Jaichung Lee
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September 15, 2026

Professors Emily Breza, Arun Chandrasekhar, and Davide Viviano
National Bureau of Economic Research

Dear Professors Breza, Chandrasekhar, and Viviano,

I am writing to apply to the Workshop on Development Economics and Networks for Early-Career Researchers. I am a fifth-year PhD candidate in Economics at the University of Oregon and will be on the 2026–2027 academic job market. My research lies at the intersection of family economics, cultural evolution, and economic development, with a particular focus on how family and fertility preferences form and evolve across generations.

I am submitting my working paper, "[Paper Title]," for consideration for presentation at the workshop. The paper studies the joint evolution of fertility preferences and intergenerational mobility, focusing on the feedback between fertility choices, economic mobility, and the transmission of family norms. My broader dissertation research uses these mechanisms to study fertility decline and changing family norms, with South Korea as a central motivating setting.

Enclosed in the application packet are my curriculum vitae, including my current and completed PhD coursework, my statement of research interests and motivation for attending the workshop, and the working paper.

If I am shortlisted, Professor Shankha Chakraborty (shankhac@uoregon.edu) can provide a recommendation. Professor Jiabin Wu (jwu5@uoregon.edu) is also closely familiar with this project.

Thank you very much for considering my application. I would be grateful for the opportunity to participate in the workshop and discuss my research with the organizers and other participants.

Sincerely,

Jaichung Lee

Statement of Motivation and Research Interests

Jaichung Lee

My research studies how family preferences and norms co-evolve with economic conditions and shape fertility behavior. I build tractable models in which fertility preferences are shaped by intergenerational transmission, social learning, and economic experience rather than treated as fixed primitives.

This agenda is motivated by a central puzzle of contemporary low fertility. Countries experiencing rapid fertility decline, including South Korea, have devoted substantial resources to cash transfers, subsidized loans, and childcare support, yet fertility has remained persistently low. My work builds on the Beckerian approach to fertility together with Bisin and Verdier's framework of endogenous cultural transmission, asking how the preferences underlying fertility choices are themselves formed and transformed by the economic and social environment. This approach also connects to recent research emphasizing the role of social norms and the compatibility of work and family as central to understanding today's low-fertility economies.

My dissertation approaches this question from two complementary directions. One project studies how fertility preferences evolve through intergenerational and social transmission and feed back into fertility choices, economic mobility, and political outcomes. The other uses a quantitative lifecycle model of Korean women to distinguish changes in preferences from the institutional frictions that make career and family difficult to combine. Together, these projects have led me to a broader question about the social environment behind preference formation, including whose behavior individuals observe, whom they compare themselves with, and how these interactions shape the evolution of family norms.

I would therefore value the opportunity to participate in the Workshop on Development Economics and Networks and receive feedback from researchers who study how behavior and information spread through social ties. In my current model, the oblique transmission channel, a mechanism of learning from people outside the family, is represented by random matching with the population. The model also takes the resources provided by one's parents as the relevant benchmark when individuals evaluate the material conditions they can provide for their own children. Both are deliberately simplified representations of underlying social processes. Feedback on how to give these mechanisms a richer social structure and discipline them with empirical evidence would directly shape the next stage of my work. The workshop would also help me connect the theoretical predictions of the model to observable patterns of mobility, social interaction, and fertility behavior.

Although my primary tools are theoretical, I view empirical evidence as essential for disciplining plausible economic mechanisms. I therefore engage closely with empirical work on fertility, social norms, and cultural change. I would particularly value learning from researchers who identify social interactions and diffusion processes in the data, while contributing a complementary theoretical perspective on how these interactions can feed back into preferences and generate longer-run demographic and economic dynamics.

JAICHUNG LEE

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EDUCATION

University of Oregon — Eugene, Oregon
Ph.D in Economics — *Expected June 2027*

Dissertation Committee: Jiabin Wu (Co-Chair), Shankha Chakraborty (Co-Chair), Alfredo Burlando, and Michael Aguilera

Seoul National University — Seoul, South Korea
M.A. in Economics — *Mar 2019 - Aug 2021*

Advisor: Bonggeun Kim

Ewha Womans University — Seoul, South Korea
B.A. in Economics, Philosophy, and Scranton Honors Program — *Mar 2012 - Feb 2019*

FIELD OF INTEREST

Development Economics, Family Economics, Cultural Economics

HONORS AND AWARDS

Dale Underwood Outstanding Graduate Student Scholarship, University of Oregon	2022
Lecture & Research Scholarship, Seoul National University	2019-2020
Asan Young Fellow, Asan Institute for Policy Studies	2016-2017
International Foundation for Ewha Womans University Inc	2016
Dean's list (3 semesters, Honors scholarships), Ewha Womans University	2012-2015

RESEARCH

Explaining the Fertility Crunch: The Roles of Intergenerational Income Mobility and Shifting Preferences (work in progress)

- Overlapping-generations model in which fertiltiy preferences are culturally transmitted and then revisesd in response to intergenerational income mobility.
- Higher intergenerational income mobility leads to a lower long-run fertility rate as mobility-induced preference revisions curb the spread of high-fertility preferences.
- Shows that shutting down mobility-induced preference revisions raises steady-state fertility and eliminates cultural heterogeneity in the long run.

The Self-Restraining Decline: Pension Politics, Observable Costs, and the Cultural Transmission of Low Fertility with Jiabin Wu (work in progress)

- OLG model with heterogeneous types where agents choose fertility and vote over future pay-as-you-go pension taxes, taking into account how policy affects the size and composition of future cohorts.
- Characterizes politico-economic equilibria and steady states, highlighting demographic externalities and the trade-off between current pensions and future population size.

PRESENTATIONS

Northwest Development Workshop, Oregon State University, Portland, OR — May 2026

University of Oregon, Development Group and Graduate Student Group — 2024, 2025, 2026

TEACHING & EXPERIENCE

Graduate Student Instructor — University of Oregon

EC370 Money and Banking — *2024 Fall & 2025 Fall*

- Lectured with new course material, modernizing course offering to increase student engagement.
- Taught students fundamentals of banking, monetary policy, and advanced topics such as shadow banking, financial crisis, QE.

EC327 Introduction to Game Theory — *2026 Fall*

- Redesigned assignments and assessments to emphasize the critical use of LLMs, focusing on critically using LLM understanding how they get to an answer and not on the final answer alone.
- Introduced in-class quizzes to assess students' independent understanding of the material without AI assistance.

Research Intern — East-West Center Washington D.C.

- Authored policy-oriented articles for the Asia Matters for America Initiative translating detailed trade and investment data into accessible narratives (articles available at `asiamattersforamerica.org`)
- Collected, cleaned, and analyzed large county-level and macroeconomic datasets for the *ASEAN Matters for America* publication, constructing indicators on trade and economic linkages.

COMPLETED PHD COURSES

Field: Development Economics, Culture and Evolution, Labor and Social Insurance, Micro Econometrics, Computational Economics, Urban Economics, International Economics, Macro Field Economics, Empirical Macroeconomics
Core: Microeconomic Theory I–III, Macroeconomic Theory I–III, Econometrics I–III

TECHNICAL SKILLS

Programming & Data: Python, Julia, R, MATLAB, Stata
Tools: Jupyter, Git/GitHub, LaTeX

Explaining the Fertility Crunch: The Roles of Intergenerational Income Mobility and Shifting Preferences

Jaichung Lee
Department of Economics, University of Oregon
jaichung@uoregon.edu

September 2026

1 Introduction

Childbearing represents a deeply personal decision that nevertheless commands considerable social and economic significance. The relationship between income and family size has been extensively examined in the literature since Malthus (1798) and formalized by Becker (1960), while scholars have closely investigated how the expansion of women's rights and their increased labor-force participation influence fertility choices. In macroeconomic research, population dynamics have long been recognized as closely linked to economic growth. Yet, as in much of modern economics, studies have typically assumed homogeneous preferences over childbearing and focused on how individuals' fertility decisions vary with socioeconomic conditions.

Given the substantial costs associated with childbearing, it is indeed plausible that individuals determine their fertility decisions in accordance with their prevailing economic circumstances. However, a growing body of empirical evidence indicates that fertility preferences are far from homogeneous. For instance, rich data sets such as World Fertility Survey have made preferences quantifiable. Respondents' preference varies from zero to as many as ten children. Independent of individual economic circumstances, culturally distinct groups within the same society may exhibit systematically different attitudes toward childbearing. Hakim (2003) has suggested a theory that emphasizes individual lifestyle preferences as primary determinants of fertility decision. Thanks to modern contraception, declining child mortality, and the broader availability of safe abortion, individuals now possess far greater control over whether—and when—they realize their desired family size. As these technological and medical advances expand personal autonomy, fertility preferences become an ever more critical lens through which to understand contemporary fertility outcomes.

This study proposes a framework that incorporates the economic optimization aspect of fertility choice and heterogeneity in fertility preferences, and it further extends this framework into a dynamic model that preference formation is partially driven by intergenerational income shocks. Unlike traditional fertility models that assume static or exogenously given preferences, this framework endogenizes preference adjustments based on upward or downward income mobility relative to one's parents. This mechanism captures how agents revise their fertility ideals in response to changing economic expectations, adding a dynamic and socioeconomically grounded dimension to the modeling of family size decisions. To date, no existing theoretical work develops a dynamic model in which fertility is endogenously determined by culturally transmitted preferences that themselves evolve in response to economic shocks.

Preference formation in this paper follows a two-stage mechanism. The first stage–cultural transmission–builds on the seminal work of Cavalli-Sforza and Feldman (1981) and Boyd and

Richerson (1985) which operates in two channels. The vertical channel transfers preferences directly from parents to children. The oblique channel is activated if vertical socialization fails; in that case, the child instead adopts the preference of a randomly encountered adult, with probabilities proportional to the current distribution of preferences in the adult population.

After this initial stage, the agent reconsiders how many children she finds ideal once she can see how her own economic prospects compare with the household she grew up in. The home she was raised in is the economic environment she observed earliest and longest, and the standard of living it provided becomes her yardstick for what raising children should look like. Because fertility is decided early in adult life and cannot be undone, what guides the decision is not income already in hand but what she expects to be able to provide. Expecting to fall short of the standard she grew up with makes a large family hard to keep hoping for, and the number she considers ideal settles lower, while expecting to do better lets it settle higher. This adjustment is not a deliberate calculation. The agent does not strategically reset her ideal to manage how she feels. The ideal therefore moves with her economic standing relative to her upbringing, not with her income in absolute terms. And because the comparison is to her parents rather than to her own budget, two people with the same income but different parents revise in different directions, which an effect working through the budget alone cannot produce. This is the relative income idea of Easterlin (1987), built explicitly into how preferences form.

Introducing intergenerational income mobility shocks produces two central results. First, higher mobility lowers long-run fertility because children of high-fertility parents are not guaranteed to inherit their ideals, and many instead adjust downward in line with income comparison to their parents'. Second, cultural heterogeneity in fertility preferences is preserved, even though high preference groups enjoy an evolutionary advantage. Both results stem from the same mechanism that mobility shocks offset the dominance of high preference groups by continuously reshuffling preferences across generations. Combined with the weakening influence of the family in modern societies, this mechanism helps explain why contemporary societies not only sustain preference heterogeneity but also exhibit lower fertility rates than traditional societies.

The remainder of the paper is organized as follows. Section 2 reviews the related literature and presents key stylized facts. Section 3 outlines the model, including the household optimization problem, preference formation, and the role of income mobility. Section 4 analyzes the theoretical dynamics of population and preference evolution under alternative parameterizations, contrasting modern and traditional societies. Section 5 provides counterfactual simulations to highlight the role of intergenerational mobility shocks. Section 6 discusses the findings and concludes.

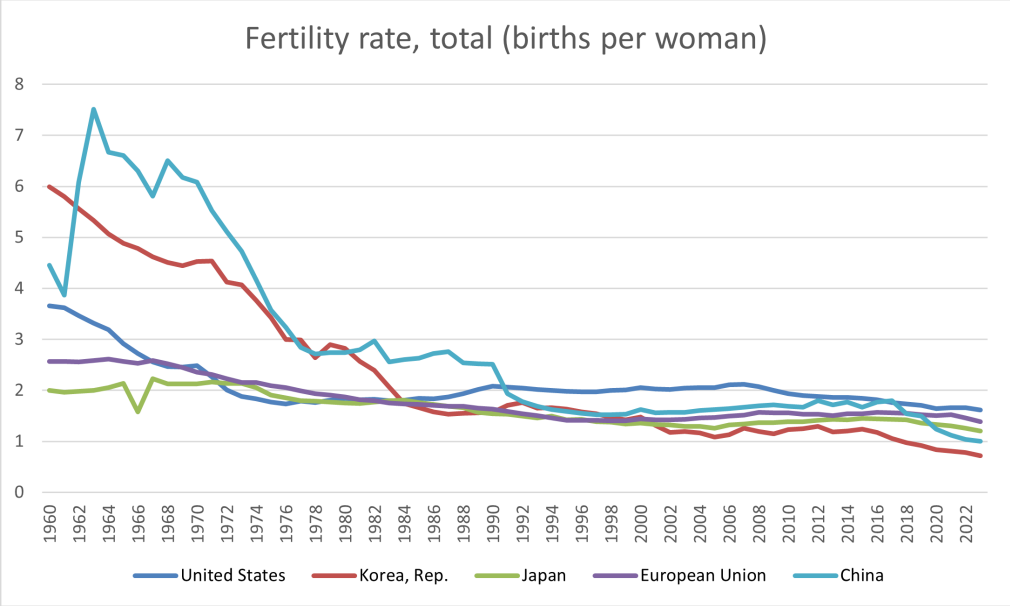


Figure 1: Total Fertility Rate Trend in Selected Countries

Notes: Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.
Source: World Bank, World Development Indicators (SP.DYN.TFRT.IN), retrieved on Aug 24th, 2025 from https://data.worldbank.org/indicator/SP.DYN.TFRT.IN

2 Related Literature and Stylized Facts

The economic analysis of fertility spans both dynamic and cross-sectional perspectives. Extensive evidence documents the demographic transition: since the late 1960s fertility has declined steadily in most countries, with some now trapped in an "ultra-low fertility" regime. Figure 1 plots total fertility rates (TFRs) for the United States, South Korea, Japan, the European Union, and China from 1960 onward. China and South Korea exhibit the steepest contractions, driven in part by aggressive family-planning programs, famously known as One Child Policy in China, whereas the European Union, Japan, and the United States show more gradual declines. Some of a leading explanation in this declining trend in fertility are the increase in women's relative wages (Galor and Weil, 1993), and changes in the costs of and returns to child quality (Goldin and Katz, 2000). More recently, Kearney and Levine (2025) claim that very low fertility in high-income countries primarily reflects evolving preferences rather than economic constraints or institutional shortcomings.

As fertility decline first emerged in the early-industrialized countries, the demographic transition came to be viewed as a by-product of successful economic growth and structural transformation. The negative association between living standards and fertility appears

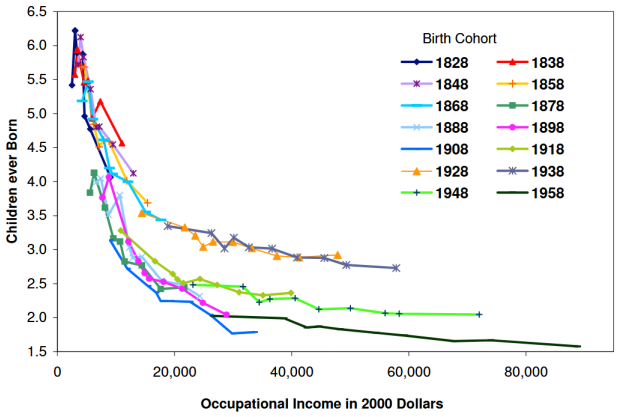


Figure 2: Occupational Income in Year 2000 U.S. Dollars (Price-Adjusted)

Note: Figure from Jones and Tertilt (2008), Figure 4. Income is occupational income, which is constructed based on husbands' occupations and converted into year 2000 U.S. Dollars.

consistently both across countries at a given point in time and within countries. Figure 2 illustrates this pattern for the United States. For every birth cohort from 1828 to 1958, higher household occupational income is associated with fewer children ever born, confirming a robust inverse income-fertility gradient.

Becker (1960) identified the quality-quantity trade-off as the principal mechanism behind the negative income-fertility gradient observed in industrialized societies. Treating children as durable goods, he posited that parents both "purchase" and invest. Parents derive utility from the number of children they have ("quantity") and from the resources devoted to each child ("quality"). Under the assumption of exogenous preferences, Becker and Lewis (1973) formalized this insight, a higher income might raise the cost of child quality—private schooling, individual bedrooms, and other costly investments—so that if the income elasticity of demand for quality is sufficiently high, richer parents optimally choose fewer children. Education, the principal vehicle for human-capital accumulation, illustrates this mechanism. Dynamic extensions, such as Barro and Becker (1989) and the overlapping-generations model of De La Croix and Doepke (2003), embed this quality–quantity framework in intertemporal settings to study long-run demographic and growth outcomes.

Homogeneous preferences are assumed in most economic models with fertility choices, yet a growing body of evidence indicates otherwise. Hakim's (2003) Preference Theory argues that women differ systematically in lifestyle orientation—home-centered versus work-centered—and that these orientations predict both stated fertility ideals and realized fertility. Figure 3 corroborates this claim using a nationally representative survey of married Korean women aged 15-49. Respondents assessed the "optimal" number of children under eight hypothetical

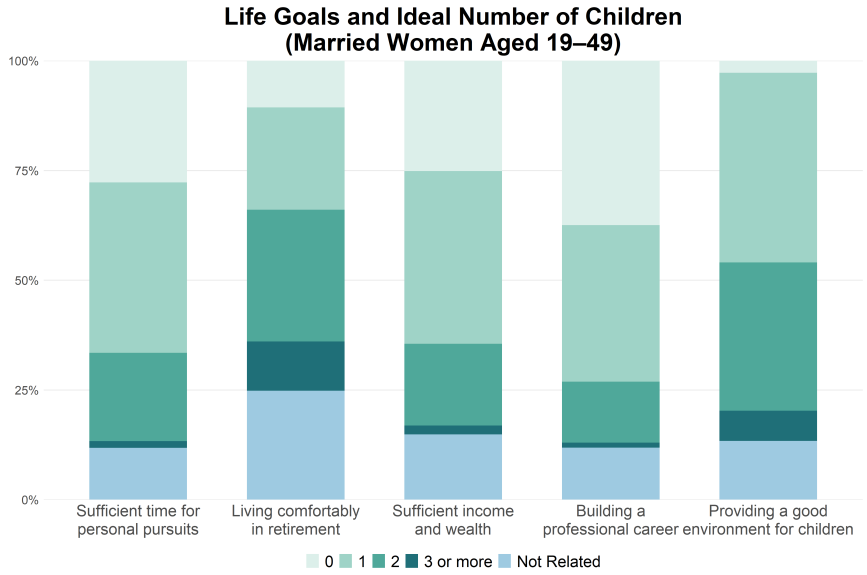


Figure 3: Perception of the Optimal Number of Children by Life Goal

Source: Family and Fertility Survey(2018), Statistics Korea

life goals. As the life goal becomes more self- or career-oriented (e.g., "building a professional career," "allocating sufficient time for personal pursuits"), responses shift toward having no children, underscoring the tight link between lifestyle orientation and fertility ideals. Figure 4 reports the distribution of desired family size among married Korean women aged 19-49. The mean fell from 2.2 in 1991 to 1.98 in 2021, yet considerable dispersion persists. Given Korea's status as one of the world's most ethnically homogeneous societies, even greater variation would be expected in countries with broader cultural diversity. Preferences are also flexible. Early demographic studies (Ryder 1973; Lee 1980) describe fertility ideals as a "moving target," and more recent work shows that preferences adjust to economic conditions and uncertainty (Trinitapoli and Yeatman, 2017).

This study builds on the cultural-transmission framework first mathematically formalized in evolutionary biology by Cavalli-Sforza and Feldman (1981) and, in anthropology by Boyd and Richerson (1985). Both describe a process of intergenerational cultural transmission within a continuum of agents whose cultural transmissions are shaped by direct vertical socialization from parents and oblique socialization in society at large. The population dynamics are highly simplified, with asexual reproduction and each parent having only one child. Bisin and Verdier (2001) introduced the first economic model of cultural transmission, which treats vertical transmission as a rational choice made by the parent. They also enrich their model by adding fertility choice to the parent's decision problem. Gobbi (2013) demonstrates that heterogeneity in preferences and its transmission can explain why voluntary

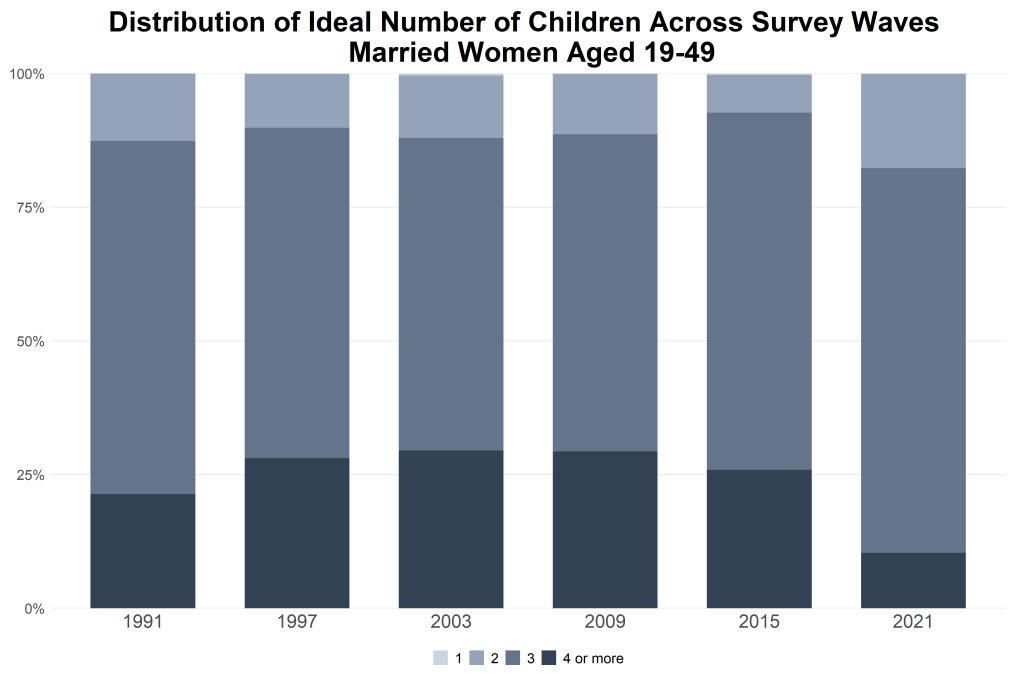


Figure 4: Distribution of Ideal Number of Children in South Korea

Source: Family and Fertility Survey(2015, 2018, 2021), Statistics Korea

childlessness and average fertility are not always negatively correlated. Economy-wide shocks that lower the demand for children—such as a narrowing gender pay gap—reduce fertility more among low-taste for children families than among high-taste families, thereby lowering proportion of childlessness even as mean fertility falls. Empirical evidence underscores the importance of both vertical and oblique transmissions in fertility preference: fertility behavior is positively correlated across generations (Murphy and Knudsen, 2002), mothers' attitudes shape those of their children (Farré and Vella, 2013), and exposure to high-achieving peers influences educational choices (Porter and Serra, 2020). Given the close association between women's life goals and fertility norms documented in Figure 3, these findings suggest that fertility preferences themselves are routinely transmitted across and within generations. Alesina et al. (2013) show how historical shocks to gender norms, such as traditional plough use, still affect contemporary gender attitudes and hence fertility ideals.

A long line of work suggests that the standard of living a person is used to serves as a reference point, so that well-being is judged by how far current circumstances sit above or below that reference rather than by their absolute level (Stigler and Becker, 1977; Campbell and Cochrane, 1999). A parallel idea holds that people care about the future before it arrives, so that the hopes they carry tend to ease the present discomfort of an expected shortfall and to expand with an expected gain Loewenstein (1987); Brunnermeier and Parker (2005).

Recent evidence gives this empirical force. Experiments that shift how people see their future opportunities move their stated goals and later investment (Bernard et al., 2026), and long panels show family size goals revised over the life course as the conditions to realize them succeed or fail (Liefbroer, 2009). Applied to childbearing, this implies that the family sizes people report as ideal already reflect their economic standing relative to the home they were raised in.

Traditional economic research views fertility as a driver of intergenerational mobility. In a perspective of resource transfers, larger family size dilute parental investments, thereby limiting upward mobility (Altonji et al., 1997). This perspective has motivated family-planning campaigns in many developing countries (Chu and Koo, 1990). This paper reverses the direction of pressure by asking how mobility itself reshapes fertility preferences. Easterlin (1987), although not explicitly focused on intergenerational mobility per se, have suggested similar mechanism. Young adults evaluate their job prospects, such as employment opportunities, relative to those their parents experienced, and that this comparison grounded in childhood experiences shapes their fertility decisions. Cohorts born during high-fertility periods encounter more intense labor-market competition, and anticipating limited opportunities, they opt for smaller families which in turn produces smaller cohorts. Cohort size is therefore endogenous because fertility affects economic conditions, and those conditions subsequently influence fertility behavior. A recent work shows that children's career aspirations track parental occupations (Oliveira et al., 2020). Downward mobility has been found to influence political attitudes (Mitrea et al., 2021), suggesting that mobility shocks plausibly affect broader preference formation as well. The current paper formalizes this intuition by embedding an income-mobility shock into a cultural-transmission model of fertility.

3 Model

3.1 The Economy

The economy is modeled as a two-period overlapping generation (OLG) framework with L_t adult agents present in each period. Family is assumed to be monoparental. Upon reaching adulthood, each individual of type i makes an optimal decision over consumption (C_t^i) and the number of children (N_t^i). The size of a family is a discrete choice from the set $S = \{0, 0.5, 1, 1.5\}$. Given the assumption of a monoparental family, a choice of 0.5 children in this context corresponds to having one child in a biparental setting. Individuals are categorized by their preferred family size, which defines their type. The number of children matters to each agent in two ways. First, it is costly so it competes with consumption over

limited resource, and second, agents derive the most utility when their fertility choice matches their ideal.

Adults of type i in time t maximizes utility function given as

$$W_t^i(C_t^i, N_t^i) = C_t^i + I_t^i(N_t^i) \tag{1}$$

Preference proximity function $I_t^i(N_t^i)$ illustrates the utility of having the number of children similar to an agent's preference. It penalizes deviations from the agent's ideal family size i.

$$I_t^i(N_t^i) = -(N_t^i - i)^2 + \max_{\substack{i \\ N^i \in S}} (N^i - i)^2 \tag{2}$$

The function $I_t^i(N_t^i)$ is strictly decreasing in the absolute deviation $|N_t^i - i|$. That is, utility declines as the gap between the realized and ideal number of children widens. This specification parallels the framework in Akerlof and Kranton (2005) in which individuals experience disutility when their actions conflict with their identity. In this model, an individual's type is defined by fertility preference. Therefore, an agent makes the fertility choice that yields the highest overall utility balancing the satisfaction from aligning with the ideal family size against the consumption loss due to childrearing cost. Unlike Akerlof and Kranton (2005), the asymmetry in $(N_t^i - i)^2$ imposes a larger penalty when the realized family size deviates more substantially from the preferred size i. The final term ensures that the function remains nonnegative over its entire domain.

Unlike conventional economic fertility frameworks such as the Barro–Becker model and De La Croix and Doepke (2003), the present model omits an explicit altruism term in the utility function.[1] Instead, adult agents derive utility solely from aligning their realized number of children with their own fertility preference. At first glance, this assumption may appear unduly individualistic, given that childbearing is often viewed as an intrinsically social and altruistic act. The model addresses this concern in the second stage of preference formation (discussed in the next section).

Let Ω_t^i denote the labor income of an agent of type i. In this model, income is interpreted in two complementary ways; as a measure of lifetime earnings and as an indicator of income quartile, where $\Omega_t^i \in \{1,2,3,4\}$. A higher Ω_t^i therefore implies both greater income in absolute level and a higher position in the income distribution. To embed Becker's (1960) quality-quantity trade-off, each birth is assumed to entail a cost equal to η fraction of the parent's labor income, reflecting the time intensity of child-rearing. Since the income Ω is taken as

[1]For example, children's utility appears in the parent's utility function of Barro and Becker (1989) and De La Croix and Doepke (2003) introduces a parent's utility function that derives utility from child quality, which is referred as a "warm glow" type.

given, not only the time spent for raising children but the cost of goods is also eventually represented in terms of proportion of income. Therefore, the distinction between time and goods cost of children in this model is unnecessary. The cost increases linearly with the number of children. The resulting budget constraint given their preference and income is:

$$C_t^i + \eta \Omega_t^i N_t^i = \Omega_t^i \tag{3}$$

Every adult born in $(t-1)$ chooses C_t^i, and N_t^i to maximize equation (1) subject to equation (3). Decision rules are:

$$(N_t^{i=0}, C_t^{i=0}) = (0, \Omega_t^i)$$

$$(N_t^{i=0.5}, C_t^{i=0.5}) = \begin{cases} (0, \Omega_t^i) & \text{if } \Omega > \frac{2}{\eta}(I_t^{0.5}(0.5) - (I_t^{0.5}(0))) \\ (0.5, (1-0.5\eta)\Omega_t^i) & \text{if } \Omega \leq \frac{2}{\eta}(I_t^{0.5}(0.5) - (I_t^{0.5}(0))) \end{cases}$$

$$(N_t^{i=1}, C_t^{i=1}) = \begin{cases} (0, \Omega_t^i) & \text{if } \Omega > \frac{2}{\eta}(I_t^{1}(0.5) - I_t^{1}(0)) \\ (0.5, (1-0.5\eta)\Omega_t^i) & \text{if } \frac{2}{\eta}(I_t^{1}(1) - I_t^{1}(0.5)) < \Omega \leq \frac{2}{\eta}(I_t^{1}(0.5) - I_t^{1}(0)) \\ (1, (1-\eta)\Omega_t^i) & \text{if } \Omega \leq \frac{2}{\eta}(I_t^{1}(1) - I_t^{1}(0.5)) \end{cases}$$

$$(N_t^{i=1.5}, C_t^{i=1.5}) = \begin{cases} (0, \Omega_t^i) & \text{if } \Omega > \frac{2}{\eta}(I_t^{1.5}(0.5) - I_t^{1.5}(0)) \\ (0.5, (1-0.5\eta)\Omega_t^i) & \text{if } \frac{2}{\eta}(I_t^{1.5}(1) - I_t^{1.5}(0.5)) < \Omega \leq \frac{2}{\eta}(I_t^{1.5}(0.5) - I_t^{1.5}(0)) \\ (1, (1-\eta)\Omega_t^i) & \text{if } \frac{2}{\eta}(I_t^{1.5}(1.5) - I_t^{1.5}(1)) < \Omega \leq \frac{2}{\eta}(I_t^{1.5}(1) - I_t^{1.5}(0.5)) \\ (1.5, (1-1.5\eta)\Omega_t^i) & \text{if } 0 \leq \Omega \leq \frac{2}{\eta}(I_t^{1.5}(1.5) - I_t^{1.5}(1)) \end{cases}$$

To facilitate better understanding of this decision rule, an example with specific parameter values of $p = 0.5$ and $\eta = 0.2$ are presented in Table 1. Each entry in Table 1 shows the optimal fertility choices of agents in a given preference-income combination. For instance, an agent who prefers to have 0.5 child and belongs to income group 2 chooses to have 0.5 child, whereas the same preference paired with income group 3 yields zero children.

The first column of table 1 confirms that agents whose final preference is not to have children, the optimal choice is always $N_t^0 = 0$ in any income group. This is because not only do they derive the greatest utility from aligning their fertility behavior with their preferences, but they also avoid incurring any childbearing costs. In general, for a given preference type, the utility gained from having additional children must outweigh the cost of childbearing in order to larger family size to be optimal. In the case of those with zero preference, the utility is maximized by not having children, and thus there is no incentive to deviate from this choice. More broadly, no individual chooses to have more children than her stated preference. Across

Income \ Preference	i=0	i=0.5	i=1	i=1.5
Ω=1	0	0.5	1	1.5
Ω=2	0	0.5	1	1.5
Ω=3	0	0	0.5	1
Ω=4	0	0	0.5	1

Table 1: Decision rule with basic parameter set of $p = 0.5$ and $\eta = 0.2$

all preference types, agents with higher income are more likely to have fewer children, or even none at all. This pattern is driven by the increasing opportunity cost of time. Wealthier households—facing a higher marginal child cost—choose no more and often fewer children than poorer households with the same fertility preference i. As η increases, the cost of having children rises across all income levels, leading to a general decline in fertility.

3.2 Evolution

3.2.1 Preference Formation

The First Stage A child's preference on family size is shaped through a two-stage formation process. i_f denotes the first stage preference and i_s denotes the final preference of an agent after the entire process. The first stage resembles a socialization process in the spirit of Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985). Initially, the child is exposed to familial socialization. Continuous experience and exposure during childhood play a crucial role in shaping an individual's identity. While parents in this model do not actively attempt to transmit their preference to their children, there exists a passive influence–referred to as vertical transmission–that affects the children's preference formation. With probability $p \in [0, 1]$, a child inherits the same preference regarding the ideal number of children as her parent.

If the familial socialization fails, the child is randomly matched with a societal role model in the society and adopts that individual's traits. With probability $x_t^{i_s}$ the child is matched with an adult of preference type i_s where $x_t^{i_s}$ denotes the proportion of type i_s adults in the population at time t, and $\sum_{i_s} x_t^{i_s} = 1$. Thus, the first stage of preference formation consists of both vertical and oblique transmission, as illustrated in Figure 5.

The transition probabilities of the first stage can be expressed as follows:

$$P_t^{i_s,i_f} = p + (1-p)x_t^{i_s} \tag{4}$$

$$P_t^{i_s,j_f} = (1-p)x_t^{j_s} \tag{5}$$

Let $P_t^{i,j} \in [0,1]$ denote the probability that a parent of type i has a child of type j in the first stage. The probability for a child to have the same preference as her parent increases with p. Cultural differences may lead to variations in p; for instance, some familial cultures emphasize close-knit family bonds and spend more time engaging in family activities, which likely increases parental influence on children's preferences. Conversely, in cultures where children spend more time outside the home–such as in school or extracurricular activities–children are more likely to develop their preference independently from their parents, leading to a lower value of p.

When a child seeks a role model outside the family, the popularity of preference within the broader society becomes important. In such cases, the probability that a child adopts preference type i increases with the proportion of type i adults in the population, denoted by $x_t^{i_s}$, regardless of the parent's type. It is important to note that even if vertical transmission fails, a child may still acquire the same preference as her parent. This can occur if the parent's preference is sufficiently prevalent in society, allowing the child to adopt it through oblique transmission by encountering another adult of the same type.

The Second Stage As an economic environment the agent observed earliest and for the longest time, long before peers or the wider world came into view, the standard of living the household she grew up in provided is what she has internalized as an adequate setting in which to raise children.[2] Two features of the fertility decision then shape how the ideal responds. Childbearing is concentrated early in adult life, before lifetime income is fully realized, and it cannot be reversed, so the agent acts on the standard she expects to be able to provide rather than on resources already realized. An ideal she expects to fall short of is hard to keep holding, and it gives way to one closer to what she expects to attain. Expecting to exceed the parental standard relaxes the ceiling and the ideal can rise. None of this is a conscious calculation. The ideal shifts on its own as she comes to read her situation. This rests on the long-recognized point that people draw present feeling from anticipated outcomes and that the expectations they hold move accordingly (Loewenstein, 1987; Brunnermeier and Parker, 2005).[3]

The reference point is the parent's economic position, and the second stage moves the ideal by one step in the direction of the comparison between that benchmark and the income

[2]The idea that the standard one is accustomed to acts as a reference point, against which later outcomes register as falling short or pulling ahead, is long-standing in economics (Stigler and Becker, 1977; Campbell and Cochrane, 1999). What is specific here is that the reference is the family one grew up in rather than society at large.

[3]Those models represent the adjustment as the choice of a belief that maximizes well-being, but we read it as a process that occurs without deliberate calculation. What matters for the model is that it acts on the ideal itself rather than only on the choice the budget permits.

the agent anticipates for herself

$$\text{Final } i_s = \begin{cases} min\{i_f + 0.5, 1.5\} & \text{if } \Omega^{\text{parent}} < \text{my } \Omega^e \\ i_f & \text{if } \Omega^{\text{parent}} = \text{my } \Omega^e \\ max\{i_f - 0.5, 0\} & \text{if } \Omega^{\text{parent}} > \text{my } \Omega^e \end{cases} \tag{6}$$

where Ω^e is the income the agent anticipates for herself and Ω^{parent} is her parent's income group.

The object the agent compares against the parental standard is her anticipated income Ω^e, not income already in hand. Fertility is concentrated early in adult life and is irreversible, so the decision is made before lifetime income is realized, and what enters it is the position the agent expects to occupy relative to her parents. For tractability the present version assumes perfect foresight, so that the anticipated quartile coincides with the realized one and Ω^e is generated by the same mobility process described in 3.2.2. This assumption can be relaxed in later work by letting anticipated and realized mobility diverge. Two agents with the same parental income group can still anticipate different destinations, because the mobility process disperses them across quartiles. This captures idiosyncratic differences in field of study, early-career signals, ability, and luck, which are largely formed before and apart from family planning and so enter the income dimension rather than the preference dimension of the model.

The revision is symmetric. Anticipating an income below the parental standard lowers the ideal by one step, and anticipating to exceed it raises the ideal by one step, each within the bounds of the preference space.[4]

Following is a specific example. Consider, for instance, a young agent who belongs to the group $(i = 1, m = 1)$ after the first stage. If her parent's income was higher, for example, in income group 3, the gap between the standard she grew up with and the position she anticipates revises her final preference downward to $i = 0.5$ in the second stage. Since she already anticipates the lowest income group, her preference cannot be revised upward to $i = 1.5$, as her parents cannot have come from a lower income group than the one she anticipates.

In this framework both the realized fertility choice and the underlying preference respond to cultural and economic forces. The analysis also imposes an upper bound on fertility preference, so upward mobility can increase the desired family size only within that limit. This constraint is plausible because raising children demands substantial time and resources,

[4]We impose symmetry for tractability. The downward revision rests on firmer ground, since giving up on an out-of-reach goal is the cleaner case, and a planned extension after the prospectus lets the downward response dominate.

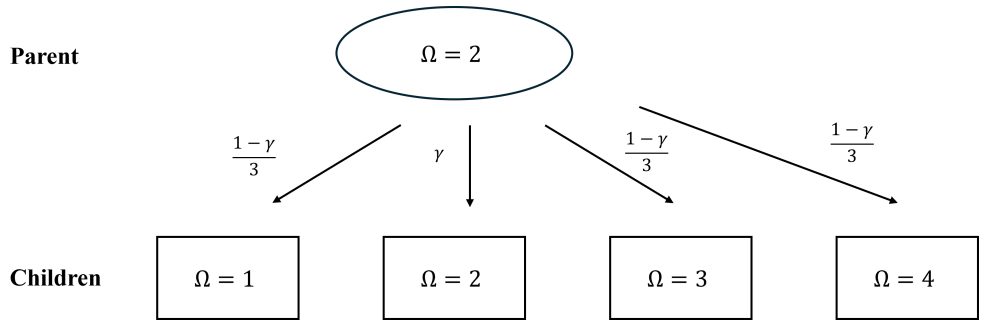


Figure 5: Income mobility rule with example when the parent's income is $\Omega = 2$

which agents are aware of, and stated intentions are unlikely to grow without bound. A milder assumption, such as upward revisions being harder than downward ones, would lead to results that are qualitatively similar to those presented here.

3.2.2 Intergenerational mobility

Intergenerational economic mobility is characterized by an exogenously given parameter, γ, and follows a Markov process. Each agent has a probability γ of belonging to the same income quartile as her parent. Alternatively, an agent is expected to fall into a different income quartile with probability $(1-\gamma)\frac{1}{3}$. An example of the income distribution rule is illustrated in Figure 6. Therefore, γ can be interpreted as an inverse intergenerational mobility parameter: a higher γ corresponds to lower intergenerational mobility. All else equal, higher (lower) intergenerational mobility is associated with more(fewer) agents having preference that differ from their parents. Alternative mobility rule can be easily implemented in this model as long as they adhere to a Markov process. More complicated income mobility structure or models with endogenous mobility, are left for future study.

A crucial distinction in this model is that economic conditions—specifically income dynamics—affect not only the agent's budget constraint, but also her preference formation. Because fertility is decided before income is realized, this second channel operates through anticipated rather than realized income. In standard household optimization models, income typically enters the decision problem only through the budget constraint, shaping feasible choices but not the underlying preferences. In contrast, this model allows income to play a dual role. It influences the agent's economic capacity through the budget constraint and simultaneously alters the subjective desirability of fertility outcomes through intergenerational income comparisons. Agents do not merely optimize given static preferences; instead, preferences themselves evolve in response to changes in expected lifetime income relative to parental benchmarks. As such, income dynamics shape not just what agents can afford, but

what they aspire to—highlighting a psychological and cultural dimension of fertility behavior that is often overlooked in literature. As will be demonstrated in Section 4, this shock is pivotal in curtailing the evolutionary advantage of the high-fertility-preference group, thereby averting explosive population growth.

3.2.3 The Dynamic of Preference Evolution

Now we combine both dimensions of the model, preference and income. Let $z_t^{i,m}$ denote the absolute size of population in period t who hold preference i and belong to income group m. As agents experience the first stage of preference formation during their childhood, $z_t^{i_f=i,m}$ refers to the cohort of young population in period t who, after completing the first stage of socialization, hold preference i and belong to income group m. In contrast, $z_t^{i_s=i,m}$ represents the size of adult generation at time t that has passed through both stages of preference formation, so that i is their final preference and has income level of m. Following equation describes the evolution of population types in the first step of preference formation.

$$
\begin{aligned}
z_{t+1}^{i_f=i,m} = & \underbrace{\gamma(p+(1-p)x_t^{i_s=i})N^{i,m}z_t^{i_s=i,m}}_{\text{Same preference and same income parents}} \\
& + \underbrace{(1-\gamma)\frac{1}{3}(p+(1-p)x_t^{i_s=i})\sum_{s\neq m}N^{i,s}z_t^{i_s=i,s}}_{\text{Same preference and different income parents}} \\
& + \underbrace{\gamma(1-p)x_t^{i_s=i}\sum_{j\neq i}N^{j,m}z_t^{i_s=j,m}}_{\text{Different preference and same income parents}} \\
& + \underbrace{(1-\gamma)\frac{1}{3}(1-p)x_t^{i_s=i}\sum_{j\neq i}\sum_{s\neq m}N^{j,s}z_t^{i_s=j,s}}_{\text{Different preference and different income parents}}
\end{aligned}
\tag{7}
$$

Each segment of equation represents the inflow to the group $(i_f = i, m)$ from different family background. The second stage is described in equation (8).

$$
\begin{aligned}
z_{t+1}^{i_s=i,m} = & (z_{t+1}^{i_f=i-0.5,m}| \text{ Parent's income} < \text{Own anticipated income}) \\
& + (z_{t+1}^{i_f=i_s,m}| \text{ Parent's income} = \text{Own anticipated income}) \\
& + (z_{t+1}^{i_f=i+0.5,m}|\text{Parent's income} > \text{Own anticipated income})
\end{aligned}
\tag{8}
$$

Since agents live only two periods and make the fertility choice only during their adulthood, fertility f can be measured as the rate of change in adult population each year. This is equal to weighted average fertility rate of each characteristic groups which is the right hand side of

equation (9).

$$f_t = \frac{L_{t+1} - L_t}{L_t} = \sum_i \sum_m N^{i,m} L_t z_t^{i,m} = \sum_i \sum_m N^{i,m} x_t^{i,m} \tag{9}$$

4 Analysis

One of the trivial result is that $z_t^{i,m} = 0$ for any i and m is a steady state. Some interesting analytic expectation on cultural heterogeneity and fertility rate are also possible.

Based on the simulation results, with a positive level of intergenerational mobility, cultural heterogeneity persists in equilibrium even though high-fertility types have an evolutionary edge. Vertical transmission with probability p enlarges the high-preference group, and oblique transmission reinforces any majority trait when vertical transmission fails. This expansion is checked by mobility-induced preference shocks. Because family-size ideals are bounded above, upward mobility cannot raise the preference of already high-preference families, whereas downward mobility can reduce their children's preferences. The resulting, persistent flow from high to lower preference types prevents complete dominance by any single group.

Comparative statistics follow directly. By equation (9), aggregate fertility is the population-weighted average of group-specific rates, so shifts in the high-preference share drive the aggregate. A higher vertical-transmission probability p raises the steady-state mass of high-fertility types and increases the fertility rate. Greater intergenerational mobility increases the frequency of preference downgrades, shrinks the high-preference share, and lowers aggregate fertility. When mobility is very low (equivalently, when the inverse-mobility parameter γ is high), the zero-preference group can vanish, yet complete takeover by the highest-preference group does not occur because mobility shocks continue to redirect some offspring toward lower preferences.

This section analyzes two contrasting settings, modern and traditional societies, that differ in social exposure, income mobility, and child-rearing costs. The goal is to explore how cultural differences map into economic structure and, in turn, shape long-run fertility patterns.

While modern economies can be characterized in various ways, one of their most distinctive features compared to premodern societies is the absence of rigid status systems. In traditional societies, economic roles and social positions are typically inherited. Children are likely to follow their parents' occupation and remain in the same household or locality. Without major external shocks, one's socioeconomic status tends to persist across generations. Although the question of whether modern societies have fully achieved equality of opportunity or meritocracy remains an open debate, this paper abstracts from such definitional controversies.

Instead, it assumes that increased intergenerational economic mobility is a salient feature of modern economies and adopts this as a modeling foundation.

Another distinguishing feature of modern society is the weakening influence of the family in preference formation. Multigenerational co-residence has declined and communication technologies have enabled wider exposure. Individuals now increasingly encounter diverse role models beyond the immediate family. In traditional contexts, most socialization occurred within kin networks and culturally homogeneous communities, reinforcing preference stability across generations. In contrast, modern societies exhibit weaker vertical transmission of preferences and greater susceptibility to oblique transmission via broader social influence.

Child-rearing costs also differ substantially. In modern societies, the baseline expectations for what constitutes adequate parenting have risen considerably. As Lawson and Mace (2011) note, post-industrial societies place greater emphasis on qualitative child outcomes—such as education, health, and social competitiveness—rather than on survival or reproductive success per se. Childbearing now involves substantial medical, educational, and opportunity costs, the latter particularly due to women's increased labor force participation. In traditional societies, however, child-rearing is often community-based, and formal education was minimal. Children were viewed as economic contributors rather than financial burdens, which often yielded a positive expected return. This section therefore assumes higher per-child costs in modern than in traditional settings.

For each case, I then hold all parameters constant except for one, and examine how steady-state outcomes respond to each variation. This comparative statics exercise provides a quantitative validation of the theoretical intuitions developed earlier. All baseline calibrations assume an even initial distribution across preference-income groups. That is, each group begins with the same population share. However, this assumption may not hold in real societies, which often start from skewed initial conditions. For example, if the majority initially holds a low-fertility preference, even the evolutionary advantage of high-preference groups may be insufficient to shift population composition. Conversely, if high-preference types are dominant at the outset, the counteracting force of economic mobility shocks may prove too weak to restrain their expansion. To explore these possibilities, we examine three extreme initial conditions. The first assumes a society composed only of individuals with preferences $i = 0$ and $i = 0.5$, while the others assume either dominance by the highest $i = 1.5$ or the $i = 1$ preference group, respectively. The exact assumed initial distributions are reported in Table 3. The simulation investigates whether the group, given this advantageous starting point and in some cases a fertility-driven evolutionary edge as well, ultimately comes to dominate the entire population.

Despite the severity of these initial conditions, the simulations show that the economy

Parameters		Modern	Traditional
η	Cost of Childbearing in Terms of Time	0.2	0.1
p	Probability of Vertical Transmission	0.5	0.8
γ	Inverse Intergenerational Mobility	0.25	0.8

Table 2: Value of Parameters for Each Cases

Case	i=0	i=0.5	i=1.0	i=1.5
Baseline	0.25	0.25	0.25	0.25
Case 1	0.4	0.6	0	0
Case 2	0	0	0	1
Case 3	0	0	1	0

Table 3: Different Initial Distributions for Each Cases

always converges to a unique steady state. This suggests that initial distribution affects the path to equilibrium, but not the destination. The long-run fertility rate and preference distribution are determined by structural parameters, not by starting conditions. That said, initial conditions do influence the transition dynamics: societies experiencing lower interim fertility rates will arrive at the same steady-state distribution with a smaller total population. Since our model centers on the tension between the evolutionary pressure of high or low-preference groups and the restraining effects of mobility shocks, we examine these transitional patterns under both modern and traditional settings.

Table 2 reports the parameter values for each case, and equation (10) presents the value of preference-proximity function given the fertility preference set.

$$I(N_t^i) = \begin{cases} 2.25 & \text{if } |N_t^i - i| = 0 \\ 2 & \text{if } |N_t^i - i| = 0.5 \\ 1.25 & \text{if } |N_t^i - i| = 1 \\ 0 & \text{if } |N_t^i - i| = 1.5 \end{cases} \tag{10}$$

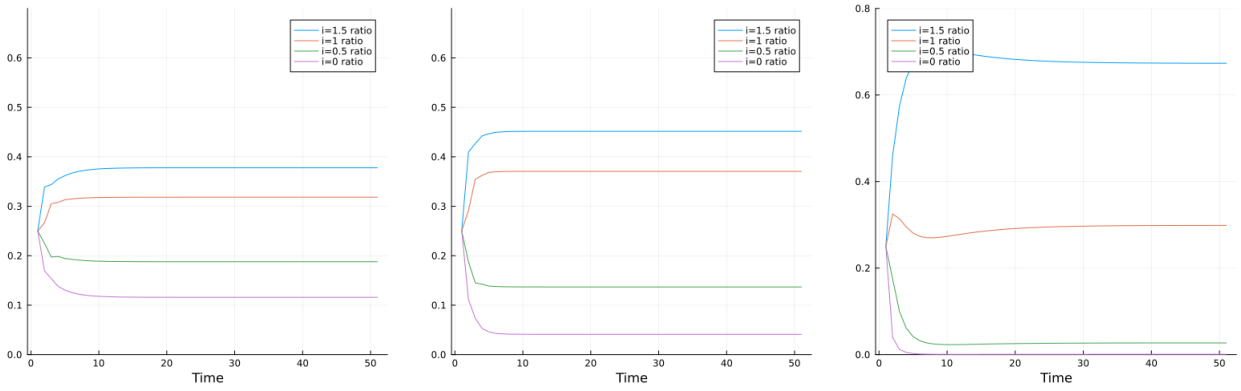
4.1 Modern Societies

The modern society scenario applies the baseline calibration in which children inherit preferences from parents with probability $p = 0.5$, income mobility is high ($\gamma = 0.25$), and the cost of child-rearing is 20 percent of lifetime income for each children. These values capture key features of modern economies: weaker intergenerational cultural persistence, high exposure to diverse social influences, and substantial time and financial costs associated with raising

Case	Parameters	$x^*_{i=0}$	$x^*_{i=0.5}$	$x^*_{i=1}$	$x^*_{i=1.5}$	f
Modern	$p = 0.7$, $\gamma = 0.25$, $\eta = 0.2$	0.0189	0.1118	0.3971	0.4722	0.9129
	$\boldsymbol{p = 0.5}$, $\boldsymbol{\gamma = 0.25}$, $\boldsymbol{\eta = 0.2}$	0.0411	0.1369	0.3705	0.4515	0.8703
	$p = 0.2$, $\gamma = 0.25$, $\eta = 0.2$	0.1159	0.1878	0.3184	0.3778	0.7424
	$p = 0.5$, $\gamma = 0.7$, $\eta = 0.2$	0.0050	0.0448	0.2664	0.6838	1.1212
	$p = 0.5$, $\gamma = 0.5$, $\eta = 0.2$	0.0186	0.0927	0.3397	0.5490	0.9762
Traditional	$p = 0.9$, $\gamma = 0.8$, $\eta = 0.1$	0.0009	0.0271	0.2987	0.6733	1.3223
	$\boldsymbol{p = 0.8}$, $\boldsymbol{\gamma = 0.8}$, $\boldsymbol{\eta = 0.1}$	0.0018	0.0348	0.2937	0.6697	1.3156
	$p = 0.5$, $\gamma = 0.8$, $\eta = 0.1$	0.0093	0.0670	0.3076	0.6161	1.2652
	$p = 0.8$, $\gamma = 0.9$, $\eta = 0.1$	0.0003	0.0116	0.1849	0.8032	1.3955
	$p = 0.8$, $\gamma = 0.5$, $\eta = 0.1$	0.0118	0.1001	0.4119	0.4761	1.1762

Table 4: Steady State Value Under Each Cases

children. A mobility parameter of $\gamma = 0.25$ implies that children have equal probability of entering any income quartile, independent of their parents' status. The first 5 rows in Table 4 reports the numerical results for each calibration.



(a) $p = 0.2$ (b) $p = 0.5$ (c) $p = 0.7$

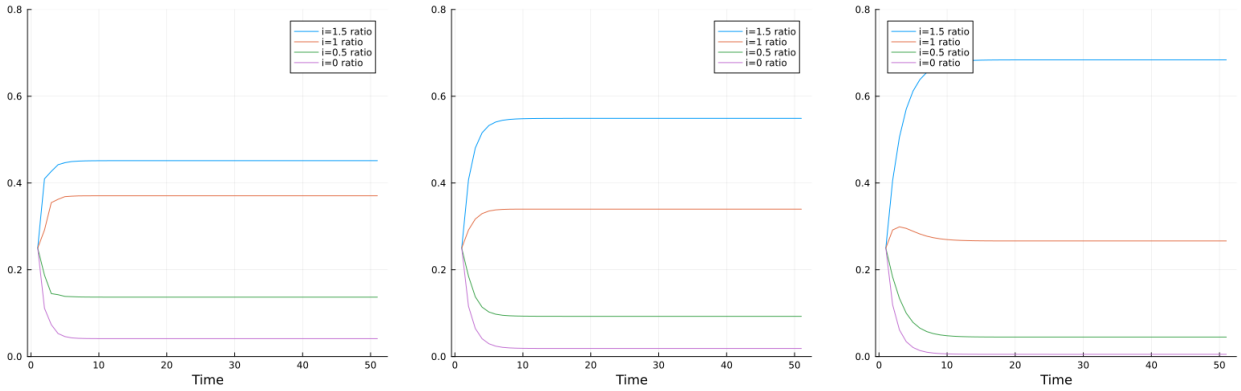
Figure 6: Preference Distribution By Different Level of Vertical Transmission in Modern Society

Under these conditions, the model converges to a steady state with a fertility rate of 0.8703, which is below replacement threshold of one child per monoparental adult. The resulting distribution of preferences reflects the balance between fertility-driven expansion of high-preference groups and the dampening effect of income shocks and oblique transmission. While high-preference types reproduce at higher rates, persistent exposure to intergenerational mobility shock and cultural diffusion prevents any one group from fully dominating the population.

Figures 7 through 9 summarize how the long-run preference distribution and fertility

outcomes respond to changes in key parameters around this benchmark. Notably, fertility rises with stronger vertical transmission and weaker mobility, but remains bounded due to ongoing shocks and the assumed ceiling in preference levels. For most parameter values the fertility rate remains below the replacement rate. In settings with extremely low mobility, however, fertility exceeds replacement, implying the potential for long-run population expansion. These findings help explain cross-country and within-country variation in fertility. Societies whose cultures place a stronger emphasis on family, or whose economic structures offer limited upward mobility, tend to sustain higher birth rates, whereas more mobile or individual-oriented societies are more likely to experience persistent low fertility.

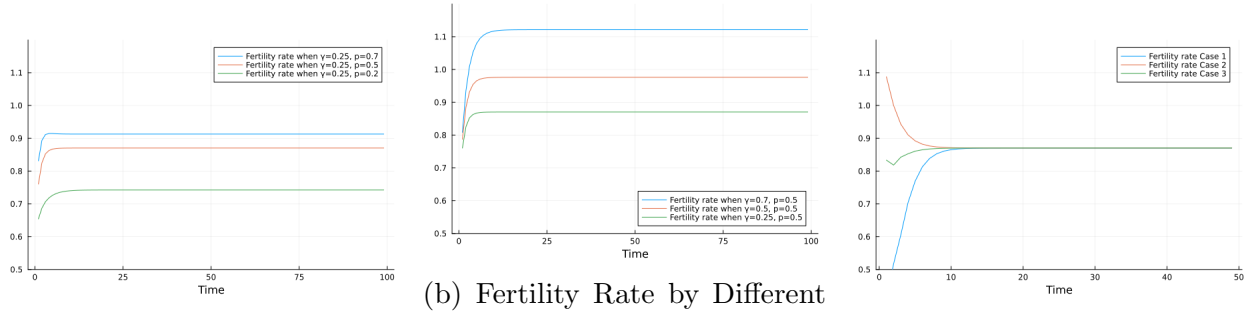
Panel (c) of Figure 9 confirms that, despite differing initial conditions, all scenarios converge to the same steady-state fertility rate due to identical structural parameters. However, societies that begin with a higher share of low- (or high-) preference groups exhibit correspondingly lower (or higher) fertility rates in the early periods. If a society experiences a temporary shock that alters fertility preferences—such as a popular media campaign promoting large size family or a trend on TikTok encouraging non-marriage and non-childbearing—it may lead to short run fluctuations in fertility. Nonetheless, in the long run, fertility rates converge to levels determined by the vertical transmission rate and the degree of intergenerational income mobility.[5]



(a) $\gamma = 0.25$ (b) $\gamma = 0.5$ (c) $\gamma = 0.7$

Figure 7: Preference Distribution By Different Level of Intergenerational Income Mobility in Modern Society

[5]The plot showing the distribution of preference over time for each initial condition is provided in Appendix.



(a) Fertility Rate by Different Level of Vertical Transmission

(b) Fertility Rate by Different Level of Intergenerational Mobility

(c) Fertility Rate by Different Scenario of Initial Distribution

Figure 8: Fertility Rate by Different Level of Parameters in Modern Society

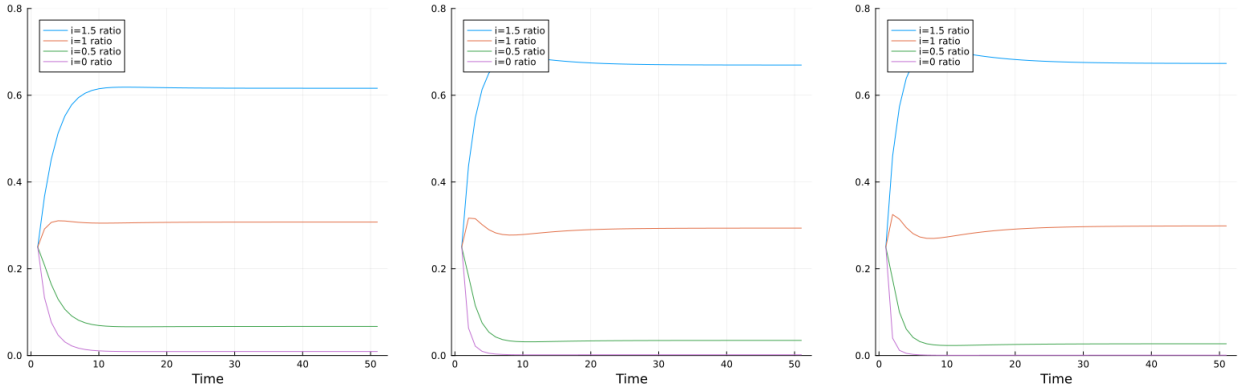
4.2 Traditional Societies

In this study, the traditional society is characterized by limited social exposure and low income mobility. The probability of vertical cultural transmission is set at 0.8, and children remain in their parents' income quartile with the same likelihood of 0.8. Historical conditions also imply lower child-rearing costs relative to the modern benchmark.

Under this calibration, the traditional society converges to a steady-state fertility rate of 1.3156. This outcome demonstrates that even in the presence of income mobility shocks, the fertility rate can far exceed the replacement level. Compared to the patterns observed in Figures 7 and 8 for the modern setting, Figures 10 and 11 reveal a visibly larger share of high-preference individuals. The effects of parameters are consistent with those identified earlier: higher values of vertical transmission p and lower mobility both reduce the forces that limit the expansion of high-preference groups. Unless one parameter is sufficiently offset by a strong counteracting value of the other, fertility remains above replacement level, producing a Malthusian scenario of exponential population growth.

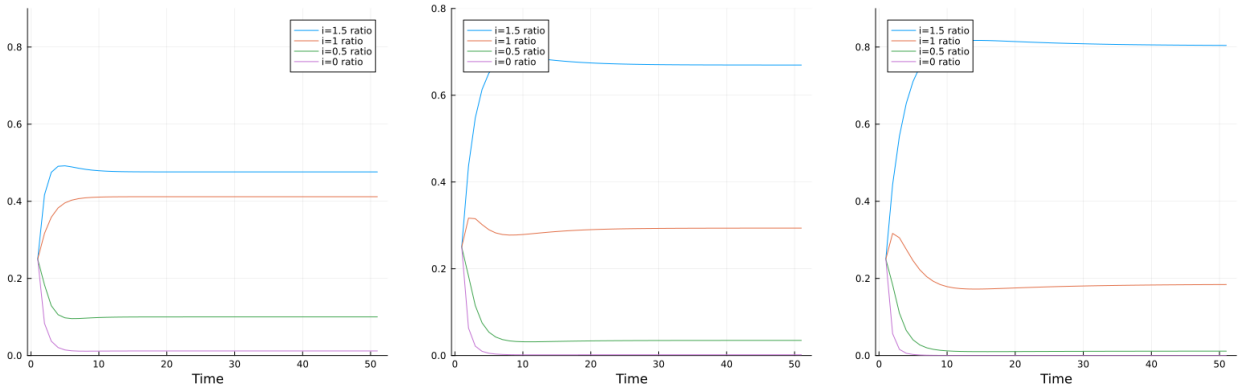
This mechanism mirrors demographic trends observed in the West following the Industrial Revolution or the World War II. During this period, population growth surged due to substantial advancements in medical and agricultural technologies, which enabled individuals to pursue optimization strategies similar to those in modern settings. However, cultural norms remained largely traditional. Family-centered values continued to shape behavior, and it was not uncommon for children to inherit not only their parents' education levels but also their occupations.

Similarly, in Asia, contemporary low-fertility societies such as South Korea once experienced remarkably high fertility. For example, in the post–Korean War era, the total fertility rate in Korea exceeded six children per woman as shown in Figure 1. Considering that Korea's modernization only began in the late 19th century and was disrupted by colonization and



(a) $p = 0.5$ (b) $p = 0.8$ (c) $p = 0.9$

Figure 9: Preference Distribution By Different Level of Vertical Transmission in Traditional Society

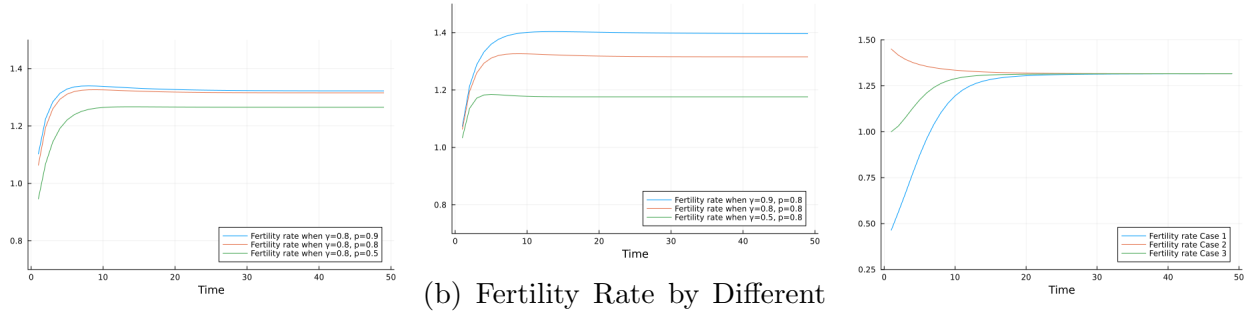


(a) $\gamma = 0.5$ (b) $\gamma = 0.8$ (c) $\gamma = 0.9$

Figure 10: Preference Distribution By Different Level of Intergenerational Income Mobility in Traditional Society

war, the societal structure of the 1960s retained deeply traditional values. The subsequent decline in fertility may have been a response to rapid structural shifts induced by nationwide family-planning campaigns and accelerated modernization.

Even today, countries that retain more traditional social structures often exhibit higher fertility rates than modern societies. In contexts where family ties remain strong, and intergenerational expectations persist—such as the cultural norm that children will provide support in old age—fertility behavior may remain elevated. In such societies, the high share of wealth transferred through inheritance also functions as a form of reduced intergenerational economic mobility. These features suggest that persistent traditional norms, both cultural and institutional, continue to shape fertility outcomes in meaningful ways.



(a) Fertility Rate by Different Level of Vertical Transmission

(b) Fertility Rate by Different Level of Intergenerational Mobility

(c) Fertility Rate by Different Scenario of Initial Distribution

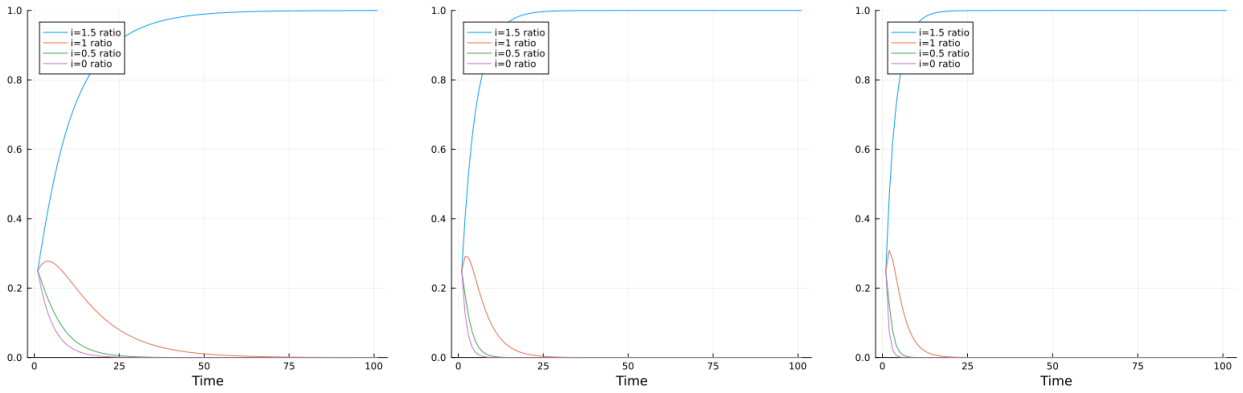
Figure 11: Fertility Rate by Different Level of Parameters in Traditional Society

5 Counterfactual Analysis: The Role of Intergenerational Mobility

Previous sections demonstrated that intergenerational mobility is critical for shaping long-run fertility patterns. To further illustrate this point, we conduct a counterfactual analysis by simulating the modern society scenario without the mobility-induced preference shock. In this setting, preference formation occurs only through the first stage—vertical or oblique cultural transmission—and children do not adjust their fertility ideals in response to intergenerational income differences. Nonetheless, substitution effects arising from income can still lead to fertility choices that deviate from stated preferences.

All parameters are identical to those in the modern benchmark. The probability of vertical transmission is set to $p = 0.5$, income mobility is high with $\gamma = 0.25$, and the cost of childbearing is 20 percent of lifetime income per child.

Figure 13 and 14 illustrate the evolution of preference distribution under varying levels of vertical transmission and income mobility, respectively. The results highlight several important differences. First, the directional effects of vertical transmission and income mobility remain unchanged. Higher vertical transmission or lower mobility continues to increase fertility. Second, in the absence of mobility shocks, the high-preference group eventually dominates the population, while the low-preference group disappears. Without the countervailing force of preference downgrades, the evolutionary advantage of high-fertility types is unchecked. As a result, fertility rates are consistently higher than in the benchmark with mobility shocks, exceeding the replacement level at 1.25 compared to 0.87 in the benchmark. Panel (a) and (b) in Figure 15 illustrates this pattern, where dashed lines represent the benchmark with mobility shocks and solid lines represent the counterfactual without them. This comparison demonstrates that intergenerational mobility shocks to preferences not only reduce long-run



(a) $p = 0.2$ (b) $p = 0.5$ (c) $p = 0.7$

Figure 12: Preference Distribution By Different Level of Vertical Transmission without Intergenerational Income Mobility-induced Preference Shocks

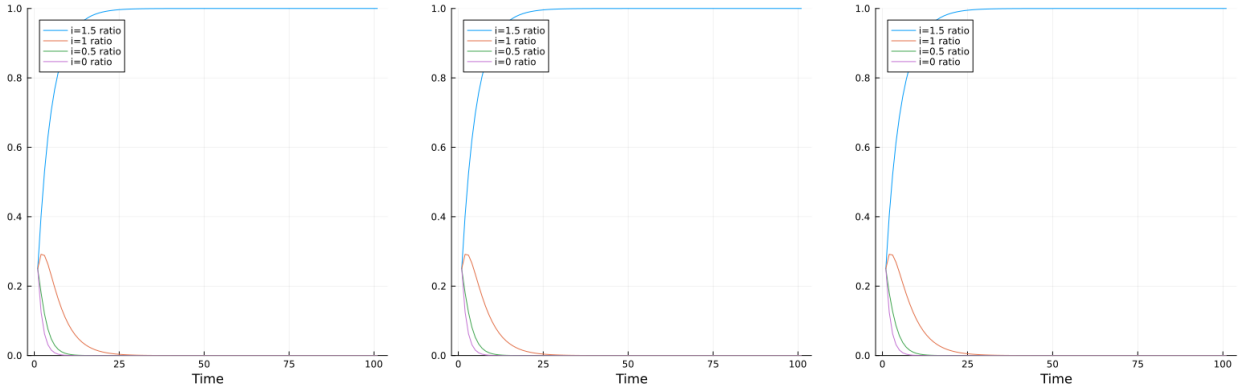
fertility but also play a central role in preserving cultural heterogeneity within the population.

In the counterfactual scenario without mobility-induced preference shocks, initial conditions play a decisive role in shaping long-run outcomes. As shown in Panel (c) of Figure 15, when the population begins with a high share of low-preference types (case 1), the evolutionary advantage of high-fertility groups is insufficient to drive their expansion, resulting in a persistent low-fertility equilibrium. The steady-state fertility rate in case 1 is 0.25, substantially lower than in the benchmark model with mobility shocks, where the rate is 0.87. Conversely, if high-preference types dominate initially, they can eventually take over the entire population. This sensitivity to initial conditions stands in sharp contrast to the benchmark model with mobility shocks to preferences, where structural parameters alone determine long-run outcomes regardless of the initial distribution. Intergenerational mobility-induced preference shocks therefore not only curb the unchecked dominance of high-fertility groups but also induce upward preference shifts among children of low-preference parents, thereby sustaining cultural diversity over time.

6 Discussion and Next Steps

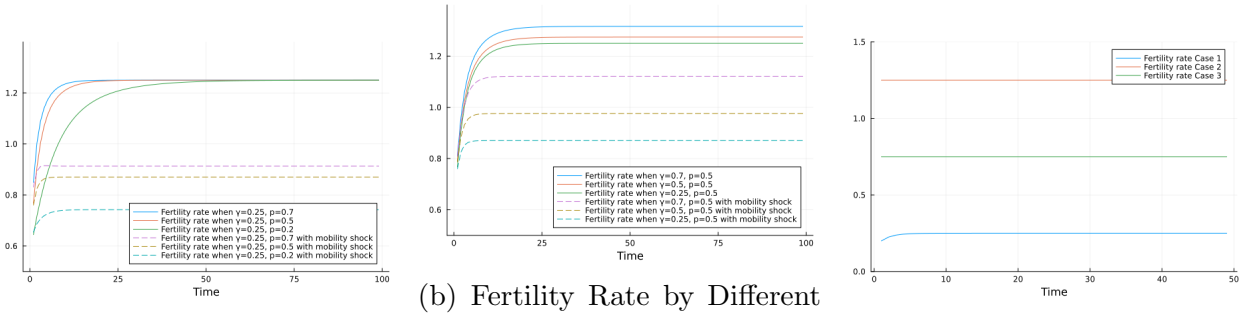
6.1 What the Model Explains

The framework developed in this chapter offers a tractable account of three interrelated phenomena that have proven difficult to reconcile within standard fertility models. The first is the persistence of preference heterogeneity in fertility ideals despite the apparent evolutionary advantage of high-fertility types. The second is the convergence of modern societies toward



(a) $\gamma = 0.25$ (b) $\gamma = 0.5$ (c) $\gamma = 0.7$

Figure 13: Preference Distribution By Different Level of Intergenerational Income Mobility without Intergenerational Income Mobility-induced Preference Shocks



(a) Fertility Rate by Different Level of Vertical Transmission

(b) Fertility Rate by Different Level of Intergenerational Mobility

(c) Fertility Rate by Different Scenario of Initial Distribution

Figure 14: Fertility Rate by Different Level of Parameters without Intergenerational Income Mobility-induced Preference Shocks

sub-replacement fertility even when high-preference groups remain present in the population. The third is the contrast between traditional societies that sustain above-replacement fertility and modern societies that fail to do so under broadly similar economic optimization problems.

In contrast to standard models that assume homogeneous and exogenous fertility ideals, the framework highlights how preferences themselves evolve in response to both socialization and economic dynamics. The key innovation lies in introducing a second stage of preference formation in which children revise their fertility ideals after comparing their own income prospects to those of their parents. This mechanism allows intergenerational mobility shocks to directly alter preferences, thereby counteracting the evolutionary advantage of high-fertility groups.

The analysis yields three main findings. First, with intergenerational mobility shock, cultural heterogeneity in fertility preferences can persist, even though evolutionary force

would predict the dominance of high-fertility types. Mobility-induced shocks prevent complete homogenization and sustain preference diversity. Second, higher intergenerational mobility reduces long-run fertility by increasing the likelihood that children of high-fertility parents adopt lower fertility ideals due to downward preference shock. Third, weaker vertical cultural transmission accelerates fertility decline, as children are more likely to adopt preferences from the broader social environment rather than from their parents. Together, these results provide a unified explanation of how the interaction between cultural transmission and intergenerational mobility, combined with rising direct and indirect costs of childrearing, has led many societies to converge toward lower fertility rates.

6.2 What the Model Leaves Open

This framework relies not only on the assumption that individuals hold heterogeneous fertility preferences, but also that they adjust these preferences in response to differences in socioeconomic status (SES) relative to their parents. Within the presented model, this intergenerational preference adjustment mechanism plays a central role in generating the observed decline in fertility. However, because socioeconomic status also affects the budget constraint, it is challenging to disentangle whether low fertility outcomes reflect changes in underlying preferences or shifts in economic conditions. Although preference formation is inherently difficult to measure, the increasing availability of large-scale cross-country survey data offers promising opportunities for future empirical validation. Further work may also explore alternative mechanisms capable of producing similar dynamics without relying on explicit SES-based preference updating.

Several questions remain outside the scope of the current framework. The most important is that the central parameters governing the results, the intergenerational mobility rate γ and the vertical transmission probability p, are treated as exogenous primitives. While their comparative-statics effects are clear within the model, the framework does not explain why γ varies systematically across societies, nor why p tends to decline as societies modernize. Since the main contribution of the paper is the claim that these objects matter for long-run fertility, the absence of a model-based account of their determination limits the interpretation of the results.

A second open question concerns the form of the preference revision rule itself. The current specification adjusts the ideal family size by a fixed discrete step in response to any deviation between own income and the parental benchmark, regardless of the magnitude of that deviation. This binary structure is convenient for tractability but it does not distinguish between small and large mobility shocks. A more flexible specification in which the size of

the revision depends on the size of the comparison gap may be needed to align the model with the gradient-sensitive evidence documented in the aspiration formation literature.

Third, the choice set over family size is bounded above by $N = 1.5$, which corresponds to three children in a biparental setting. This bound is imposed for computational convenience and is justified informally by the observation that very large families are rare in modern data. Yet the bound is in fact a key driver of the result that high-fertility types do not explode in population share. A model in which the upper bound is itself an endogenous outcome of biological, economic, or cultural forces would provide a stronger foundation for this finding.

6.3 Next Steps

The remainder of this dissertation will pursue three lines of extension that address these limitations directly, together with a complementary empirical strategy if possible.

Endogenous mobility through human capital investment. The first extension makes γ an outcome rather than a parameter by introducing a quality-quantity tradeoff in the spirit of Becker and Lewis (1973), De La Croix and Doepke (2003), and Moav (2005). In this extension parents allocate resources between number of children and per-child human capital investment. Each child's income position in the next period depends on the human capital received from the parent, so the aggregate fertility distribution endogenously generates the aggregate mobility matrix. This creates a feedback loop in which high aggregate fertility produces low per-child investment, low mobility, and persistent high-fertility preferences, while low aggregate fertility produces the opposite configuration. This structure also connects the model to the Great Gatsby curve documented in Corak (2013), where higher cross-sectional inequality is associated with lower intergenerational mobility. Multiple steady states may emerge under this specification, offering a potential explanation for why otherwise similar economies settle at very different fertility regimes.

Endogenous vertical transmission. The second extension addresses the determination of p. In the original Bisin and Verdier (2001) framework, what corresponds to p in the present model is itself the outcome of parental socialization effort. The current paper treats p as a fixed parameter, which obscures one of the most natural channels through which modernization affects fertility. Building on Doepke and Zilibotti (2017), Fernández and Fogli (2006), and Alesina and Giuliano (2010), the planned extension will let p depend on parental income, time allocation, and the aggregate fertility rate. The expected mechanism is that as societies modernize and aggregate fertility falls, family time per child rises, but exposure to

non-family role models also expands, with the net effect on p determined within the model rather than imposed by the calibration. This extension will also turn the modern versus traditional comparison developed in Section 4 into a genuine equilibrium distinction rather than a parameter comparison.

Endogenous choice set boundaries. The third extension addresses the exogenously imposed boundaries of the fertility choice set. In the current model, fertility choices are restricted to a finite set of discrete values. This assumption is useful for tractability and for defining preference types clearly. It also allows the analysis to isolate the role of intergenerational mobility shocks within a fixed preference and choice environment. However, the model does not yet explain why the relevant choice set is bounded between 0 and 1.5. In reality, the set of family sizes that individuals perceive as feasible or socially acceptable may change over time. Economic development, contraception, labor market opportunities, housing conditions, childrearing norms, and public policy can all shift these perceived boundaries. A natural extension is therefore to endogenize the fertility choice set itself. This would allow the model to study how modernization changes not only the distribution of preferences, but also the range of fertility ideals available to agents.

Taken together, these extensions transform the current chapter from a calibrated theoretical exercise into an internally determined framework in which mobility, transmission, and choice set boundaries are all outcomes of the model rather than primitive inputs. The contribution of the present chapter is to establish that the mobility-comparison channel is sufficient to generate the joint pattern of preference heterogeneity and sustained low fertility.

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