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The Dynamics of Gender Norms and Fertility Decline

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Received: 5 January 2026 | **Revised:** 8 June 2026 | **Accepted:** 29 June 2026

Keywords: fertility | gender-biased technological change | intra-household allocation | norm formation

ABSTRACT

This paper models fertility as the outcome of gender-biased technological progress interacting with endogenous social norms governing childcare. When rising female wages outpace norm adjustment, the inherited norm makes reallocating childcare toward fathers costly, so mothers bear a disproportionate burden and the shadow price of children rises. In cross-country data, fertility falls faster where women's relative standing rises, especially where norms are tighter or more rigid. Calibrated to South Korea (1976–2016), the model shows that strong, slow-adjusting norms deepen the decline. Despite smaller short-run effects, male childcare subsidies yield larger long-run gains than female subsidies by accelerating convergence to egalitarian norms.

JEL Classification: J12, J13, O11

1 | Introduction

Fertility has fallen below the replacement rate in much of the world, straining fiscal sustainability and slowing economic growth (Jones 2022). The challenge is sharpest in economies that risk getting old before they get rich, where catching-up prospects depend on demographic momentum that is no longer there. Why has fertility fallen so far so fast, where is it headed, and which policies actually work? These are first-order questions for both researchers and policymakers.

This paper develops a quantitative overlapping-generations model in which fertility is shaped by the interaction between gender-biased technological progress and the social norm governing the gender division of childcare. Households bargain over fertility and childcare under the limited-commitment framework of Doepke and Kindermann (2019). We extend that framework by letting parents trade off two costs when they choose how to allocate childcare time: the standard opportunity cost in lost market earnings, and a utility loss for deviating from the prevailing childcare norm. When men have traditionally done

little childcare, a rise in women's relative wages makes a more equal split cheaper in monetary terms, but the departure from tradition carries the social disapproval that parents internalize. The norm therefore drives a wedge between the childcare allocation households actually choose and the allocation that would minimize the opportunity cost alone, and that wedge raises the shadow price of children. As a result, the norm shapes both fertility and labor supply in equilibrium.

The model's central novelty is that the norm itself is endogenous, shaped by the past practices of older cohorts and their ongoing re-evaluation of them. Building on Bisin and Verdier (2001), we let the prevailing norm at any point in time be the population-weighted average of *opinions* expressed by all cohorts past childbearing age. Each older cohort forms its expressed opinion in a re-evaluation stage that depends on the current economic environment and on its own past childcare practice. The norm therefore evolves through two channels. New cohorts entering the fertile period adopt childcare arrangements that may diverge from established practice, and those choices feed into the norm in subsequent periods. We call this the *between-cohort* channel,

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often labeled cohort replacement in the sociology literature (Brooks and Bolzendahl 2004). Older cohorts also re-evaluate the situation each period in light of current wages, shifting the opinions they express even though their own past behavior is fixed. We call this the *within-cohort* channel, often labeled the social-structural channel. The relative weight of the two channels depends on the size of each cohort, which is itself an endogenous outcome of past fertility decisions.

Strong social pressure on young couples and reluctant re-evaluation by older cohorts together create cultural inertia. When technology calls for a reallocation of childcare time, that inertia keeps the household away from the new cost-minimizing point and pushes a disproportionate share of the burden onto one parent. Since fertility requires the consent of both parents, this added burden depresses the realized number of children. The same logic produces the non-monotonic fertility path discussed in Feyrer et al. (2008) and Doepke et al. (2023): an initial drop while the norm lags behind technology, followed by a recovery as the norm catches up. The same channels determine how deep the initial decline runs and how long it persists, both of which depend on the strength of social pressure and the pace of norm adjustment.

We then take model predictions to international data. Our empirical counterpart for women's relative economic standing is the female labor income share from the World Inequality Database (WID), together with a labor-income-based proxy for the relative female wage. Fertility falls more rapidly where this standing rises faster: a one-percentage-point faster annual rise in the female labor income share is associated with about a 0.06 children-per-woman faster annual fertility decline. The gradient is markedly steeper for countries above the median of the tightness-looseness index of Uz (2015). A panel of ten-year within-country differences shows a similar within-country pattern and shows the gradient is also steeper where cross-cohort gender-role attitudes have changed less, measured from the 2002 and 2012 International Social Survey Programme (ISSP) Family and Changing Gender Roles modules. The pattern is similar after residualizing the labor-market measure with respect to log GDP per capita and controlling for service-sector expansion.

To quantify the mechanism, we calibrate the model to South Korea between 1976 and 2016. Gender-specific wage paths are chosen to match the observed trajectories of GDP per capita and the gender wage gap. Preference parameters are disciplined primarily by the initial fertility level and its subsequent trend, and the relative productivity of women in childcare is disciplined by the first observed gender gap in childcare time. The strength of social pressure is calibrated to the persistence of the gender gap in childcare time reported in Park (2021), based on the Korean Time Use Survey (KTUS). The stubbornness parameter, which governs how heavily older cohorts weight their own past practice, is calibrated to the share of within-cohort change in the overall evolution of expressed gender-role attitudes, measured from the Korean General Social Survey (KGSS).

The calibrated model assigns a substantial role to social norms in shaping the fertility consequences of gender-biased technological change. To see this most clearly, we trace the response of fertility to the observed change in the gender wage gap under two scenarios. In the first, the social norm is held fixed at its initial

level; in the second, the norm adjusts to its new long-run value. The fertility decline in the first scenario is roughly twice as large as in the second.

We then run five counterfactual experiments. The first varies the pace of gender-biased technological change, which drives gender wage convergence. Faster wage convergence accelerates the fertility decline, because the slow-moving norm cannot keep pace with the rapid change in wages. The second and third counterfactuals vary the degree of stubbornness and the strength of social pressure, one at a time. Both produce the expected pattern: weaker social pressure or faster re-evaluation by older cohorts dampens the fertility decline, speeds up the convergence of the norm, and lifts fertility along the transition path. The fourth counterfactual asks what the Korean transition would have looked like under US parameters. The US calibration yields lower social pressure and lower stubbornness than the Korean one, and feeding those parameters into the Korean economy produces a substantially milder fertility decline.

The fifth counterfactual studies gender-specific childcare subsidies. Subsidizing female childcare delivers a large immediate increase in fertility but reinforces traditional roles, so the boost erodes as the wage gap continues to narrow. Subsidizing male childcare produces a smaller short-run effect because the norm initially resists the shift, but it pushes the norm toward a more egalitarian steady state and ultimately delivers larger fertility gains. These predictions line up with the recent evidence in Lee and Lee (2025) and Kleven et al. (2026).

1.1 | Related Literature

This paper contributes to a growing literature on the effects of technological change on fertility and female labor supply. The closest studies are Goldin (2025), Doepke and Kindermann (2019), Myong et al. (2021), and Fogli and Veldkamp (2011).¹

Goldin (2025) links lowest-low fertility to the combination of rapid per-capita GDP growth and slowly evolving cultural norms, with generational and gender conflicts as the underlying drivers. Our broad reading aligns with this view: low fertility reflects the gap between fast-moving technology and slow-moving norms. We build on Goldin's argument in three directions. We provide a tractable model in which the gender norm evolves endogenously through both within-cohort and between-cohort channels. We derive fertility decisions and intra-household bargaining from explicit micro-foundations rather than from gender-specific fertility desires. Finally, we show in cross-country data that the link between rising female economic standing and fertility decline is steeper in societies with more rigid gender norms, a pattern that survives controlling for the GDP-growth channel that Goldin emphasizes.

Doepke and Kindermann (2019) show that countries with more equitable childcare divisions exhibit smaller gender gaps in desired fertility and higher realized birth rates, and they rationalize the pattern with a limited-commitment bargaining model. We adopt their three-stage household structure and add an endogenous social norm to the first stage, allowing the model to speak to how economies adjust over time. A complementary

fact comes from Doepke and Tertilt (2018), who find that women's desired fertility lies systematically below men's across developing countries. This is exactly the equilibrium pattern in our calibrated model, in which women are the binding party in the fertility-bargaining stage.

looseMyong et al. (2021) study fertility and marriage in East Asian societies and jointly estimate the effects of two norms: the stigma of out-of-wedlock births, and the gender division of childcare. Using South Korean data, they find that the latter has the larger quantitative effect on fertility, which is why we focus on the childcare norm and set aside marriage and fertility-level norms in the baseline model.² Myong et al. (2021) treat the childcare norm as exogenous and estimate it directly. We instead micro-found its formation, which allows us to project future fertility paths and to study counterfactuals defined in terms of the structural parameters of norm formation. Real households face many overlapping norms at once, and recent methodological work by La Ferrara et al. (2026) on social-norm complementarities is a natural complement to the structural approach we pursue here.

Our paper also speaks to the broader literature on the evolution and transmission of social norms, including Bisin and Verdier (2001), Bisin and Verdier (2011), and Giuliano and Nunn (2021), and to the role of culture in fertility transitions, including Spolaore and Wacziarg (2022) and Beach and Hanlon (2023). Baudin (2010) uses a Bisin–Verdier framework to study how cultural transmission, in particular the contrast between traditionalist and modernist preferences, shaped the post-Industrial-Revolution fertility transition. We complement that work by focusing on the gender division of childcare and its consequences for fertility. Methodologically, the Bisin–Verdier framework emphasizes parents' forward-looking socialization decisions during the child-rearing period. We instead abstract from forward-looking socialization and let older cohorts solve a per-period opinion-expression problem. This formulation allows for frequent generational interaction, instantaneous reactions to technological shocks, and a tractable transition path.

Finally, our work complements the literature in which social learning drives the rise in female labor force participation and the changing patterns of marriage in the face of technological progress, including Fernández et al. (2004), Fernández and Fogli (2009), Fogli and Veldkamp (2011), Fernández (2013), and Bertrand et al. (2021). These papers focus on how individuals learn about the consequences of female labor force participation for child outcomes, and how that learning is transmitted vertically across generations and horizontally across neighborhoods or peer groups. Our work focuses instead on norms surrounding childcare, on their effect on household decisions, and on their endogenous evolution through within-cohort and between-cohort adjustments.

The remainder of the paper proceeds as follows. Section 2 develops the model and derives its core predictions. Section 3 presents the cross-country evidence. Section 4 describes the calibration to South Korea. Section 5 reports the counterfactual exercises, and Section 6 concludes.

2 | Model

We now develop an overlapping-generations economy in which parents bargain over fertility and childcare under the influence of a social norm, and in which that norm is itself endogenous to the childcare practices of past cohorts.

Households face overlapping norms in reality, over marriage, desired family size, and the gender division of childcare. Our analysis focuses on the norm governing the gender division of childcare for two reasons. In the East Asian societies that anchor our quantitative exercise, Myong et al. (2021) jointly estimate the effects of a marriage norm (the stigma of out-of-wedlock births) and a childcare-division norm in South Korean data, and find the latter to be the quantitatively dominant force on fertility. The childcare-division norm is also the one that interacts most directly with gender-biased technological change, since it constrains how households can reallocate childcare time as relative wages move.³

2.1 | Household Problem

The economy is populated by women and men who live until age J . Each cohort consists of women and men of equal mass.⁴ Within a cohort, agents of the same gender are homogeneous. Individuals consume their labor income at every age, but the bargaining problem we focus on takes place at age J_f , the period in which couples form and make fertility decisions.

A couple consists of a woman and a man, indexed by gender $g \in \{\mathcal{F}, \mathcal{M}\}$. The couple chooses individual consumption c^g , gender-specific childcare time l^g , and the number of children n , which is shared. Time is indexed by t . Gender-specific market wages w_t^g are exogenous and reflect technological forces that shift labor demand differentially across genders, in the spirit of Ngai and Petrongolo (2017).⁵

Preferences over consumption and fertility take the form

$$u^g(c^g, n) = c^g + \gamma \cdot \frac{n^{1-\rho} - 1}{1-\rho}, \quad \rho > 0, \quad (1)$$

where γ is the weight on fertility and ρ governs its curvature.

Each child requires a fixed total time input ϕ , supplied by the two parents through a CES production function:

$$n\phi = \left(\beta \cdot (l^{\mathcal{F}})^{\frac{\sigma-1}{\sigma}} + (1-\beta) \cdot (l^{\mathcal{M}})^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \quad \sigma > 1, \quad (2)$$

where β governs the relative productivity of mothers in childcare and σ governs the substitutability of maternal and paternal time.

2.1.1 | Bargaining Structure

We adopt the three-stage limited-commitment timing of Doepke and Kindermann (2019). The couple first commits to a childcare allocation, then bargains over fertility under disagreement (the min rule), and finally bargains over consumption through Nash

bargaining. The first stage is the natural place to introduce the social norm, since the norm operates directly on how childcare time is split between the parents. The remaining two stages translate that allocation into a realized fertility level and a consumption split.

First Stage: Childcare Arrangement. Conditional on having n children, the couple chooses a childcare allocation and commits to it.⁶ The problem is

$$\min_{l_i^q, l_i^d} w_i^q l_i^q + w_i^d l_i^d + \lambda \cdot w_i^d \cdot \left(\frac{l_i^q}{l_i^d} - \eta_t \right)^2, \quad (3)$$

subject to the childcare constraint (2). The first two terms in (3) are the opportunity cost of childcare in units of consumption goods. The third term is a utility loss from deviating from the prevailing social norm η_t , which the couple takes as given. The parameter λ measures the intensity of social pressure. The factor w_i^d scales the psychic cost so that the female-to-male wage ratio w_i^q/w_i^d , rather than the wage levels, determines the childcare allocation. We denote the solutions by $l_i^q(n)$ and $l_i^d(n)$.

Second Stage: Fertility. The couple then chooses fertility under disagreement. Realized fertility equals the lower of the two spouses' desired levels,

$$n_t = \min\{n_t^q, n_t^d\}. \quad (4)$$

Unlike consumption, fertility cannot easily be contracted upon or reversed, so each spouse retains effective veto power. The min rule encodes this veto. With $c_i^g(n)$ denoting the consumption levels that emerge from the third stage, each gender's ex-ante desired fertility is

$$n_t^g = \arg \max_n u^g(c_i^g(n), n). \quad (5)$$

Equations (4) and (5) together imply that any factor that widens the gender gap in desired fertility lowers realized fertility. A childcare norm that holds the allocation away from the cost-minimizing point is such a factor, and this is the channel that drives the model's main result.

Third Stage: Consumption. After childbirth, the couple implements the agreed childcare arrangement $l_i^g(n)$ and bargains over consumption $c^g(n)$. Conditional on having n children, each gender's outside option is

$$\bar{u}^g(n) = w_i^g(1 - l_i^g(n)) + \gamma \cdot \frac{n^{1-\rho} - 1}{1-\rho}, \quad \rho > 0, \quad (6)$$

which corresponds to consuming the residual labor income after childcare. Following Doepke and Kindermann (2019), the disagreement state is interpreted as a continuing relationship in the spirit of the separate-spheres model of Lundberg and Pollak (1993): the couple stays together and both partners derive utility from the child, but consumption-allocation bargaining breaks down. Childcare follows the ex-ante commitment $l_i^g(n)$, and the couple loses the returns to scale in joint consumption.

If the couple cooperates, the Nash bargaining problem is

$$\max_{c^q, c^d} \left(u^q(c^q, n) - \bar{u}^q(n) \right)^{1/2} \cdot \left(u^d(c^d, n) - \bar{u}^d(n) \right)^{1/2}, \quad (7)$$

subject to the budget constraint

$$c^q + c^d = (1 + \alpha) \cdot [w_i^q(1 - l_i^q(n)) + w_i^d(1 - l_i^d(n))], \quad (8)$$

where α captures the economies of scale that come with cooperation. Following Doepke and Kindermann (2019), we assume equal bargaining power for the two spouses.

2.2 | Endogenous Social Norm

The novel ingredient of the model is that the prevailing childcare norm η_t is not exogenous. It is the population-weighted average of the opinions expressed by older cohorts, and those opinions in turn depend on past childcare practices. The norm therefore inherits memory from past household decisions, transmits social pressure to current parents, and allows older cohorts to re-evaluate the situation as conditions change.

Formally, the social norm at time t is

$$\eta_t = \sum_{j=1}^{J-J_f} \phi_{J_f+j,t} \cdot \tilde{\eta}_{J_f+j}, \quad \sum_{j=1}^{J-J_f} \phi_{J_f+j,t} = 1, \quad (9)$$

where $\tilde{\eta}_{J_f+j}$ is the opinion expressed at time t by the cohort currently aged $J_f + j$, and $\phi_{J_f+j,t}$ is the weight assigned to that cohort.⁷ The weight equals the share of households of that age within the subpopulation older than J_f ,

$$\phi_{j,t} = \frac{\pi_{j,t}}{\sum_{k=J_f+1}^J \pi_{k,t}}, \quad (10)$$

where $\pi_{j,t}$ is the population share of age j at time t . Larger cohorts exert more influence on the prevailing norm, which makes the cohort weights endogenous to the history of fertility itself.

Following the imperfect-empathy approach of Bisin and Verdier (2001), each older cohort forms its expressed opinion by solving

$$\tilde{\eta}_{J_f+j} = \arg \min_{\eta} \underbrace{w_i^q \cdot \tilde{l}^q(\eta) + w_i^d \cdot \tilde{l}^d(\eta)}_{\text{opportunity cost of childcare}} + \psi \cdot w_i^d \cdot \underbrace{\left(\eta - \frac{l_i^q}{l_i^d} \right)^2}_{\text{distance to own past practice}}, \quad (11)$$

where the pair $\{\tilde{l}^q(\eta), \tilde{l}^d(\eta)\}$ lies on the unit isoquant of the childcare production function and satisfies $\tilde{l}^q(\eta)/\tilde{l}^d(\eta) = \eta$, that is,

$$\left(\beta \cdot (\tilde{l}^q(\eta))^{\frac{\sigma-1}{\sigma}} + (1-\beta) \cdot (\tilde{l}^d(\eta))^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} = 1.$$

The ratio l_{t-j}^q/l_{t-j}^d is the actual childcare practice that this cohort adopted j periods ago. The psychic cost is again scaled by w_i^d so that relative wages, rather than wage levels, are what matter. Each older cohort picks a desired ratio of female to male childcare time

on the isoquant, balancing the opportunity-cost objective faced by current parents against the pull of its own past behavior.

The parameter ψ governs how strongly older cohorts are anchored by their own past childcare arrangement. Two limiting cases help fix ideas. When $\psi = 0$, older cohorts share the same incentives as current parents: they discard their own history and minimize the same opportunity-cost objective, on the same isoquant. The opinion they express then coincides with the cost-minimizing childcare ratio at current wages, so the prevailing norm reproduces what young couples would do anyway. When ψ is large, older cohorts express opinions close to the childcare ratio they themselves followed j periods ago, regardless of how wages have moved since. The empirical case lies between these two extremes, and Section 4 disciplines ψ using cross-cohort variation in expressed gender-role attitudes.

2.3 | Population Dynamics

The age structure of the economy, $\{\pi_{j,t}\}_{j=1}^J$, evolves endogenously, driven by the realized fertility rate n_t . Letting $\pi_t = (\pi_{1,t}, \dots, \pi_{J,t})^T$ collect the population shares,

$$\pi_{t+1} = \frac{\Pi_t \cdot \pi_t}{1' \Pi_t \cdot \pi_t}, \quad (12)$$

where Π_t is a $J \times J$ demographic transition matrix. The matrix has two non-trivial features. The element in the $(j+1)$ -th row and j -th column equals one for all j , capturing aging from age j to age $j+1$. The element in the first row and the J_f -th column equals $n_t/2.1$, capturing births from couples currently at the fertile age, normalized by the replacement level of approximately 2.1 children per couple. Dividing by the sum of the entries keeps the population shares summing to one over time.

2.4 | Mechanisms

Fertility in the model responds to the interaction between gender-biased technological progress and the slowly moving social norm, not to either force in isolation. Technological change that raises women's relative wage shifts the cost-minimizing childcare allocation toward greater male involvement (see Equation 3). When the prevailing norm still favors traditional roles, it acts like an adjustment cost: the household ends up at a childcare allocation between the new cost-minimizing point and the inherited tradition, and the gap between these two allocations raises the shadow price of children. Figure 1 illustrates the geometry. Couples therefore want fewer children ex ante, with the strength of the effect governed by the tightness of the norm λ .

The norm is itself endogenous, shaped by within-cohort and between-cohort changes, as Equation (9) makes clear. Cohorts entering fertile age in a higher-female-wage environment may favor more egalitarian childcare arrangements, and older cohorts, observing the same wage shift, may revise the opinions they express, as in Equation (11).

The first source of norm change is a between-cohort effect. New cohorts enter at age J_f and choose childcare contributions that

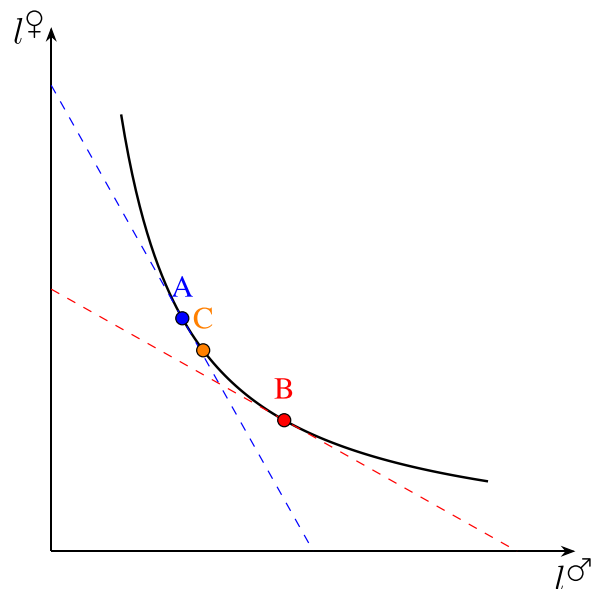


FIGURE 1 | The childcare allocation problem with social norms.

Notes: The figure illustrates the household childcare problem in the presence of a social norm. The isoquant ABC traces combinations of male and female childcare time that produce one unit of childcare. The slopes of the dashed budget lines reflect the prevailing wage ratio w^σ/w^φ . Point A is the original steady state, where the gender wage gap is large and women shoulder most of the childcare. Gender-biased technological change shifts the cost-minimizing point to B, the new long-run equilibrium. With a binding social norm, the household instead chooses point C, which lies closer to A and is more costly than B at current wages. The gap between C and B raises the shadow price of childcare and depresses fertility. As the norm evolves, the household's choice converges to B, and fertility recovers. Lower social pressure (small λ) or lower stubbornness (small ψ) brings C closer to B on impact.

may diverge from established practice. Once their behavior enters the population average, future norms shift toward their preferred allocation. A cohort that adopts a more egalitarian childcare ratio incrementally pulls η_t in that direction over the following periods. This is the cohort-replacement channel familiar from sociology.

The second source is a within-cohort effect. Older cohorts choose the opinions they express at each date, and that choice depends both on their own past experience and on their re-evaluation of current conditions. This is the social-structural channel, whose strength is governed by the stubbornness parameter ψ .

The relative weight of the two channels is itself endogenous, because it depends on the population weight $\phi_{j,t}$, which reflects past fertility decisions. Higher fertility j periods ago produces a larger cohort of age j today, and a larger cohort of age j has more influence on the current norm. Fertility, demographic structure, childcare choices, and expressed opinions therefore all evolve together.

Even with both channels at work, the social norm typically adjusts more slowly than wages do. The model accordingly predicts a non-monotonic fertility response to a positive shock to women's relative wage. Fertility falls sharply on impact while the

norm still reflects entrenched gender roles, and recovers later as the norm catches up. Short-run path dependence and long-run adaptation are two sides of the same mechanism.

These observations yield three testable predictions. The first concerns the average relationship: economies experiencing faster gender-biased technological change should display faster fertility declines. The other two concern heterogeneity in the slope of that relationship: it should be steeper in tighter norms and steeper in more rigid norms.

Prediction 1. Economies experiencing faster gender-biased technological change exhibit more rapid fertility declines.

Prediction 2. The fertility response to gender-biased technological change is stronger in economies with tighter social norms (larger λ).

Prediction 3. The fertility response to gender-biased technological change is stronger in economies with more rigid social norms (larger ψ).

The advantage of an explicit model of norm formation is that we can take these predictions to data and quantify the underlying mechanisms. We examine the predictions in cross-country data in Section 3, calibrate the model in Section 4, and run counterfactual experiments in Section 5.

3 | Cross-Country Supporting Evidence

This section asks whether these predictions are visible in international data. We organize it as two exercises, both descriptive. The first is a cross-section that relates the pace of change in women's relative standing to the pace of fertility decline, and asks whether the relationship is steeper where norms are tighter (Prediction 2). The second is a country-year panel that asks whether it is steeper where norms have changed less across cohorts (Prediction 3). Each exercise reports the average relationship (Prediction 1) before turning to its moderation prediction.

The empirical counterparts of gender-biased technological change in our analysis are changes in women's relative position in the labor market. We use the female share of labor income from the WID, together with a labor-income-based proxy for the relative female wage built from labor income shares and gender-specific participation rates. Both objects proxy women's relative labor-market position, and the inferred wage measure maps more directly onto the relative-wage variable in the model.⁸

A note on measurement is in order before we turn to the results. In the model, λ and ψ are distinct objects: λ governs the per-period utility cost of deviating from the norm, while ψ governs how heavily older cohorts weight their own past practice when forming expressed opinions. Section 4 disciplines them using time-use data and cross-cohort attitude data. The cross-country exercise in this section uses proxies. For λ , we use the dispersion-based tightness–looseness index of Uz (2015). The logic is that in equilibrium a larger λ should produce less dispersion of expressed opinions, which is what the Uz index captures. For ψ , we summarize stubbornness by the cross-cohort change in gender-

role attitudes, measured from the two ISSP waves: societies with larger ψ should display attitudes that change more slowly across cohorts, so younger generations face more rigid norms.⁹ The cross-country evidence below should be read as documenting that the qualitative patterns predicted by the model are visible in the international data, with the precise quantitative identification of λ and ψ left to Section 4.

3.1 | Norm Tightness

3.1.1 | Data and Variable Construction

The first exercise is a cross-section of economies. Total fertility rates are taken from the Our World in Data “children-born-per-woman” series, which combines observations from the Human Fertility Database with estimates from the United Nations World Population Prospects. The female labor income share is from the WID, defined as the share of pre-tax labor income accruing to working-age women. Labor force participation rates by sex are from the World Bank's World Development Indicators (WDI), and real GDP per capita is from the Penn World Table 10.01. We retain economies with at least twenty annual observations on the common-sample intersection of these sources over 1990–2019, which leaves 62 economies.¹⁰

For each economy i , we summarize the pace of change in a variable by its annual trend, the slope coefficient $\text{speed_}X_i$ from

$$X_{i,\text{year}} = \alpha_i^X + \text{speed_}X_i \times \text{year} + u_{i,\text{year}}, \quad (13)$$

estimated separately for each economy over 1990–2019. We construct speed_tfr_i from the total fertility rate, and two measures of the pace of change in women's relative standing: speed_finc_i from the female labor income share, and a second slope from an inferred relative-wage proxy,

$$\frac{\text{finc}}{1 - \text{finc}} \cdot \frac{\text{LFPR}^\delta}{\text{LFPR}^\vartheta},$$

which backs the relative wage out of the income share and relative participation.¹¹ The control variable speed_gdp_i is constructed analogously from log real GDP per capita.

Norm tightness is measured by the tightness–looseness index of Uz (2015), which uses the dispersion of individual opinions to gauge how strongly a society enforces conformity. In a tight culture, values and behavior cluster because deviations are sanctioned, which is the empirical content of the social-pressure parameter λ in the model.

Results. Table 1 reports population-weighted least-squares regressions of speed_tfr_i on these measures. Columns (1)–(4) use the female income share; columns (5)–(8) use the inferred relative-wage proxy.

Columns (1)–(2) and (5)–(6) report the average relationship, the cross-sectional counterpart of Prediction 1: economies in which women's relative economic standing improves faster experience faster fertility decline. The coefficient on $\text{speed_}X$ is negative and statistically significant under both measures, and is essentially

TABLE 1 | Cross-sectional regressions: Female income share, inferred relative wage proxy, and fertility decline

	Dependent variable: Annual change in total fertility rate							
	Female income share				Inferred relative wage proxy			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Speed_X	−4.833*** (1.611)	−6.013*** (1.975)	−14.936*** (2.443)	3.377 (2.772)	−1.941*** (0.724)	−2.171** (0.844)	−4.793*** (1.239)	1.881 (1.973)
Speed_X × CTL_DS			0.2421*** (0.0485)				0.0883*** (0.0319)	
Speed_X × tight				−12.991*** (2.996)				−4.601** (2.039)
Speed_GDP		−0.17 (0.17)	−0.02 (0.14)	−0.04 (0.15)		−0.09 (0.16)	0.04 (0.16)	0.01 (0.16)
Observations	62	62	62	62	62	62	62	62
R-squared	0.130	0.146	0.403	0.355	0.107	0.111	0.215	0.183

Note: The dependent variable in all columns is the per-economy annual slope of the total fertility rate (TFR) over 1990–2019, estimated from the Our World in Data children-born-per-woman series, which combines Human Fertility Database observations with United Nations World Population Prospects estimates. Speed_X denotes the per-economy annual slope of the relevant labor-market measure: the female labor income share from the World Inequality Database (columns 1–4), or an inferred relative-wage proxy, $\text{femincshare}/(1 - \text{femincshare}) \cdot \text{LFPR}^m/\text{LFPR}^f$, where LFPRs are from World Bank WDI (columns 5–8). Speed_GDP is the per-economy annual slope of log real GDP per capita from Penn World Table 10.01. CTL_DS is the dispersion-based tightness–looseness index of Uz (2015); larger values denote looser societies. “tight” is a dummy equal to one if CTL_DS is at or below the sample median. Estimation is by population-weighted least squares. Sample: India and Slovenia are excluded because Uz’s CTL_DS and CTL_C indices give inconsistent rankings for these economies (rank differences of 40 and 32 out of 65, respectively, vs. a maximum of 28 among all other economies). Egypt is excluded due to a 3-fold single-year jump in the WID female income share between 2009 and 2010 that reflects an underlying methodological revision rather than an economic shift. * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

unchanged when the per-economy slope of log GDP per capita is included. The magnitude is modest but economically meaningful. From column (2), an economy whose female labor income share rises one percentage point per year faster than another’s sees its total fertility rate fall about 0.06 children per woman per year faster, or more than half a child over a decade. The inferred relative-wage proxy in columns (5)–(6) tells the same story.

Columns (3), (4), (7), and (8) speak to Prediction 2. Columns (3) and (7) interact speed_X with the continuous Uz (2015) dispersion index, which takes larger values in looser societies. Columns (4) and (8) instead use a dummy for above-median tightness. Under both income-share and relative-wage measures, the fertility gradient is significantly steeper in tighter societies. The interaction is sizable relative to the average effect. From the dummy specification in column (4), a one-percentage-point faster annual rise in the female income share is associated with about a 0.10 children-per-woman faster annual fertility decline in tight societies, while the corresponding gradient in loose societies is small and not statistically distinct from zero. Where conformity is more strongly enforced, a given improvement in women’s relative standing translates into a sharper fertility decline.

3.2 | Norm Rigidity

3.2.1 | Data and Variable Construction

The second exercise turns from how strongly norms are enforced to how quickly they change. We move to a country-year panel in which the pace of change is measured as a ten-year difference. Measuring norm rigidity requires repeated cross-cohort attitude

data, which we take from the ISSP Family and Changing Gender Roles modules. We build the panel by combining, at the country-year level, the fertility, female income share, relative-wage proxy, and GDP-per-capita series of the previous subsection with the ISSP attitude data and with sectoral employment shares from the GGDC 10-Sector Database (Timmer et al. 2015). Sixteen economies have all of these series and constitute the panel sample.¹²

From the 2002 and 2012 ISSP waves, we take responses to the statement, “A man’s job is to earn money; a woman’s job is to look after the home and family,” coded +1 for disagree, −1 for agree, and 0 for neutral. We define $\Delta\text{GenderNorm}$ for each country as the difference in mean attitude between its 1980s and 1920s birth cohorts.¹³ A larger value indicates a society in which gender-role attitudes have moved further toward egalitarianism across generations, that is, a less rigid norm. This is the empirical counterpart of (the inverse of) the stubbornness parameter ψ in the model.

For each economy and year, speed_X is the change in the female income share (or in the relative-wage proxy) over the preceding decade, and the dependent variable is the corresponding ten-year change in the total fertility rate. All specifications include country fixed effects and a common year trend.

3.2.2 | Results

Table 2 reports the estimates. Columns (1) and (4) report the average relationship using ten-year within-country changes, the panel counterpart of Prediction 1: a faster decade-on-decade rise in women’s relative economic standing is associated with faster

TABLE 2 | Panel regressions: Female income share, inferred relative wage proxy, and fertility, with services share controls

	Dependent variable: 10-year change in total fertility rate					
	Female income share			Inferred relative wage proxy		
	(1)	(2)	(3)	(4)	(5)	(6)
Speed_X	−5.137*** (1.122)	−15.124*** (2.215)	−16.413*** (2.227)	−1.794*** (0.312)	−5.044*** (0.569)	−4.785*** (0.536)
Speed_X × Δ GenderNorm		16.108*** (3.148)	18.086*** (3.132)		5.619*** (0.857)	5.628*** (0.850)
Δ Services share	−0.578 (0.790)	−0.873 (0.741)	−0.823 (0.714)	−1.367* (0.730)	−1.209* (0.655)	−0.980 (0.660)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year linear trend	Yes	Yes	Yes	Yes	Yes	Yes
SBTC-residualized X	No	No	Yes	No	No	Yes
Observations	192	192	192	192	192	192

Note: Panel of 16 economies with ISSP attitude data and GGDC 10-Sector services-share data. Taiwan is omitted (no WDI LFPR series). The dependent variable is the 10-year change in the total fertility rate. Speed_X is the 10-year change in (a) the female labor income share from the WID (cols 1–3) or (b) an inferred relative-wage proxy (cols 4–6). Δ GenderNorm is the country-level difference in egalitarian gender attitudes between the 1980s and 1920s birth cohorts (ISSP 2002 and 2012 waves). Δ Services share is the 10-year change in services employment share, computed as the residual of total employment after subtracting agriculture (AtB) and industry (C+D+E+F = mining, manufacturing, utilities, construction); equivalently, ISIC Rev. 3.1 sectors G–P. Source: GGDC 10-Sector Database 2014 release (Timmer, de Vries & de Vries 2015). All columns use country FE plus a common year linear trend. Columns 3 and 6 use SBTC-residualized X: the residual from regressing Speed_X within-country on the year trend and log GDP per capita. Standard errors use FE-adjusted degrees of freedom. * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

fertility decline. The coefficient is negative and significant under both the female income share and the inferred relative-wage proxy. From column (1), a ten-percentage-point rise in the female income share over a decade is associated with about a half-child decline in the total fertility rate over the same decade. Column (4) gives the same sign and significance for the proxy.

Columns (2) and (5) speak to Prediction 3, adding the interaction with ΔGenderNorm. The interaction is positive under both measures and most precisely estimated for the inferred relative-wage proxy. The fertility response is attenuated where gender-role attitudes have shifted more toward egalitarianism, and steeper where they have not. The implied heterogeneity is economically large. At lower values of ΔGenderNorm, a ten-percentage-point rise in the female income share over a decade is associated with a fertility decline on the order of a child, whereas at higher values of the norm measure the relationship is close to flat. Columns (3) and (6) report similar estimates after residualizing speed_X within country on the common year trend and log GDP per capita, which absorbs variation driven by the broad pace of development.

All panel specifications additionally control for the ten-year change in the services employment share. The interaction estimates are essentially unchanged, especially for the inferred relative-wage proxy, so the heterogeneity is not mechanically driven by service-sector expansion.

Taken together, the cross-country patterns are consistent with the model's mechanism: fertility moves with women's relative economic standing, and the strength of the relationship depends on the social norm. Section 4 now calibrates the model to

South Korean data and uses it to quantify the channels and run counterfactual experiments.

4 | Calibration

We now apply the model to South Korea and study its fertility decline over recent decades. South Korea is a useful laboratory: it has experienced exceptionally fast economic growth and one of the steepest fertility declines on record since the 1960s, all within a relatively short window. This section describes the model's solution algorithm, the calibration strategy, and the resulting parameter values.

4.1 | Model Solution

We outline the algorithms for the steady state and for the transition path in turn.

4.1.1 | Steady State

The steady state is computed by iterating to a social norm that is consistent with household choices.

1. Guess an initial social norm η .
2. Given η , solve the childcare problem (3) subject to the constraint (2) to obtain the optimal childcare functions $l^g(n)$ and $l^d(n)$.
3. Use $l^g(n)$ and $l^d(n)$ to compute each gender's outside option utility $\bar{u}^g(n)$ for $g \in \{\varphi, \delta\}$.

4. Solve the Nash bargaining problem for consumption $c^g(n)$ and utility $u^g(n)$, conditional on n .
5. Determine each gender's desired fertility, $n^g = \arg \max_n u^g(n)$. Realized fertility is $n = \min\{n^g, n^d\}$, with associated childcare arrangements $l^g(n)$ and $l^d(n)$.
6. Compute the implied norm, $\tilde{\eta} = l^g(n)/l^d(n)$. Update η and repeat until $|\eta - \tilde{\eta}| < \epsilon$ for a small tolerance $\epsilon > 0$.

4.1.2 | Transition Path

Starting from any initial state, we compute the dynamics by forward iteration.

1. Given the current norm η_t , solve the static household problem to obtain n_t , $l^g(n_t)$, and $l^d(n_t)$.
2. Update the population distribution from π_t and n_t to π_{t+1} via Equation (12).
3. Combine π_{t+1} with the history of childcare arrangements $\{l_{t-j}^g, l_{t-j}^d\}_{j=0}^{J-J_f}$ and Equations (9) and (11) to compute tomorrow's norm η_{t+1} . Return to step 1 for the next period.

The result is a joint trajectory of fertility, the childcare norm, and the population structure.

4.2 | Identification Strategy

We calibrate the model to match key data moments from South Korea over 1976–2016. The parameters to be calibrated are

$$\underbrace{J, J_f}_{\text{demographics}}, \underbrace{\gamma, \rho, \psi, \lambda}_{\text{preferences}}, \underbrace{\phi, \beta, \sigma, \alpha}_{\text{technologies}}.$$

A subset of these parameters is taken directly from the literature. The economies-of-scale parameter α is set to 1.2, following Doepke and Kindermann (2019). The time cost per child ϕ is set to 0.15, following de La Croix and Doepke (2003). The elasticity of substitution between maternal and paternal childcare σ is set to 2.5, following Knowles (2013) and Yum (2023). Each model period is five years. We set $J = 16$ (a total lifespan of 80 years) and $J_f = 6$ (childbearing between ages 25 and 30), in line with South Korean life expectancy and the mean age at first birth during the sample period.

The remaining parameters are calibrated jointly to match South Korea's transition path. The exogenous gender-specific wage paths w_t^g and w_t^d are chosen to match the time series of GDP per capita and the gender wage gap from the OECD database. The model is then simulated to match three further sets of moments: the fertility trajectory, the gender gap in childcare time, and the share of within-cohort changes in the overall evolution of expressed gender-role attitudes.

Fertility data come from the United Nations. Gender-specific childcare time is taken from the estimates reported in Park (2021), based on the Korean Time Use Survey (KTUS); because the first survey year is 1999, the “initial” childcare gap we target is its 1999

value, while the fertility moments run from 1976. To construct the within-cohort share, we use the KGSS. For any variable Y , we first compute the change in its sample average over time, that is, the gap between $\bar{Y}_{\text{start time}}$ and $\bar{Y}_{\text{end time}}$. We then identify the cohorts that have at least N observations both at the start and at the end of the period, restrict the sample to those cohorts, and compute how much Y changes in this restricted sample, that is, the gap between $\bar{Y}_{\text{start time}}^{\text{subsample}}$ and $\bar{Y}_{\text{end time}}^{\text{subsample}}$. The ratio of the within-cohort gap to the overall gap measures the relative importance of within-cohort changes. We compute this ratio for two KGSS variables on gender-role attitudes:

1. SEXROLE1: Opinions on gender roles: It is more important for a wife to help her husband's career than to pursue her own career.
2. SEXROLE2: Opinions on gender roles: A husband's job is to earn money; a wife's job is to look after the home and family.

For both variables, the ratio is around 0.8 over 2006–2016. Within-cohort change therefore accounts for the bulk of the overall change in expressed attitudes in South Korea.¹⁴

Although all parameters jointly affect the model's moments, certain moments identify particular parameters more sharply.

- γ (the fertility weight) is disciplined primarily by the initial fertility level in 1976.
- ρ (the curvature) governs the consumption-fertility tradeoff and is identified by the fertility response as wages rise.
- β (women's relative productivity in childcare) is disciplined by the first observed gender gap in childcare time, since higher female productivity raises that gap by encouraging specialization.
- ψ (the stubbornness of opinion expressers) is identified by the share of within-cohort changes in the evolution of attitudes, with smaller ψ implying a larger within-cohort share.
- λ (the strength of social pressure) is disciplined by the persistence of the gender gap in childcare time, since higher λ produces more cultural inertia by raising the psychic cost young couples bear when they depart from the inherited norm.

4.3 | Calibration Results

Figure 2 shows that the calibrated model captures the broad long-run decline in fertility and tracks the observed gender childcare gap in South Korea from 1976 to 2016 closely, although it smooths the sharp fertility decline of the mid-1980s.

Table 3 reports the calibrated parameters along with the data moments used to identify them. The calibrated relative productivity of women in childcare β is close to 0.5, indicating no substantial comparative advantage in childcare in the model. The social-pressure parameter $\lambda = 0.0065$ implies utility losses for parents of an order of magnitude similar to those in Myong et al. (2021) and Kim et al. (2024).

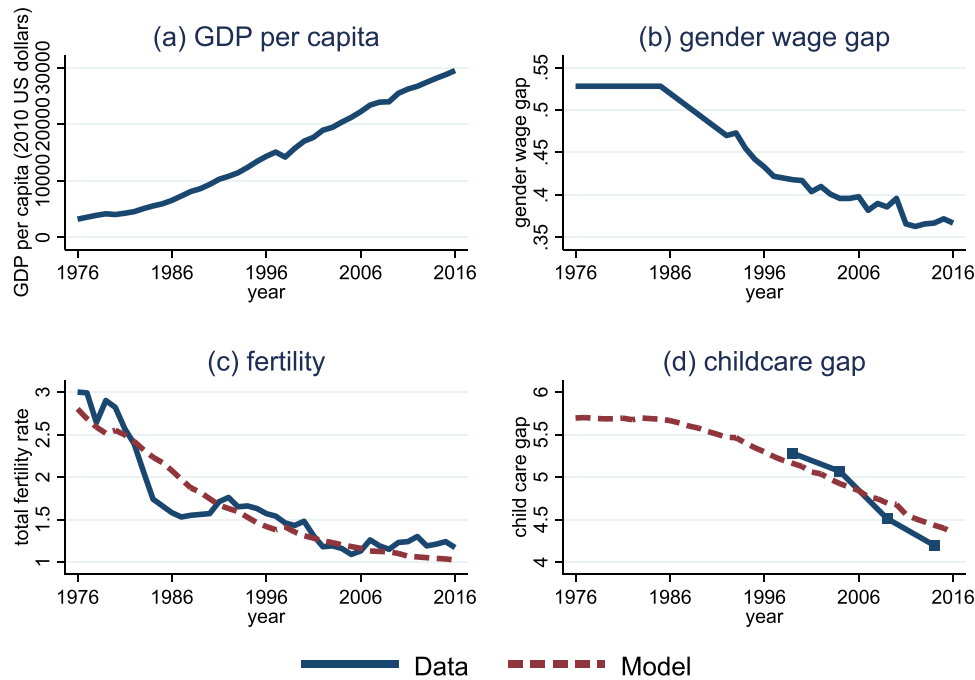


FIGURE 2 | Calibration and model fit. Notes: Solid lines represent data. Dashed lines represent model-simulated values.

TABLE 3 | Calibrated parameters

Parameter		Value	Data moment	Source	Model fit
γ	Fertility weight	3.0	$n_{1976} = 3.0$	United Nations	2.80
σ	Childcare substitutability	2.5		Knowles (2013) and Yum (2023)	
β	Childcare productivity	0.49	$\eta_{1999} = 5.25$	Park (2021)	5.16
ρ	Fertility curvature	2.4	$n_{1976} \sim n_{2016}$	United Nations	See Figure 2
ψ	Stubbornness	0.05	Within-cohort effects	KGSS	81%
λ	Social pressure	0.0065	$\eta_{1999} \sim \eta_{2014}$	Park (2021)	See Figure 2
α	Economies of scale	1.2		Doepke and Kindermann (2019)	
ϕ	Time costs per child	0.15		de La Croix and Doepke (2003)	
J	Total number of periods	16	80 years	World Health Organization	
J_f	The fertile period	6	ages 25–30	Statista	

Note: This table presents the calibration results, with parameters chosen to match the South Korean transition path from 1976 to 2016.

To put the role of the social norm in sharper relief, Table 4 compares the childcare gap and fertility across three thought experiments based on the calibrated parameters.

The first scenario, “old tech. & old norm,” is the 1976 steady state. The female-to-male wage ratio is low ($w^f/w^m = 0.47$), women shoulder roughly 5.68 times as much childcare as men, and the social norm is consistent with this allocation ($\eta = 5.68$). Young couples pick the corresponding childcare ratio and end up with fertility $n = 2.8$.

The second scenario, “new tech. & new norm,” is a new steady state with a higher female-to-male wage ratio ($w^f/w^m = 0.63$), reached by raising the female wage from 0.47 to 0.63 while holding the male wage fixed. The lower wage gap makes male

childcare less costly relative to female childcare, so the new cost-minimizing childcare ratio is more egalitarian, $l^f/l^m = 2.69$, and the long-run norm settles at the same value, $\eta = 2.69$. Fertility falls slightly to $n = 2.66$ because the higher female wage raises the marginal opportunity cost of children; ρ governs the size of the fertility response.

The third scenario, “new tech. & old norm,” is the transitional case in which technology has raised the female-to-male wage ratio to 0.63 while the norm remains at $\eta = 5.68$. Constrained by the inherited norm, young couples settle on a childcare ratio of 5.25, much closer to tradition than to the new cost-minimizing point. The unequal allocation depresses women’s residual labor income and lowers their desired fertility. Since realized fertility requires mutual agreement, the result is $n = 2.54$, well below the long-run

TABLE 4 | Three different cases

	Old tech. & old norm	New tech. & new norm	New tech. & old norm
w^{φ}/w^{δ}	0.47	0.63	0.63
η	5.68	2.69	5.68
l^{φ}/l^{δ}	5.68	2.69	5.25
n	2.80	2.66	2.54
Δn	—	−0.14	−0.26

Note: w^{φ}/w^{δ} is the gender wage ratio. η is the social norm for the mother's relative childcare time. l^{φ}/l^{δ} is the actual relative childcare time chosen by the couple. n is the fertility rate, in children per couple. Δn is the change in fertility relative to the “old tech. & old norm” benchmark. “Old” refers to 1976 calibrated values; “new” refers to the long-run steady state after technological change. In the “new tech.” scenarios the female wage rises while the male wage is held fixed.

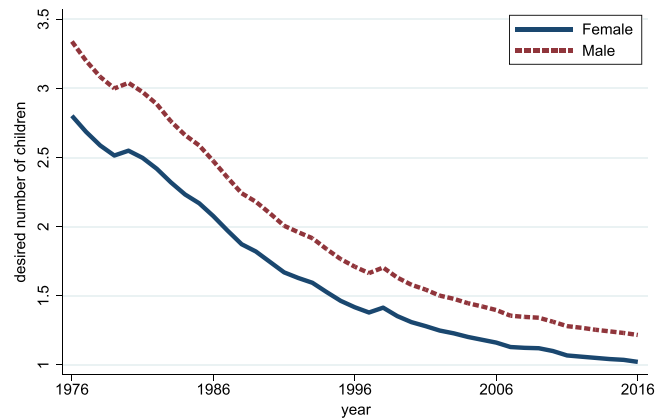


FIGURE 3 | Desired Fertility by Gender along the Baseline Transition. Notes: Model-generated paths of each spouse's desired number of children, n_t^g for $g \in \{\varphi, \delta\}$, in the calibrated baseline. Realized fertility in the bargaining stage is $n_t = \min\{n_t^{\varphi}, n_t^{\delta}\}$, and the woman is the binding party in every period.

equilibrium in the second scenario. A persistent norm therefore amplifies the direct effects of gender-biased technological change by close to 90% in this comparison.

4.3.1 | Which Spouse is the Binding Party?

Equation (4) makes the identity of the binding party an empirical question. Figure 3 plots the model-generated trajectories of n_t^{φ} and n_t^{δ} along the calibrated baseline transition. The woman is uniformly the binding party: $n_t^{\varphi} < n_t^{\delta}$ in every period, by a sizable margin, and the same ranking holds across all of the counterfactual experiments reported in Section 5. The same pattern appears in the cross-country evidence of Doepke and Tertilt (2018), who document that women's desired fertility lies systematically below men's across developing countries, and in the Korean survey evidence reported in Appendix A.2, where female respondents aged 24–34 report a lower ideal number of children than male respondents in every survey year.¹⁵

5 | Counterfactual Analysis

Using the calibrated model, we now examine how technological change, social norms, and policy interventions shape fertility,

childcare, and the social norm itself. To isolate the effects of technological progress operating through the gender wage gap, we hold men's wages w_t^{δ} fixed and let only women's wages w_t^{φ} vary. We study five experiments, with results shown in Figures 4–8. Each figure plots the trajectories of (a) the gender wage gap, (b) fertility, (c) the realized female-to-male childcare ratio, and (d) the prevailing social norm, which is itself a normative female-to-male childcare ratio. The woman is the binding party in the bargaining stage throughout, so the fertility paths shown can be read as the trajectory of n_t^{φ} .

5.1 | Speed of Gender-Biased Technological Change

The first experiment varies the pace of gender-biased technological change, which drives gender wage convergence. Starting from the 1976 steady state with a female-to-male wage ratio of 0.47, we let it rise to 0.63, the level South Korea reached by 2016. In the baseline this convergence takes 40 years; in the fast scenario it takes 15 years. The male wage is held fixed throughout. Figure 4 reports the results.

In the fast scenario, the gender wage gap (panel a) narrows sharply, while the social norm (panel d) stays close to its initial value of 5.68 for several years, because cohort replacement and re-evaluation by older cohorts are both slow. The mismatch between fast-moving wages and a slow-moving norm produces a sharp early fertility drop (panel b): fertility falls to a little over 8% below its initial level by period three, well before the baseline trajectory has begun to move much. The childcare gap and the norm (panels c and d) eventually move further than in the baseline, since rapid wage convergence puts more pressure on young couples to deviate from tradition, and the cumulative effect of these deviations on subsequent norms is larger.

The pattern is non-monotonic in two senses. Within the fast scenario, fertility first overshoots downward and then recovers as the norm catches up. Across the two scenarios, faster technological change brings forward norm adjustment at the cost of a sharper short-run fertility decline. Both features come from the same friction: gender-biased technological change moves quickly, the inherited norm moves slowly, and the wedge between actual childcare and the cost-minimizing allocation determines fertility along the transition.

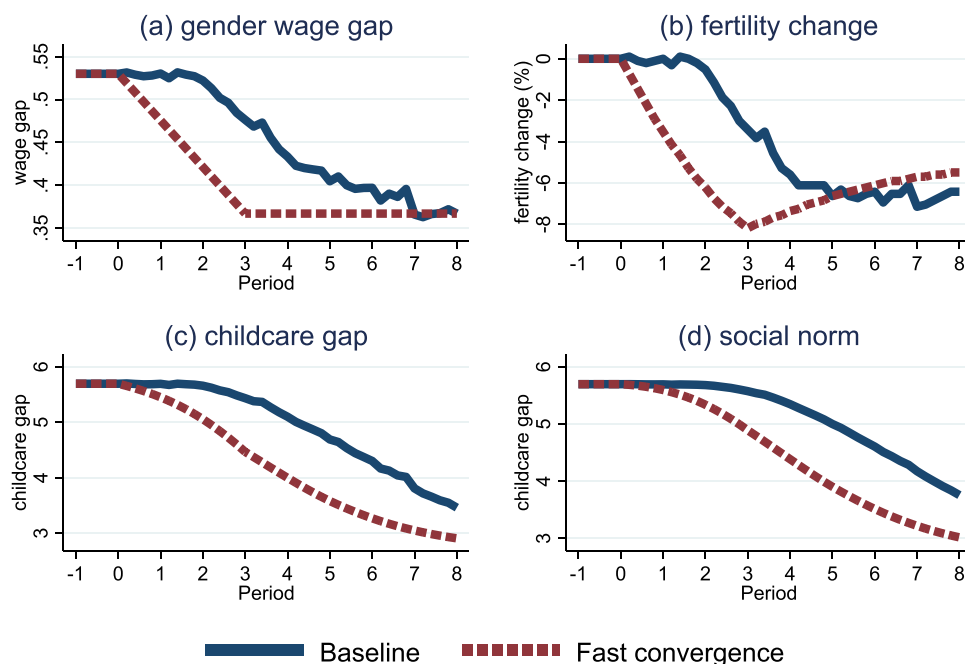


FIGURE 4 | The role of gender-biased technological change. *Notes:* Solid lines represent the baseline, in which the female-to-male wage ratio rises from 0.47 to 0.63 over 40 years. Dashed lines represent the fast-convergence counterfactual, in which the same change occurs over 15 years.

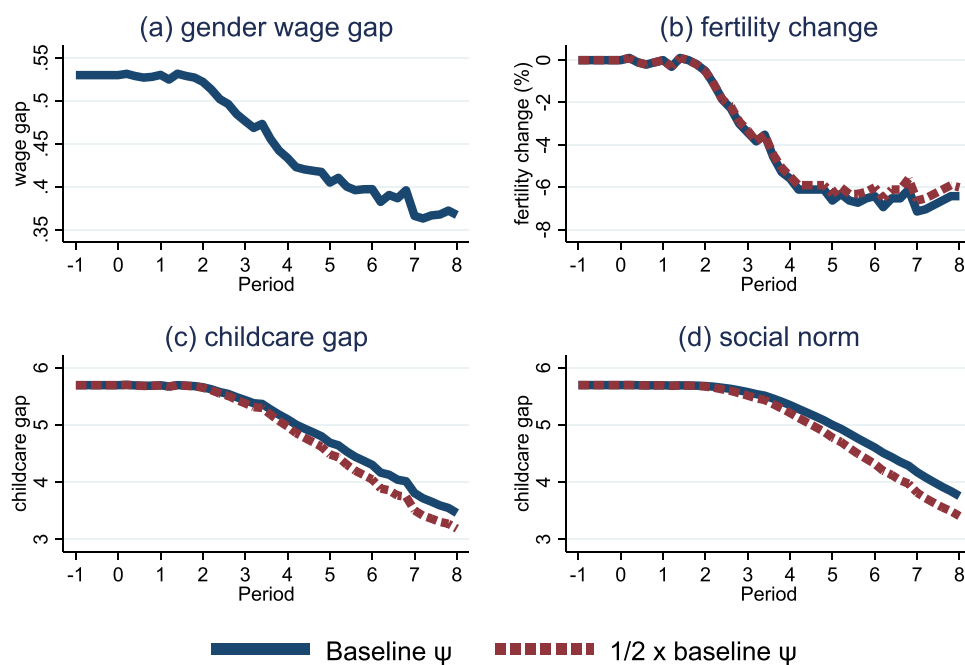


FIGURE 5 | The role of older cohorts' re-evaluation. *Notes:* Solid lines represent the baseline case ($\psi = 0.05$). Dashed lines represent the counterfactual in which the stubbornness parameter is halved to $\psi = 0.025$.

5.2 | Older Cohorts' Re-Evaluation

The next experiment loosens the friction on the older side by reducing how heavily older cohorts anchor their expressed opinions to their own past childcare practice. We hold the pace of

wage convergence at the baseline 40-year transition and keep the social-pressure parameter at its calibrated value $\lambda = 0.0065$, while halving the stubbornness parameter from $\psi = 0.05$ to $\psi = 0.025$. A smaller ψ means older cohorts put less weight on the way they themselves arranged childcare in the past and more weight on

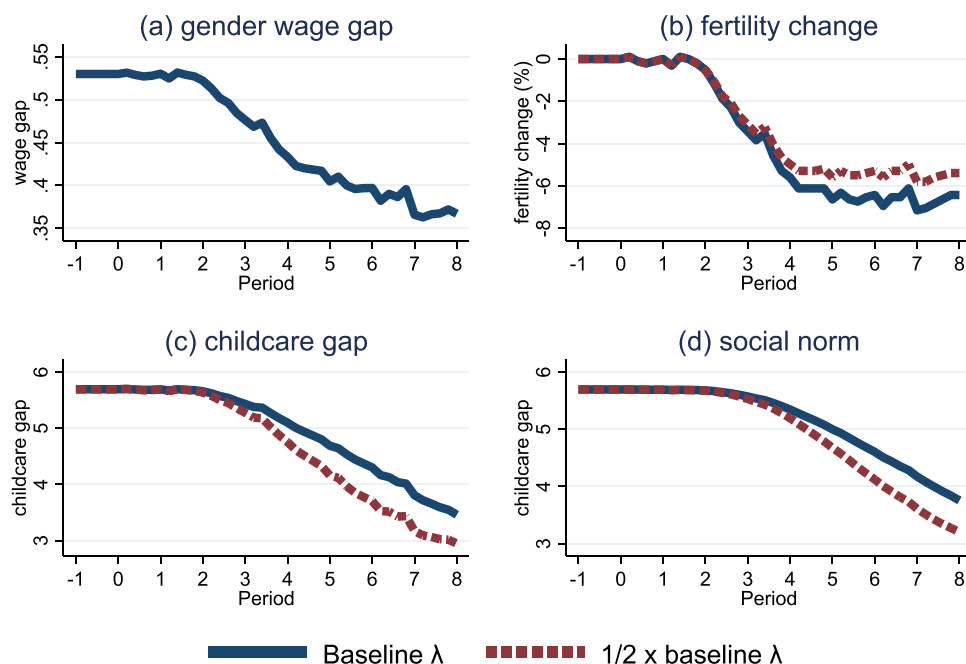


FIGURE 6 | Reduced social pressure on young couples, λ halved. *Notes:* Solid lines represent the baseline case. Dashed lines represent the half- λ counterfactual, in which young couples weight the utility cost of deviating from the prevailing norm half as heavily.

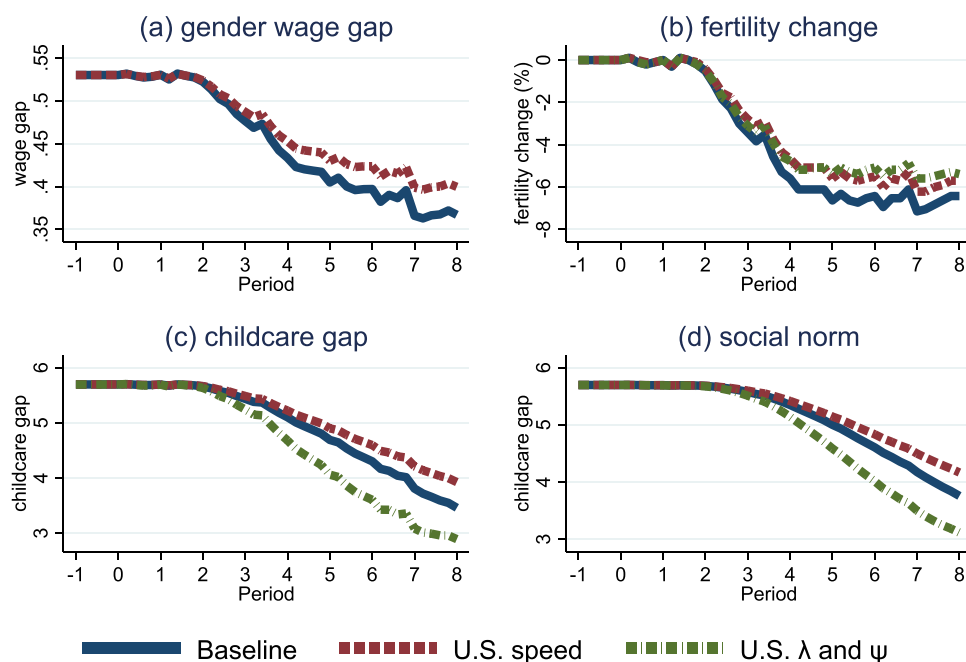


FIGURE 7 | Counterfactual Korean transition with US parameters. *Notes:* Solid lines represent the Korean baseline. Dashed lines use the scaled US-style wage path with the Korean norm parameters. Dash-dotted lines use the US λ and ψ while retaining the Korean baseline wage path.

the opportunity-cost objective faced by current parents, so the opinions they voice respond more readily to the prevailing gender wage gap. Figure 5 reports the results.

In the counterfactual, the social norm (panel d) and the childcare gap (panel c) both adjust somewhat faster than in the baseline

once the wage gap starts to narrow, and end the simulation at lower levels. Young couples therefore inherit a slightly less traditional norm at each date and reallocate a bit more childcare time toward the cost-minimizing point. The fertility decline (panel b) is correspondingly muted, ending at about 6.0% below its initial level, compared with 6.4% in the baseline. The size of

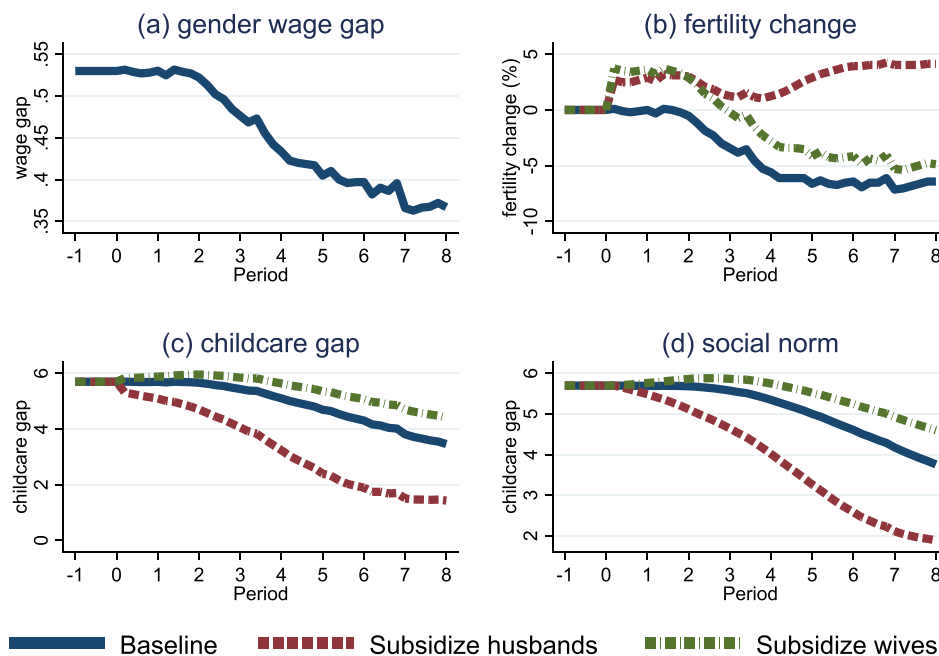


FIGURE 8 | Gender-specific childcare subsidies. *Notes:* Solid lines represent the no-policy baseline. Dashed lines represent counterfactual results.

the effect is modest, as one would expect from a partial loosening rather than the elimination of stubbornness: older cohorts still tilt their expressed opinions toward their own past practice, just less so. The quantitative effect is modest because fertility decisions are driven primarily by the norms facing newly formed households, which lowering ψ affects only indirectly. Even with social pressure on young couples held at its calibrated value, faster re-evaluation by older cohorts moves the prevailing norm and softens the fertility response to gender-biased technological change.

5.3 | Social Pressure on Young Couples

The previous experiment removed the friction from the older side. The natural complement is to keep older cohorts stubborn and instead reduce the weight young couples put on disagreeing with them. We hold ψ at its calibrated value 0.05, so older cohorts continue to express opinions anchored to the childcare allocations they themselves practiced in earlier decades, and we halve the social-pressure parameter from $\lambda = 0.0065$ to $\lambda = 0.00325$. Figure 6 reports the results.

The opinion-formation rule and the stubbornness parameter remain unchanged, so incumbent older cohorts initially voice the same opinions as in the baseline, but young couples now bear a smaller utility cost for choosing a more egalitarian childcare allocation. Over time, cohorts with more egalitarian childcare histories enter the older population, reinforcing the gradual adjustment in the norm. The narrowing gender wage gap (panel a) therefore translates more readily into a more egalitarian childcare allocation, with the childcare gap (panel c) dropping to about 2.94 over 40 years rather than to 3.46. Those choices feed into the population average of past behavior over time, so the prevailing norm itself drifts down (panel d) to about 3.20, against 3.76 in the baseline, even though older cohorts are no less

stubborn than before. Fertility (panel b) ends about 5.4% below its initial level, rather than 6.4% below.

This experiment confirms the logic of the previous one. Social pressure originates in the discrepancy between young couples' choices and the prevailing norm, so it can be loosened either by aligning the norm with current economic conditions, as in Section 5.2, or by reducing the weight young couples place on the discrepancy, as here. The two experiments differ in interpretation. Lowering ψ affects how rapidly older cohorts revise the norm they transmit, whereas lowering λ changes the behavior of newly forming households directly. They yield qualitatively similar fertility implications because both reduce the norm-induced wedge, although through distinct margins.

5.4 | US Parameters

The fourth experiment asks what the Korean transition would look like under two features of the US calibration. We calibrate the model separately to US data over 1965 to 2015 (Appendix A.1 reports the details), and then run two counterfactuals against the Korean baseline. The first scales the cumulative increase in the Korean female-to-male wage ratio over the 40-year horizon by a factor of 0.8, approximating the smaller change observed in the US calibration, while retaining the Korean social-norm parameters. The second isolates the norm-parameter channel: it restores the Korean baseline wage path and replaces the calibrated Korean social-norm parameters with their US counterparts. The US calibration features substantially lower social pressure, $\lambda = 0.003$, and moderately lower stubbornness, $\psi = 0.04$, than the Korean values ($\lambda = 0.0065$, $\psi = 0.05$). Figure 7 reports the results.

The more modest wage-ratio change implied by the US calibration moderates and smooths the fertility decline, in line with the

analysis in Section 5.1, and reduces the cumulative pressure that young couples place on the norm through cohort replacement. The childcare gap and the social norm under the scaled US-style wage path (panels c and d) end the simulation at slightly higher levels than in the Korean baseline, because the smaller wage-ratio change generates less norm adjustment. Thus, a less pronounced technological shift produces a milder fertility decline but leaves the inherited tradition more nearly intact.

The second counterfactual isolates the US norm parameters while retaining the Korean baseline wage path. Lower λ and lower ψ both reduce the effective norm distortion facing young couples: the first lowers the weight on the social term directly, while the second narrows the discrepancy by allowing older cohorts to re-evaluate. Together they yield a milder fertility decline and a much faster adjustment of both the childcare gap and the social norm. The cumulative effect is large enough to move the Korean transition toward the milder dynamics implied by the US calibration.

5.5 | Gender-Specific Childcare Subsidies

A number of advanced economies have introduced childcare subsidies and paid parental leave to promote workplace gender equality and to support fertility (e.g., Duvander and Andersson 2006; Lalive and Zweimüller 2009; Farré and González 2019). Our framework offers a natural setting in which to study the short-run and long-run effects of such policies, since subsidies operate on the same childcare-allocation problem that the social norm does.

We analyze a subsidy that reimburses part of the opportunity cost of childcare. We interpret the subsidy as financed by a nondistortionary lump-sum tax, which is omitted from the household first-order conditions because it does not affect marginal choices. The objective in the childcare-allocation problem (Equation (3)) becomes, for a female-targeted subsidy,

$$\min_{l^q, l^s} (1 - \tau^q) w_t^q l^q + w_t^s l^s + \lambda w_t^s \left(\frac{l^q}{l^s} - \eta_t \right)^2, \quad (14)$$

and, for a male-targeted subsidy,

$$\min_{l^q, l^s} w_t^q l^q + (1 - \tau^s) w_t^s l^s + \lambda w_t^s \left(\frac{l^q}{l^s} - \eta_t \right)^2. \quad (15)$$

We set $\tau^q = 10\%$ and $\tau^s = \tau^q \cdot w^q l^q / (w^s l^s)$, so that the two policies have the same initial mechanical subsidy expenditure in the initial steady state before behavioral responses. In the initial steady state, the female-to-male childcare-time ratio is approximately 5.7 and the female-to-male wage ratio is 0.47, which implies a subsidy rate of approximately 26.8% for husbands. Figure 8 compares both policies to the no-policy baseline.

Both policies raise fertility relative to the baseline (panel b), but through very different channels and with very different long-run consequences. A female-targeted subsidy generates an immediate fertility increase large enough to raise fertility above its initial level in the short run. The same subsidy, however, lowers the relative price of mothers' childcare time and pushes the childcare gap (panel c) above the no-policy baseline, reinforcing traditional roles. The norm (panel d) follows. As the gender wage gap

continues to narrow over the rest of the transition, the inherited allocation becomes increasingly costly, and the early fertility gain gradually erodes. Nevertheless, fertility under a female-targeted subsidy remains above the no-policy path throughout the transition, and the plotted fertility change ends about 1.6 percentage points above the no-policy path.

A male-targeted subsidy works the other way. The short-run fertility increase is smaller, because the inherited norm initially resists a sharp shift toward fathers. Over time, however, the policy narrows the gender gap in childcare time, accelerates the move toward an egalitarian norm, and the male-targeted policy overtakes the female-targeted policy after roughly ten years, ending about 4.1% above the initial fertility level (panel b). Two forces drive the reversal. The effective shadow price of children falls progressively under male subsidies as fathers take on more childcare, while it rises again under female subsidies once the boost from the subsidy has been absorbed. And faster norm equalization lowers the long-run shadow price of children when women's relative wages are higher, as Figure 1 suggests.

The exercise highlights the importance of embedding fertility-policy analysis in a setting with evolving norms. Female-targeted subsidies look more effective in the short run, but male-targeted subsidies eventually dominate: they accelerate the movement toward a more egalitarian norm, whereas female-targeted subsidies slow it.

These predictions are consistent with recent direct evidence. Lee and Lee (2025) study the introduction of fully paid paternal leave at a large South Korean conglomerate and document a sharp rise in male take-up, a breakdown of traditional childcare patterns, and substantial fertility increases, especially among high-earning wives.¹⁶ Kleven et al. (2026) document that Denmark's earmarked paternity leave shifted gender norms and childcare practices, and Albrecht et al. (2024) model endogenous peer pressure in leave take-up. Together, these studies provide direct evidence for several key links in the dynamic mechanism emphasized by our framework.

6 | Conclusion

Fertility is falling across much of the world, with serious economic and demographic consequences. This paper develops a quantitative model of fertility bargaining in which equilibrium outcomes emerge from the interplay between gender-biased technological progress and an endogenous childcare norm shaped by older cohorts. The norm moves through both within-cohort re-evaluation and between-cohort replacement. Cross-country evidence is consistent with the model's predictions: fertility falls more rapidly in economies where women's relative economic standing improves faster, and the decline is amplified in societies whose norms are tighter or more rigid.

Calibrated to South Korea over 1976 to 2016, the model captures the long-run paths of fertility and the gender childcare gap and makes precise the tension between fast wage convergence and slow norm adjustment. The counterfactual analyses highlight the relative speed of wage and norm adjustment as a central margin. When wage convergence outpaces norm adjustment, the

resulting norm lag amplifies and front-loads the fertility decline. Weaker social pressure, faster re-evaluation by older cohorts, or norm-shifting policies such as subsidies for male childcare moderate the decline and can raise fertility later in the transition.

While the model is calibrated to South Korea, the mechanism may also be relevant for developing economies facing the same tension between gender-biased technological progress and entrenched norms, which contributes to the getting-old-before-getting-rich challenge they confront.

Our model also yields a sharp prediction about the childcare time-allocation channel that we have not tested directly. Conditional on having children, an exogenous rise in a woman's relative wage should shift childcare hours toward the father, with a weaker response where norms are tighter or more rigid. Holding other channels fixed, the resulting easing of mothers' childcare burdens should attenuate the fertility decline associated with the wage change. Testing this requires time-use data that record the childcare-hour margin, such as the Multinational Time Use Study, the ATUS, or the KTUS, together with plausibly exogenous variation in relative wages, for instance from gender-specific labor demand or parental-leave reforms. Combining such variation with the cross-country differences in tightness and cross-cohort attitude change used in Section 3 would sharpen the empirical bite of the mechanism we propose. We see this as a promising avenue for future research.

Acknowledgments

We thank Dirk Krueger and Xincheng Qiu for very helpful comments and suggestions. We also thank Alberto Bisin, Chaoran Chen, Dean Corbae, Matthias Doepke, Ying Feng, Paula Gobbi, Claudia Goldin, Jeremy Greenwood, James Heckman, David Lagakos, Xiao Ma, Uta Schönberg, Ananth Seshadri, Aaron Sojourner, Vincent Sterk, Michèle Tertilt, David Weil, Junjian Yi, Basit Zafar, and Xiaodong Zhu. Shixiong Ye and Lingrui Zhou provided excellent research assistance. Anson Zhou gratefully acknowledges the financial support provided by the Hong Kong Research Grants Council through the Early Career Scheme Grant (Project No. 27502925). All errors are our own.

Data Availability Statement

The code and documentation are openly available in openICPSR at <https://doi.org/10.3886/E251430V1>

(Xi and Zhou 2026). Raw data are not redistributed; the replication package identifies each source, explains its access conditions, and documents the construction of the released inputs.

Public sources include the World Inequality Database, World Development Indicators, Penn World Table 10.01, the GGDC 10-Sector Database, the OWID “children-born-per-woman” series (combining HFD observations and UN WPP estimates), and the UN fertility series used in the South Korean and U.S. calibrations. The 2002 and 2012 ISSP Family and Changing Gender Roles modules (GESIS ZA3880 and ZA5900) require registration. Other inputs are the tightness-looseness index of Uz (2015); OECD GDP-per-capita and gender-wage-gap data; childcare-time estimates from Park (2021), Gershuny et al. (2005), and Milkie et al. (2025); and gender-role attitudes from the Korean and U.S. General Social Surveys.

Endnotes

¹See Doepke et al. (2023) for a recent overview.

- ²For the same reason, we abstract from the status externalities studied by Kim et al. (2024) and the fertility norm studied by De Silva and Tenreiro (2020).
- ³Disentangling the joint effects of multiple, possibly complementary norms is a promising direction for future work, and the recent methodological tools in La Ferrara et al. (2026) point toward how this can be done.
- ⁴Cohort sizes vary over time through endogenous fertility choices.
- ⁵An equivalent formulation is to model structural change through time-varying, gender-specific labor demand shifters, with equilibrium wages determined by market clearing. The shifters can be backed out from observed wages and the hours decisions implied by the model. Because our focus is on the household-side response to technological change and on the role of the endogenous norm, we adopt the simpler exogenous-wage approach. We also abstract from the reverse-direction story, in which falling fertility and rising female labor supply themselves drive structural transformation, a possibility discussed by Kuhn et al. (2024) along the lines of the Rybczynski theorem.
- ⁶Doepke and Kindermann (2019) motivate this commitment by pointing to the switching costs and advance planning involved in childcare arrangements (such as securing daycare slots before birth) and to the interaction with persistent decisions such as residential location.
- ⁷By assuming homogeneity within cohorts, we abstract from the horizontal-socialization channel discussed in Bisin and Verdier (2011). Recent work by Albrecht et al. (2024) and Lee and Lee (2025) explores this channel in the context of parental leave taking.
- ⁸Internationally comparable gender wage panels would be ideal, but their coverage is too thin for our sample. Constructing a ten-year change from the OECD gender wage gap, for example, leaves only three economies in the sample. The female labor income share and the inferred relative-wage proxy are available across the full sample.
- ⁹Because this measure compares attitudes across birth cohorts, it may reflect stable differences in cohort fundamentals as well as norm rigidity, which the cross-country exercise cannot separate.
- ¹⁰Egypt is excluded because the WID female-income-share series exhibits a threefold single-year jump between 2009 and 2010 that reflects a revision in the source data rather than an economic change. India and Slovenia are excluded because the two tightness indices of Uz (2015) rank them inconsistently (see the note to Table 1).
- ¹¹The proxy treats relative labor supply as proportional to relative participation, abstracting from differences in hours per worker. This abstraction is less restrictive for the prime-age women whose decisions drive fertility: for this group, the secular rise in total hours of work is driven primarily by the extensive margin of participation rather than by hours per worker (Blundell et al. 2011).
- ¹²We follow Herrendorf et al. (2014) in the GGDC sector assignments. The services employment share is computed as the residual of total employment net of agriculture (ISIC sections A–B) and industry (ISIC sections C–F: mining, manufacturing, utilities, and construction).
- ¹³A measure that would be more closely aligned with the identification of ψ , as used in the Korean calibration below, is the ratio between within-cohort opinion changes and total opinion changes. Constructing it across countries requires the same birth cohorts to be observed in both the 2002 and 2012 ISSP waves, which leaves fewer than half of our economies; we therefore use the cross-cohort difference, available for the full panel.
- ¹⁴The opinion measures are ordinal rather than cardinal, which complicates the mapping to model objects. We address this in three ways. First, we calibrate to the ratio of within-cohort to total change, not the level of opinions. Second, the two attitude variables, together with a third variant we examine, give consistent ratios near 0.8, which limits

the role of any single variable's coding. Third, sensitivity analysis with target ratios between 0.6 and 1.0 leaves the main quantitative results essentially unchanged.

¹⁵ While these survey responses are consistent with the model's prediction, we do not use them as calibration targets. The survey question ("What is the ideal number of children for a family to have?") likely captures respondents' views about social expectations more than their own personal fertility plans, in the spirit of the social-desirability bias documented by Bursztyn et al. (2025). Even when the question asks about the respondent's own ideal fertility, such measures are known to be difficult to interpret relative to the revealed-preference approach more widely adopted in economics. The reported levels also diverge sharply from realized fertility.

¹⁶ Kim and Yum (2025) similarly find, in a life-cycle model without endogenous norms, that leave policies drawing fathers into leave-taking, through incentives for joint leave use, raise fertility more effectively than mandates. The mechanism in our model works through a different channel: the larger long-run effect of male-targeted subsidies arises because they shift the social norm itself.

¹⁷ See Greenwood et al. (2005) for a detailed treatment of the US baby boom. The post-1970s fertility recovery in the United States also reflects rising immigration from high-fertility origins such as Mexico (Jonsson and Rendall 2004).

References

- Albrecht, J., P.-A. Edin, R. Fernández, J. Lee, P. Thoursie, and S. Vroman. 2024. "Parental Leave: Economic Incentives and Cultural Change." NBER Working Paper 32839, National Bureau of Economic Research.
- Baudin, T. 2010. "A Role for Cultural Transmission in Fertility Transitions." *Macroeconomic Dynamics* 14: 454–481.
- Beach, B., and W. W. Hanlon. 2023. "Culture and the Historical Fertility Transition." *The Review of Economic Studies* 90: 1669–1700.
- Bertrand, M., P. Cortes, C. Olivetti, and J. Pan. 2021. "Social Norms, Labour Market Opportunities, and the Marriage Gap Between Skilled and Unskilled Women." *The Review of Economic Studies* 88: 1936–1978.
- Bisin, A., and T. Verdier. 2001. "The Economics of Cultural Transmission and the Dynamics of Preferences." *Journal of Economic Theory* 97: 298–319.
- Bisin, A., and T. Verdier. 2011. "The Economics of Cultural Transmission and Socialization." In *Handbook of Social Economics*, Volume 1, 339–416. Elsevier.
- Blundell, R., A. Bozio, and G. Laroque. 2011. "Labor Supply and the Extensive Margin." *American Economic Review* 101: 482–486.
- Brooks, C., and C. Bolzendahl. 2004. "The Transformation of US Gender Role Attitudes: Cohort Replacement, Social-Structural Change, and Ideological Learning." *Social Science Research* 33: 106–133.
- Bursztyn, L., I. K. Haaland, N. Röver, and C. Roth. 2025. "The Social Desirability Atlas." NBER Working Paper 33920, National Bureau of Economic Research.
- de La Croix, D., and M. Doepke. 2003. "Inequality and Growth: Why Differential Fertility Matters." *American Economic Review* 93: 1091–1113.
- De Silva, T., and S. Tenreiro. 2020. "The Fall in Global Fertility: A Quantitative Model." *American Economic Journal: Macroeconomics* 12: 77–109.
- Doepke, M., A. Hannusch, F. Kindermann, and M. Tertilt. 2023. "The Economics of Fertility: A New Era." In *Handbook of the Economics of the Family*, Volume 1, 151–254. Elsevier.
- Doepke, M., and F. Kindermann. 2019. "Bargaining Over Babies: Theory, Evidence, and Policy Implications." *American Economic Review* 109: 3264–3306.
- Doepke, M., and M. Tertilt. 2018. "Women's Empowerment, the Gender Gap in Desired Fertility, and Fertility Outcomes in Developing Countries." *AEA Papers and Proceedings* 108: 358–362.
- Duvander, A.-Z., and G. Andersson. 2006. "Gender Equality and Fertility in Sweden: A Study on the Impact of the Father's Uptake of Parental Leave on Continued Childbearing." *Marriage & Family Review* 39: 121–142.
- Farré, L., and L. González. 2019. "Does Paternity Leave Reduce Fertility?" *Journal of Public Economics* 172: 52–66.
- Fernández, R. 2013. "Cultural Change as Learning: The Evolution of Female Labor Force Participation Over a Century." *American Economic Review* 103: 472–500.
- Fernández, R., and A. Fogli. 2009. "Culture: An Empirical Investigation of Beliefs, Work, and Fertility." *American Economic Journal: Macroeconomics* 1: 146–177.
- Fernández, R., A. Fogli, and C. Olivetti. 2004. "Mothers and Sons: Preference Formation and Female Labor Force Dynamics." *The Quarterly Journal of Economics* 119: 1249–1299.
- Feyrer, J., B. Sacerdote, and A. D. Stern. 2008. "Will the Stork Return to Europe and Japan? Understanding Fertility Within Developed Nations." *Journal of Economic Perspectives* 22: 3–22.
- Fogli, A., and L. Veldkamp. 2011. "Nature or Nurture? Learning and the Geography of Female Labor Force Participation." *Econometrica* 79: 1103–1138.
- Gershuny, J., M. Egerton, and K. Fisher. 2005. "American Time Use 1965–2003: The Construction of a Historical Comparative File, and Consideration of Its Usefulness in the Construction of Extended National Accounts for the USA." ISER Working Paper 2005–28, Institute for Social and Economic Research.
- Giuliano, P., and N. Nunn. 2021. "Understanding Cultural Persistence and Change." *The Review of Economic Studies* 88: 1541–1581.
- Goldin, C. 2025. "Babies and the Macroeconomy." *Economica* 92: 675–700.
- Greenwood, J., A. Seshadri, and G. Vandenbroucke. 2005. "The Baby Boom and Baby Bust." *American Economic Review* 95: 183–207.
- Herrendorf, B., R. Rogerson, and Á. Valentinyi. 2014. "Chapter 6 - Growth and Structural Transformation." In *Handbook of Economic Growth*, edited by P. Aghion and S. N. Durlauf, Volume 2, 855–941. Elsevier.
- Jones, C. I. 2022. "The End of Economic Growth? Unintended Consequences of a Declining Population." *American Economic Review* 112: 3489–3527.
- Jonsson, S. H., and M. S. Rendall. 2004. "The Fertility Contribution of Mexican Immigration to the United States." *Demography* 41: 129–150.
- Kim, D., and M. Yum. 2025. "Parental Leave Policies, Fertility, and Labor Supply." CEPR Discussion Paper 19951, Centre for Economic Policy Research.
- Kim, S., M. Tertilt, and M. Yum. 2024. "Status Externalities in Education and Low Birth Rates in Korea." *American Economic Review* 114: 1576–1611.
- Kleven, H., C. Landais, A. S. S. Lassen, P. Rosenbaum, H. Steingrimsdottir, and J. E. Sogaard. 2026. "Expanding Paternity Leave: Effects on Beliefs, Norms, and Gender Gaps." NBER Working Paper 34862, National Bureau of Economic Research.
- Knowles, J. A. 2013. "Why Are Married Men Working So Much? An Aggregate Analysis of Intra-Household Bargaining and Labour Supply." *Review of Economic Studies* 80: 1055–1085.
- Kuhn, M., I. Manovskii, and X. Qiu. 2024. "Female Employment and Structural Transformation." IZA Discussion Paper 17118, IZA Institute of Labor Economics.
- La Ferrara, E., C. Lim, and D. Viviano. 2026. "Estimating Social Norm Complementarities." Preprint, arXiv, May 14. <https://doi.org/10.48550/arXiv.2605.15405>.

- Lalive, R., and J. Zweimüller. 2009. "How Does Parental Leave Affect Fertility and Return to Work? Evidence From Two Natural Experiments." *The Quarterly Journal of Economics* 124: 1363–1402.
- Lee, T. S., and J. Lee. 2025. "Mandated Paternity Leave and Fertility: Evidence From South Korea." Working paper, University of Michigan.
- Lundberg, S., and R. A. Pollak. 1993. "Separate Spheres Bargaining and the Marriage Market." *Journal of Political Economy* 101: 988–1010.
- Milkie, M. A., L. C. Sayer, K. Nomaguchi, and H. X. Yan. 2025. "Who's Doing the Housework and Childcare in America Now? Differential Convergence in Twenty-First-Century Gender Gaps in Home Tasks." *Socius* 11: 23780231251314667.
- Myong, S., J. Park, and J. Yi. 2021. "Social Norms and Fertility." *Journal of the European Economic Association* 19: 2429–2466.
- Ngai, L. R., and B. Petrongolo. 2017. "Gender Gaps and the Rise of the Service Economy." *American Economic Journal: Macroeconomics* 9: 1–44.
- Park, H. 2021. "Diverging Gaps in Childcare Time by Parental Education in South Korea." *Demographic Research* 44: 143–156.
- Spolaore, E., and R. Wacziarg. 2022. "Fertility and Modernity." *The Economic Journal* 132: 796–833.
- Timmer, M. P., G. J. de Vries, and K. de Vries. 2015. "Patterns of Structural Change in Developing Countries." In *Routledge Handbook of Industry and Development*, edited by J. Weiss and M. Tribe, 65–83. Routledge.
- Uz, I. 2015. "The Index of Cultural Tightness and Looseness Among 68 Countries." *Journal of Cross-Cultural Psychology* 46: 319–335.
- Xi, X., and A. Zhou. 2026. "Replication Package for: The Dynamics of Gender Norms and Fertility Decline." *Inter-university Consortium for Political and Social Research* [distributor]. <https://doi.org/10.3886/E251430V1>.
- Yum, M. 2023. "Parental Time Investment and Intergenerational Mobility." *International Economic Review* 64: 187–223.

Appendix

A.1 | Calibration for the United States

This appendix calibrates the model to match the US transition path of fertility and the gender childcare gap from 1965 to 2015. The identification strategy is the same as in Section 4.2.

Fertility data come from the United Nations. Gender-specific childcare time over 1965–1995 is taken from Gershuny et al. (2005), who use the American Heritage Time Use Study (AHTUS). For the post-2003 period, it is taken from Milkie et al. (2025), who use the American Time Use Survey (ATUS). The share of within-cohort changes in the evolution of expressed gender-role attitudes is computed from the General Social Survey (GSS), using the same procedure as in Section 4.2. We apply that procedure to the variable *fefam*: “It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family.” The within-cohort share is around 0.3 over the 50-year sample, in line with the decomposition in Brooks and Bolzendahl (2004).

Figure A.1 plots GDP per capita and the gender wage gap, the two inputs into the calibration, in panels (a) and (b), and shows the data and model-generated paths of fertility and the childcare gap in panels (c) and (d). The model does not capture the post-baby-boom decline and recovery of fertility, but it tracks the overall decline in fertility and the path of the childcare gap over the sample period.¹⁷

Table A.1 reports the calibrated parameters. With the exception of γ , which sets the fertility level, β and ρ are very similar to their South Korean counterparts in Table 3. The norm parameters are quite different. The US value of λ is roughly one-half below the South Korean value, indicating substantially weaker social pressure, and the US value of ψ is about 20% below the South Korean value, indicating moderately less stubbornness and more re-evaluation by older cohorts.

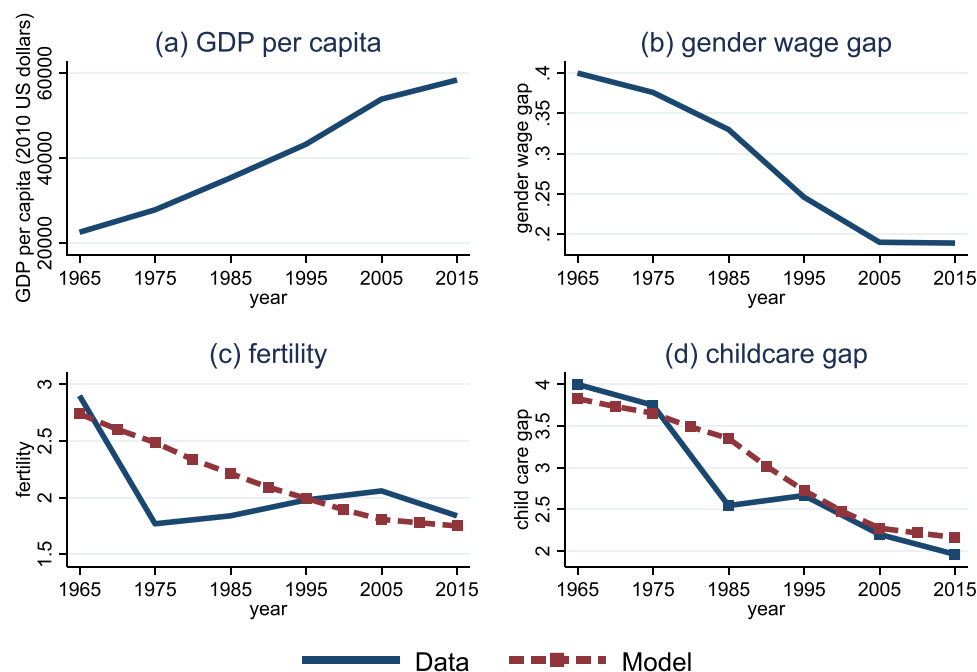


FIGURE A.1 | Calibration and model fit - USA

TABLE A.1 | Calibrated parameters - USA

Parameter		Value	Data moment	Source	Model fit
γ	Fertility weight	3.2	$n_{1965} = 2.90$	United Nations	2.74
σ	Childcare substitutability	2.5		Knowles (2013) and Yum (2023)	
β	Childcare productivity	0.51	$\eta_{1965} = 4.0$	Gershuny et al. (2005)	3.83
ρ	Fertility curvature	2.4	$n_{1965} \sim n_{2015}$	United Nations	See Figure A.1
ψ	Stubbornness	0.04	Within-cohort effects	GSS	32%
λ	Social pressure	0.003	$\eta_{1965} \sim \eta_{2015}$	Gershuny et al. (2005)	See Figure A.1
α	Economies of scale	1.2		Doepke and Kindermann (2019)	
ϕ	Time costs per child	0.15		de La Croix and Doepke (2003)	
J	Total number of periods	16	80 years	World Health Organization	
J_f	The fertile period	6	ages 25–30	Statista	

TABLE A.2 | Ideal number of children

Survey year	Male respondents	Female respondents
2006	2.41	2.38
2008	2.52	2.45
2012	2.64	2.41

Note: This table reports the average responses to the question “What is the ideal number of children for a family to have?” (IDLCHDN) in the Korean General Social Survey (KGSS), broken down by survey year and respondent gender. The sample is restricted to respondents aged 24–34, a ten-year range centered on the median age at first birth.

A.2 | Ideal Number of Children by Gender

This appendix reports the average responses to the question “What is the ideal number of children for a family to have?” (IDLCHDN) in the Korean General Social Survey (KGSS), broken down by survey year and respondent gender. The sample is restricted to respondents aged 24–34, a ten-year range centered on the median age at first birth. Female respondents report a lower ideal number of children than male respondents in every survey year. The pattern lines up with the model’s prediction that women are the binding party in the bargaining stage, and with the cross-country evidence in Doepke and Tertilt (2018) .