = T$, where:
 - h : hours in paid labor,
 - θ : time required per child,
 - T : total time available.
2. Budget constraint: $x + knq = wh + m$, where:
 - w : wage rate,

- k : cost per unit of quality per child,
- m : non-labor income.

Substituting the time constraint into the budget constraint:

$$x = w(T - \theta n) + m - knq$$

First-Order Conditions To find the optimal values of n^* and q^* , we take the first-order conditions with respect to both variables, treating x as a function of n and q .

FOC with Respect to n :

$$\frac{\partial U}{\partial n} = \alpha x^{\alpha-1} \frac{\partial x}{\partial n} n^\gamma q^\delta + \gamma x^\alpha n^{\gamma-1} q^\delta = 0$$

$$\text{Since } \frac{\partial x}{\partial n} = -w\theta - kq :$$

$$\alpha x^{\alpha-1} (-w\theta - kq) n^\gamma q^\delta + \gamma x^\alpha n^{\gamma-1} q^\delta = 0$$

Divide by $x^{\alpha-1} n^{\gamma-1} q^\delta$:

$$-\alpha(w\theta + kq)n + \gamma x = 0 \quad \Rightarrow \quad n^* = \frac{\gamma x}{\alpha(w\theta + kq)}$$

FOC with Respect to q :

$$\frac{\partial U}{\partial q} = \alpha x^{\alpha-1} \frac{\partial x}{\partial q} n^\gamma q^\delta + \delta x^\alpha n^\gamma q^{\delta-1} = 0$$

$$\text{Since } \frac{\partial x}{\partial q} = -kn :$$

$$\alpha x^{\alpha-1} (-kn) n^\gamma q^\delta + \delta x^\alpha n^\gamma q^{\delta-1} = 0$$

Divide by $x^{\alpha-1} n^\gamma q^{\delta-1}$:

$$-\alpha knq + \delta x = 0 \quad \Rightarrow \quad q^* = \frac{\delta x}{\alpha kn}$$

Interpretation The optimal number of children and quality per child are jointly determined by:

$$\begin{cases} n^* = \frac{\gamma x}{\alpha(w\theta + kq)} \\ q^* = \frac{\delta x}{\alpha kn} \end{cases}$$

These expressions show the trade-off families face between the quantity and quality of children when time and income are limited. As wages w or quality costs k rise, the opportunity cost of larger families increases, shifting preferences toward fewer, higher-investment children. This theoretical extension builds on the baseline model used in the empirical analysis, where child quality is held constant to isolate the effect of gender role attitudes on fertility intentions.

A.5 HSR Presence and Opening by City for CGSS 2021

Table A.1: High-Speed Rail (HSR) Presence and Opening Year by City for CGSS 2021

Province	City	HSR Station	Year Opened
Beijing	Beijing	Yes	2008
Hebei	Tangshan	Yes	2014
Hebei	Handan	Yes	2013
Hebei	Cangzhou	Yes	2011
Shanxi	Taiyuan	Yes	2009
Shanxi	Changzhi	Yes	2020
Shanxi	Yuncheng	Yes	2014
Inner Mongolia	Hohhot	Yes	2019
Liaoning	Shenyang	Yes	2003
Liaoning	Tieling	No	2021
Liaoning	Chaoyang	Yes	2018
Liaoning	Huludao	Yes	2023
Jiangsu	Nanjing	Yes	2011
Jiangsu	Xuzhou	Yes	2017
Jiangsu	Changzhou	Yes	2017
Jiangsu	Lianyungang	No	2021
Jiangsu	Yangzhou	No	2021
Zhejiang	Hangzhou	Yes	2013
Zhejiang	Ningbo	Yes	2014
Zhejiang	Huzhou	Yes	2013
Anhui	Bengbu	Yes	2011
Anhui	Huangshan	Yes	2015
Anhui	Fuyang	Yes	2020
Anhui	Xuancheng	No	2022
Fujian	Fuzhou	No	2023
Fujian	Sanming	No	–
Fujian	Zhangzhou	No	2024

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Table A.1: High-Speed Rail (HSR) Presence and Opening Year by City (continued)

Province	City	HSR Station	Year Opened
Jiangxi	Yingtai	Yes	2017
Jiangxi	Ganzhou	No	2022
Jiangxi	Yichun	Yes	2017
Jiangxi	Shangrao	Yes	2015
Shandong	Yantai	No	2024
Shandong	Jining	No	2022
Shandong	Tai'an	Yes	2011
Shandong	Rizhao	Yes	2020
Shandong	Linyi	Yes	2020
Henan	Luohe	Yes	2012
Henan	Shangqiu	Yes	2018
Henan	Xinyang	Yes	2013
Henan	Zhoukou	Yes	2020
Hubei	Wuhan	Yes	2013
Hubei	Xiangyang	Yes	2020
Hubei	Xiaogan	Yes	2017
Hubei	Enshi Tujia and Miao Autonomous Prefecture	No	–
Hunan	Shaoyang	Yes	2017
Hunan	Chenzhou	Yes	2010
Hunan	Huaihua	Yes	2017
Guangxi	Liuzhou	Yes	2021
Guangxi	Yulin	No	2025
Guangxi	Chongzuo	No	–
Chongqing	Chongqing	Yes	2016
Chongqing	Chongqing	Yes	2016
Sichuan	Chengdu	Yes	2015
Sichuan	Luzhou	No	2022
Sichuan	Leshan	Yes	2015
Sichuan	Nanchong	No	–

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Table A.1: High-Speed Rail (HSR) Presence and Opening Year by City (continued)

Province	City	HSR Station	Year Opened
Sichuan	Meishan	Yes	2015
Sichuan	Yibin	No	2024
Shaanxi	Tongchuan	No	–
Shaanxi	Yan’an	No	–
Shaanxi	Hanzhong	Yes	2018
Gansu	Lanzhou	No	2025
Gansu	Wuwei	No	2025
Gansu	Zhangye	No	–
Gansu	Qingyang	No	2022
Qinghai	Xining	No	2025
Ningxia	Wuzhong	Yes	2020

Summary:

Total provinces included: 28

Total cities included: 67

Cities with HSR as of 2021: 47 (70.15%)

Note: The “Yes” or “No” values indicate the presence of high-speed rail (HSR) as of the year 2021. For the purposes of this study, any city with an HSR station opened after 2021 is recorded as “No”. One station that opened in late 2021 is also classified as “No”, as its timing is unlikely to have influenced gender role attitudes captured in the 2021 CGSS survey.

A.6 Full MLR Main Regression Results

Table A.2: Regression Results by Gender for Model 1, 2, and 3 (Including Controls)

Variable	Model 1		Model 2		Model 3	
	Women	Men	Women	Men	Women	Men
Attitude Index	-0.126*** (0.004)	-0.055*** (0.004)	-0.119*** (0.011)	-0.032*** (0.011)	-0.028** (0.010)	-0.008 (0.010)
Year Effects (ref: 2010)						
2012			0.029 (0.048)	0.080* (0.043)	0.073 (0.046)	-0.003 (0.041)
2013			-0.023 (0.047)	0.057 (0.042)	-0.010 (0.044)	0.052 (0.040)
2015			0.076* (0.048)	0.087* (0.045)	0.038 (0.045)	0.031 (0.043)
2018			0.089* (0.046)	0.077* (0.042)	0.059 (0.044)	-0.034 (0.041)
2021			0.231*** (0.051)	0.240*** (0.052)	0.084 (0.049)	0.105** (0.050)
Attitude × Year						
2012			-0.004 (0.015)	-0.031** (0.015)	-0.017 (0.014)	-0.024* (0.014)
2013			0.012 (0.014)	-0.015 (0.014)	-0.003 (0.013)	-0.018 (0.014)
2015			0.006 (0.015)	-0.019 (0.015)	-0.000 (0.014)	-0.008 (0.014)
2018			-0.009 (0.014)	-0.026* (0.014)	-0.016 (0.013)	-0.008 (0.013)
2021			-0.057*** (0.015)	-0.068*** (0.016)	-0.032** (0.014)	-0.032** (0.015)
Controls						
Education = 2	-	-	-	-	-0.255*** (0.022)	-0.133*** (0.025)
Education = 3	-	-	-	-	-0.449*** (0.021)	-0.288*** (0.025)
Education = 4	-	-	-	-	-0.518*** (0.024)	-0.319*** (0.028)
Education = 5	-	-	-	-	-0.472*** (0.025)	-0.304*** (0.029)

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Variable	Model 1		Model 2		Model 3	
	Women	Men	Women	Men	Women	Men
Age Group = 25-34	-	-	-	-	0.080*** (0.024)	-0.013 (0.026)
Age Group = 35-44	-	-	-	-	0.117*** (0.025)	-0.029 (0.027)
Age Group = 45-54	-	-	-	-	0.150*** (0.025)	0.019 (0.028)
Age Group = 55+	-	-	-	-	0.476*** (0.026)	0.324*** (0.028)
Urban Hukou	-	-	-	-	0.177*** (0.013)	0.192*** (0.013)
Married	-	-	-	-	0.068*** (0.021)	0.196*** (0.019)
Party Affiliation	-	-	-	-	0.052*** (0.020)	0.095*** (0.016)
Religious Belief	-	-	-	-	0.183*** (0.017)	0.263*** (0.022)
Log Income	-	-	-	-	0.004 (0.002)	0.004 (0.003)
Constant	2.392*** (0.012)	2.185*** (0.012)	2.333*** (0.035)	2.108*** (0.031)	1.988*** (0.050)	1.827*** (0.057)
Observations	29,958	29,517	29,958	29,517	29,928	29,471
R-squared	0.034	0.006	0.036	0.007	0.144	0.094

Robust standard errors in parentheses. Reference categories: Year 2010, Illiterate, Age 18-25, Rural Hukou, Single, Non-party, Non-religious.

*** p<0.01, ** p<0.05, * p<0.1

Table A.3: Regression Results by Gender and Norm Context for Model 4 (Including Controls)

	Women (Traditional Community)	Women (Egalitarian Community)	Men (Traditional Community)	Men (Egalitarian Community)
Attitude Index	-0.025 (0.016)	-0.034* (0.016)	-0.001 (0.014)	-0.003 (0.015)
Year Effects (ref: 2010)				
2012	0.091 (0.058)	0.010 (0.080)	0.014 (0.054)	0.005 (0.067)
2013	-0.007 (0.055)	-0.032 (0.078)	0.029 (0.051)	0.057 (0.064)
2015	0.008 (0.054)	0.065 (0.081)	0.013 (0.055)	0.068 (0.068)
2018	0.055 (0.057)	-0.019 (0.076)	-0.045 (0.053)	-0.025 (0.065)
2021	0.022 (0.064)	0.132 (0.084)	0.085 (0.064)	0.090 (0.079)
Attitude Index × Year				
2012	-0.018 (0.021)	-0.004 (0.022)	-0.045* (0.020)	-0.018 (0.021)
2013	-0.004 (0.021)	0.001 (0.021)	-0.008 (0.020)	-0.020 (0.020)
2015	0.011 (0.021)	-0.008 (0.022)	-0.007 (0.020)	-0.016 (0.021)
2018	-0.001 (0.020)	-0.005 (0.020)	0.002 (0.020)	-0.015 (0.019)
2021	-0.010 (0.022)	-0.046** (0.022)	-0.023 (0.023)	-0.034 (0.023)
Controls				
Education = 2	-0.200*** (0.027)	-0.341*** (0.039)	-0.111*** (0.031)	-0.162*** (0.046)
Education = 3	-0.371*** (0.026)	-0.546*** (0.037)	-0.233*** (0.031)	-0.342*** (0.044)
Education = 4	-0.456*** (0.034)	-0.601*** (0.039)	-0.231*** (0.037)	-0.397*** (0.045)
Education = 5	-0.450*** (0.034)	-0.542*** (0.039)	-0.249*** (0.038)	-0.352*** (0.046)
Age Group = 25-34	0.040 (0.035)	0.105*** (0.032)	-0.023 (0.035)	0.006 (0.037)
Age Group = 35-44	0.072** (0.036)	0.150*** (0.034)	-0.023 (0.036)	-0.012 (0.039)

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	Women (Traditional Community)	Women (Egalitarian Community)	Men (Traditional Community)	Men (Egalitarian Community)
Age Group = 45-54	0.140*** (0.036)	0.156*** (0.035)	0.011 (0.037)	0.054 (0.040)
Age Group = 55+	0.537*** (0.038)	0.413*** (0.036)	0.395*** (0.039)	0.272*** (0.041)
Urban Hukou	0.142*** (0.019)	0.168*** (0.018)	0.136*** (0.020)	0.197*** (0.019)
Married	0.048 (0.034)	0.084*** (0.026)	0.269*** (0.027)	0.128*** (0.027)
Party Affiliation	0.083** (0.039)	0.052** (0.023)	0.104*** (0.027)	0.103*** (0.018)
Religious Belief	0.185*** (0.024)	0.182*** (0.025)	0.238*** (0.028)	0.287*** (0.036)
Log Income	0.005 (0.003)	0.001 (0.004)	0.010** (0.004)	-0.002 (0.005)
Constant	1.963*** (0.067)	2.104*** (0.081)	1.696*** (0.076)	1.941*** (0.089)
Observations	14,872	15,056	15,072	14,399
R-squared	0.143	0.124	0.095	0.078

Robust standard errors in parentheses. Reference categories: Year 2010, Illiterate, Age 18–25, Rural Hukou, Single, Non-party, Non-religious.

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

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