The Autumn of Patriarchy

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Abstract

This paper develops a unified theory to explain the concurrent declines in fertility, marriage, and gender income gaps observed during the grand gender convergence (Goldin 2014). The model integrates these phenomena through two mechanisms: (1) fertility reduces the labor supply of females relative to males; and (2) equilibrium fertility and within-household transfers clear the marriage market. The analysis offers three new insights. First, there exists a tension among high fertility, widespread dual-parenthood, and gender income equality, making it difficult for all three to coexist simultaneously in an economy—an insight supported by data. Second, rising total factor productivity alone is sufficient to drive all three phenomena, without requiring factor- or gender-biased technological changes. Third, the pace of this transition varies significantly across countries, shaped by differences in social norms governing marriage. These findings provide a cohesive framework for understanding the economic and social forces reshaping family structure and gender dynamics in the modern era.

JEL classification: D13, J11, J12, J13, J16
Keywords: Gender equality, family structure, fertility

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"...and the bells of glory that announced to the world the good news that the uncountable time of eternity had come to an end."

Gabriel García Márquez, *The Autumn of the Patriarch*

1. Introduction

After dominating human society for millennia, patriarchy has been tailing off in recent decades, giving way to egalitarianism. Amidst the "grand convergence" (Goldin 2014), three key trends stand out: fertility rates have been falling (Greenwood et al. 2005a, Guinnane 2011), marriage and dual-parenthood have been declining (Stevenson and Wolfers 2007, Folbre 2021), and gender gaps in wage, income, and wealth have been converging (Doepke and Tertilt 2009, Goldin 2014).

While extensive research has examined fertility, marriage, and gender income gaps as distinct phenomena, few studies have explored their interconnected dynamics and the mechanisms through which they mutually reinforce one another. This paper addresses this gap by proposing a novel unified framework that systematically integrates these three dimensions, offering new insights into their origins and relationship.

I begin by outlining a static model in which men and women meet in a marriage market. Men face a choice between remaining single (and childless) or entering marriage, where they allocate a portion of their income to wives' consumption and child-rearing. Women, conversely, may opt for single motherhood or raise children within a marital union. Motivated by Doepke and Kindermann (2019), fertility decisions within married households are subject to veto.

I characterize the model by demonstrating three key equilibrium outcomes: (1) individual optimization and marriage market clearing conditions jointly determine the equilibrium fertility rate and within-household income transfers; (2) the prevalence of dual-parenthood depends on the level of within-household income transfers and the gender gap in human capital; and (3) the gender income gap is shaped by both the gender gap in human capital and the endogenous labor supply decisions of women.

The model connects marriage, fertility, and gender income gaps through two simple, yet intuitive mechanisms. First, marriage and fertility are intertwined, as marital fertility serves as the "price" to clear the marriage market. Second, fertility directly influences gender gaps in labor supply and hence income, driven by societal norms that disproportionately allocate childcare responsibilities to women.

Building on the static model, I identify a fundamental tension in family and gender economics: there exists a tension among high fertility, prevalent dual-parenthood, and gender income equality, such that achieving all three simultaneously is difficult, if not impossible, within an economy. Specifically, I demonstrate that achieving any two of these outcomes often comes at the expense of the third. Even when policy interventions alter the underlying economic fundamentals, inherent tensions persist due to the equilibrium conditions of the model. Therefore, while each outcome may be desirable as an independent policy objective, this tension underscores the inevitability of trade-offs, compelling policymakers to prioritize among competing goals. Although the paper refrains from addressing the normative dimensions of these trade-offs, it uncovers a critical constraint that policymakers must navigate.

I empirically evaluate this tension using a panel dataset spanning a large set of countries from 1970 to 2014, where all three outcomes—fertility, dual-parenthood, and gender income equality—are coherently measured. To ensure the analysis does not artificially preclude the co-existence of these outcomes, I classify countries into high fertility, high dual-parenthood, and high gender income equality groups based on the sample medians of each dimension. I then visualize their intersections using a Venn diagram. The results reveal that only a negligible fraction of observations simultaneously achieve all three, a proportion significantly lower than what would be expected under random chance. This empirical pattern aligns with the tension in the model, highlighting the inherent trade-offs among these three objectives.

Next, I examine the grand gender convergence by extending the static model into a dynamic framework with intergenerational evolution of gender-specific human capital. I integrate an important result from recent empirical literature: single parenthood exerts differential effects on the human capital accumulation of boys compared to girls.[1] This finding underscores that shifts in family structures have far-reaching implications for future gender disparities in human capital, which in turn shape the descendants' marriage rates, fertility decisions, and female labor market outcomes.

In the dynamic model, the decline of patriarchy, i.e., the co-evolution of fertility, marriage, and gender income gaps, is driven by two mechanisms. First, factor-neutral technological progress increases the opportunity cost of child-rearing and thus reduces fertility. This is a classic argument in the literature (e.g. Greenwood et al. 2005a). The model further points out that this decline in fertility leads to lower within-household income transfers and declining marriage rates – an insight discussed by Folbre (2021) but not yet explored in structural models. Second, the rise in single parenthood and the narrowing of gender gaps in human capital create a self-reinforcing feedback loop, amplifying the direct effect of technological progress – a new mechanism that is consistent with the reversal of gender education gap documented by Reeves (2022) and Feng et al. (2023).

Taken together, these channels demonstrate that technological progress plays a fundamental role in explaining the inevitable erosion of patriarchal structures. In particular, rising total factor productivity alone is sufficient to drive all three phenomena qualitatively, without requiring factor- or gender-biased technological changes.

In addition, I argue that while the first mechanism (i.e., rising opportunity costs of children) operates uniformly across economies, the timing and intensity of the second mechanism (i.e., feedback between marriage and gender gaps in human capital) vary significantly due to cross-country differences in social norms governing marital decisions. For instance, in some societies experiencing declining fertility and narrowing gender income gaps, single parenthood remains rare due to persistent social norms. These institutional variations give rise to distinct transitional trajectories. I underscore this heterogeneity using the contrasting cases of the United Kingdom, Japan, and several other economies as illustrating examples.

[1] As highlighted by Wasserman (2020), "The evidence supports an emerging consensus that growing up in a family without biological married parents produces more adverse consequences for boys than for girls."

Finally, I explore whether equalizing childcare responsibilities between genders could resolve this tension. I present several arguments suggesting that such a policy intervention is unlikely to fully address the underlying trade-offs.

Related Literature

This paper is closely connected to the literature on family and gender economics, particularly the extensive body of work examining historical shifts in fertility, marriage, and gender inequality.[2] It makes four contributions to the literature.

First, while prior research has largely developed separate theories for each trend or examined at most two trends simultaneously (e.g., Galor and Weil 1996; Regalia and Rios-Rull 2001; Santos and Weiss 2016; Greenwood et al. 2016; Gayle et al. 2022; Greenwood et al. 2023), this paper introduces a unified framework that integrates all three phenomena, formalizing the inherent tensions among them.

Second, adopting a holistic perspective, I propose and empirically validate the tension hypothesis, a novel conjecture that connects previously disparate areas of the literature. This tension establishes an important boundary for policymakers: achieving high fertility, widespread dual-parenthood, and gender income equality simultaneously is structurally challenging.

Third, I demonstrate that factor-neutral technological progress can simultaneously drive declines in fertility, marriage rates, and gender income gaps. This mechanism complements existing theories that emphasize factor-biased technological changes, such as skill-biased innovation favoring child quality over quantity (Galor and Weil 2000; Fernandez-Villaverde 2001), the household appliance revolution that reduced the demand for marriage and increased female labor force participation (Greenwood et al. 2005b; Greenwood et al. 2023), or structural transformation that shifted labor demand in favor of women (Galor and Weil 1996; Ngai and Petrongolo 2017; Cao et al. 2024).

Fourth, relative to structural models of demographic transition (e.g., Greenwood et al. 2023), I introduce a new propagation channel linking marriage rates to gender disparities in human capital formation. While the empirical literature has extensively doc-

[2] For comprehensive reviews, see Greenwood et al. (2017) and Greenwood (2019).

umented the differential effects of family structure on boys versus girls (e.g., Bertrand and Pan 2013; Autor et al. 2019; Wasserman 2020; Reeves 2022; Frimmel et al. 2024), this paper is the first to incorporate these findings into a dynamic macroeconomic framework, highlighting how shifts in family structure amplify intergenerational gender gaps.

The remainder of the paper is structured as follows. Section 2 presents the static model of marriage and fertility decisions. Section 3 formulates the tension hypothesis and provides empirical evidence. Section 4 examines the decline of patriarchal structures through the dynamic model. Section 5 explores whether equalizing childcare responsibilities could resolve the tension. Section 6 concludes.

2. The Static Model

This section presents the static economy. I keep the time subscript t in variables so that the model can be readily extended to a dynamic one in Section 4.

Individuals are indexed by gender $g \in \{♂, ♀\}$. Each gender comprises half of the population. Individuals derive utility from consumption c and fertility n:

$$u(c,n) = \left((1-\beta) \cdot c^{\frac{\rho-1}{\rho}} + \beta \cdot n^{\frac{\rho-1}{\rho}}\right)^{\frac{\rho}{\rho-1}}, \qquad \beta \in (0,1). \tag{1}$$

Following Jones and Schoonbroodt (2010) and Carlos Córdoba and Ripoll (2019), I assume that $\rho > 1$ so that the utility for childless individual $u(c,0)$ is well-defined.

To focus on between-gender disparities, I assume that individuals have the same amount of human capital within each gender denoted by $h_t^{♂}$ and $h_t^{♀}$ respectively.[3] Labor is the only productive factor in the economy. Therefore, $h_t^{♂}$ and $h_t^{♀}$ determine wages. In the static model, $h_t^{♂}$ and $h_t^{♀}$ are exogenously given. The gender gap in human capital at time t is defined as

$$\Gamma_t^h = \frac{h_t^{♂}}{h_t^{♀}}. \tag{2}$$

I use A_t to denote total factor productivity (TFP) at time t. In the baseline analysis, I

[3]Incorporating within-gender human capital heterogeneity complicates the model with assortative matching (e.g., Low 2014, Chiappori 2017) which is interesting but not the focus of this paper.

assume that A_t is also exogenously given.[4]

2.1 Single Individuals

Single men consume their labor income and remain childless. They supply one unit of labor inelastically. Therefore, their utility is given by

$$V_t^{♂,s} = u(A_t h_t^{♂}, 0) \tag{3}$$

where s in the superscript denotes "single."

single women, on the other hand, can have children but do not receive any transfers or support from the absentee fathers.[5] They choose consumption $c_t^{♀,s}$, fertility n_t^s, and labor supply n_t^s to solve the utility maximization problem

$$V_t^{♀,s} = \max_{c_t^{♀,s}, l_t^s, n_t^s} \quad u(c_t^{♀,s}, n_t^s) \tag{4}$$

subject to budget and time constraints

$$c_t^{♀,s} = A_t h_t^{♀} l_t^s, \quad \text{and} \quad l_t^s = 1 - \chi n_t^s$$

where χ is the time cost of raising each child. I follow the literature and assume that the fertility choice is continuous, i.e., $n_t^s \in \mathbb{R}_+$.

To summarize, the decisions of single women involve a simple consumption-fertility trade-off via endogenous labor supply – a margin that is commonplace in the female labor supply literature (e.g., Rosenzweig and Wolpin 1980).

[4] Allowing for endogenous A_t leads to additional channels. For example, besides enhancing aggregate productivity A_t through reducing misallocation à la Hsieh et al. (2019), rising female labor supply could stimulate innovation and hence economic growth (Chiplunkar and Goldberg 2021). Another example is Galor and Weil (1996) which discusses the feedback mechanism between fertility decline, which stimulates capital accumulation, and rising demand for female labor, which is more complementary to capital than male labor.

[5] This is a model simplification. If the biological father can be identified and located, it is possible to sue him for child support. Nevertheless, according to the calculation by the Annie E. Casey Foundation using data from the Current Population Survey wave 2020-2022, just 23% of U.S. female-headed families living with one or more children under age 18 reported receiving any amount of child support during the previous year.

2.2 Married Individuals

Once married, husbands in the economy supply one unit of labor inelastically and transfer α_t share of their income to their wives to fulfill the marital contract. This assumption captures the traditional role of marriage where husbands are the main breadwinners and provide income for the family. It is important that while individuals take α_t as given, it is an equilibrium object to be characterized in Section 2.5.

Husbands derive utility from fertility and consuming their remaining income. The former is a good shared with their wives. Therefore, the value of married men is

$$V_t^{♂,m} = \max_{n_t^m} \quad u(\underbrace{(1-\alpha_t)A_t h_t^{♂}}_{\text{remaining income}}, \underbrace{n_t^m}_{\text{fertility}}). \tag{5}$$

where m in the superscript denotes "married."

Wives, on the other hand, trade-off fertility and consumption via endogenous labor supply. They solve the utility maximization problem

$$V_t^{♀,m} = \max_{c_t^{♀,m}, l_t^m, n_t^m} \quad u(c_t^{♀,m}, n_t^m) \tag{6}$$

subject to budget and time constraints

$$c_t^{♀,m} = \underbrace{\alpha_t A_t h_t^{♂}}_{\text{transfer from husband}} + \underbrace{A_t h_t^{♀} l_t^m}_{\text{own labor income}}, \quad \text{and} \quad l_t^m = 1 - \chi n_t^m$$

where n_t^m and l_t^m are the fertility and labor supply of married women. From the wives' perspective, the transfers from husbands generate a pure income effect which leads to higher consumption and fertility because both are normal goods in preferences. Rising wages for women, however, will generate a substitution effect, leading to a lower demand for children because consumption and fertility are substitutes in preferences, a mechanism emphasized by Greenwood et al. (2005a). Therefore, the model implies that increases in wages of women decrease fertility while increases in wages of men increase fertility, a prediction verified by Jakobsen et al. (2022) using Danish registry data.

Furthermore, given that husbands do not directly bear the costs of children after transferring α_t share of income, they prefer as many children n_t^m as possible.[6] Wives, however, prefer to have fewer children because they directly shoulder the burden of childcare. This observation is supported by the empirical findings in Doepke and Tertilt (2018). Motivated by Doepke and Kindermann (2019), I assume that childbirth within marriage is subject to veto. Therefore, *wives* are the key decision-makers regarding fertility within marriage in this model.

2.3 Marriage Market

I consider a competitive marriage market where marital fertility and within-household transfers balance the supply and demand. At the beginning of the period, each woman receives an idiosyncratic private shock τ on the taste of marriage which follows a distribution $J(\tau)$.[7] For a woman with taste shock τ, her utility from marriage is $\tau \cdot V_t^{♀,m}$. After receiving the shock, individual woman decides whether or not to participate in the marriage market and randomly matched with a man, or she could choose to stay single.

The distribution $J(\tau)$ is a reduced-form way to capture other considerations of marriage that are not explicitly specified in the model, such as mutual affection, tax benefits, risk-sharing, and social norms.

For women, it is straightforward that there exists a threshold τ_t^* above which they would prefer marriage over staying single. The value of τ_t^* can be implicitly defined using the indifference condition

$$V_t^{♀,m} \cdot \tau^* = V_t^{♀,s}. \tag{7}$$

Therefore, the share of men or women that are married in the equilibrium of the monog-

[6]The assumption that males do not share the cost of children is not crucial. In fact, all the results go through as long as wives shoulder *more* childcare responsibilities than their husbands–a pattern that holds widely across countries and over time (Kleven et al. 2019, Doepke et al. 2023). In Section 5, I discuss how gender equality in childcare would affect the results.

[7]Similar assumptions can be found in marriage models such as Greenwood et al. (2017).

amous economy is given by

$$\mathcal{M}_t = 1 - J(\tau_t^*) \tag{8}$$

On the other hand, because men are homogeneous and are on the long side of the marriage market,[8] the equilibrium imposes an indifference condition for them between getting married and staying single:

$$V_t^{♂,m} = u((1-\alpha_t)A_t h_t^{♂}, n_t^m) = u(A_t h_t^{♂}, 0) = V_t^{♂,s}. \tag{9}$$

Therefore, the key assumption here is that the share of within-household transfers α_t and marital fertility n_t^m acts as "prices" to clear the marriage market.

2.4 Aggregate Variables

The model provides simple expressions for other aggregate variables of interest. For example, aggregate fertility rate n_t is a weighted average of marital and non-marital fertility:

$$n_t = \mathcal{M}_t \cdot n_t^m + (1-\mathcal{M}_t) \cdot n_t^s. \tag{10}$$

The share of children born with both parents, i.e., under dual-parenthood, is given by

$$\mathcal{D}_t = \frac{\mathcal{M}_t \cdot n_t^m}{n_t}. \tag{11}$$

Average hours worked per woman is

$$l_t^{♀} = \mathcal{M}_t \cdot l_t^m + (1-\mathcal{M}_t) \cdot l_t^s = 1 - \chi n_t. \tag{12}$$

The average labor income of men and women are

$$y_t^{♂} = A_t \cdot h_t^{♂} \qquad \text{and} \quad y_t^{♀} = A_t \cdot h_t^{♀} \cdot l_t^{♀},$$

[8] This condition is commonly introduced in marriage market models, for example see Low (2024).

which leads to a simple expression of the gender income gap

$$\Gamma_t^y = \frac{y_t^{\male}}{y_t^{\female}} = \frac{\Gamma_t^h}{l_t^{\female}}. \tag{13}$$

2.5 Model Solution

The equilibrium conditions of the static economy can be characterized in the following steps. First, the indifference condition of men in the marriage market (9) implicitly defines α_t as a function of n_t^m:

$$(1-\beta)\cdot(A_t h_t^{\male})^{\frac{\rho-1}{\rho}}\left[1-(1-\alpha_t)^{\frac{\rho-1}{\rho}}\right] = \beta\cdot(n_t^m)^{\frac{\rho-1}{\rho}}. \tag{14}$$

When $\rho > 1$, using the implicit function theorem on Equation (14) reveals that the function $\alpha_t(n_t^m)$ is strictly increasing and convex. It takes the value of 0 when $n_t^m = 0$, and shifts up when A_t rises.

On the other hand, the first-order condition of married women gives the optimality condition where n_t^m is a function of α_t:

$$n_t^m \cdot \left[\left(\frac{(1-\beta)A_t h_t^{\female}\chi}{\beta}\right)^{\rho} + A_t h_t^{\female}\chi\right] = (1+\alpha_t\Gamma_t^h)A_t h_t^{\female} \tag{15}$$

Equation (15) indicates that $n_t^m(\alpha_t)$ is an increasing and linear function. It takes a strictly positive value when $\alpha_t = 0$ and shifts down when A_t rises.

Taking the properties of $\alpha_t(n_t^m)$ and $n_t^m(\alpha_t)$ together generates the first lemma.

Lemma 1: For given A_t, there is a unique fixed point of (α_t, n_t^m).

Proof: See Appendix.

Second, by comparing $V_t^{\female,s}$ and $V_t^{\female,m}$, Lemma 2 provides a condition for the cutoff τ_t^* above which women choose to get married.

Lemma 2: The marriage threshold $\tau_t^* = 1/(1+\alpha_t\Gamma_t^h)$.

Proof: See Appendix.

Lemma 2 indicates that the marriage threshold, and hence the marriage rate $\mathcal{M}_t$, is determined by the economic gains from marriage from the women's perspective. The "transfer potential" of men to women is a product of the gender gap in human capital (and hence wages) Γ_t^h and men's willingness to transfer α_t.

Together with Equation (26) in the Appendix, Lemma 2 also indicates that the fraction of dual-parenthood $\mathcal{D}_t$, defined in (11), is monotonically increasing in the marriage rate $\mathcal{M}_t$. Therefore, I will use $\mathcal{M}_t$ and $\mathcal{D}_t$ interchangeably in the remaining analyses.

3. The Tension

In this section, I define and empirically test the tension.

3.1 Theory

Collecting the equilibrium conditions, the relationship between fertility n_t, marriage rate $\mathcal{M}_t$, female labor supply $l_t^{♀}$, and gender income gap Γ_t^y can be summarized in the following three equations:

$$\mathcal{M}_t = 1 - J\left(\frac{1}{1+\alpha_t\Gamma_t^h}\right) \tag{16}$$

$$\Gamma_t^y = \frac{\Gamma_t^h}{l_t^{♀}} \tag{17}$$

$$l_t^{♀} = 1 - \chi n_t \tag{18}$$

Equations (16)-(18) highlight the core tensions in the model. In particular, (16) shows that marriage rates are higher when there are larger gender gaps in human capital Γ_t^h. But (17) implies that large gender gaps in human capital make it difficult to achieve gender income equality unless the female labor supply is high. However, the direct implication of a high female labor supply is low fertility from (18).

The Tension: There exists a tension among high fertility, dual-parenthood (or equivalently high marriage rate), and gender income equality, such that achieving all three simultaneously is challenging in an economy.

Proof: I establish this tension by discussing three possible cases.

1. *High fertility and dual-parenthood*

With high fertility n_t, female labor supply $l_t^{♀}$ is low from (18). To achieve a high marriage rate $\mathcal{M}_t$, gender human capital gap Γ_t^h cannot be too low from (16). Therefore, the gender income gap Γ_t^y is necessarily high from (17).

2. *High fertility and gender income equality*
   With high fertility n_t, female labor supply $l_t^{♀}$ is low from (18). To achieve a low gender income gap Γ_t^y, it must be the case that Γ_t^h is very low from (17). But a very low gender gap in human capital Γ_t^h leads to a low marriage rate $\mathcal{M}_t$ from (16).[9]

3. *Dual-parenthood and gender income equality*
   To achieve a high marriage rate $\mathcal{M}_t$, (16) implies that the gender gap in human capital Γ_t^h needs to be high. With high Γ_t^h, the only way to achieve a low gender income gap Γ_t^y is to have a high female labor supply $l_t^{♀}$. needs to be very high from (17). Therefore, fertility n_t is very low from (18).

3.2 Empirical Results

To empirically test this tension, I gather data from three key sources: (1) total fertility rates (TFR) from the United Nations, (2) the proportion of children born outside of marriage from the OECD database, and (3) gender gaps in median earnings, also from the OECD database. This results in an unbalanced panel dataset comprising 37 countries from 1970 to 2014, with a total of 721 country-year observations.

To categorize the observations, I use the sample medians of each variable as thresholds to define ”high” or ”low” values. This approach ensures that each group contains a sufficient number of observations, thereby providing a balanced opportunity to observe the trinity. Arbitrarily strict cutoffs would make achieving the trinity impossible by design, which is why median-based categorization is more appropriate.

Using this definition, observations are labeled as

- “high fertility” if $\text{TFR}_{it} > 1.69$,

[9]One might wonder whether Nordic countries, with high levels of cohabitation, are exceptions to the tension. Measures of living arrangements from the OECD Family Database, however, suggest that Norway, Finland, and Sweden also have a large share of children living with single parents that is well above the OCED average.

- “dual-parenthood” if out of marriage$_{it} < 31.4\%$, and
- “gender income equality” if gap$_{it} < 17.2\%$.

After categorizing the observations, I visualize their overlaps using a Venn diagram, as depicted in Figure 1. Since each variable is dichotomized at its sample median (i.e., ”high” or ”low”), the expected overlap of all three outcomes under statistical independence would be $0.5 \times 0.5 \times 0.5 = 12.5\%$. The empirical results, however, starkly diverge from this benchmark: fewer than 3% of observations simultaneously exhibit high fertility, dual-parenthood, and gender income equality. This substantial discrepancy—less than a quarter of the random expectation—provides strong empirical support for the tension, underscoring the inherent incompatibility of these three outcomes.

Moreover, Figure 1 reveals that a significant number of countries achieve only one or even none of the outcomes, further illustrating the systemic challenges in reconciling these societal goals.

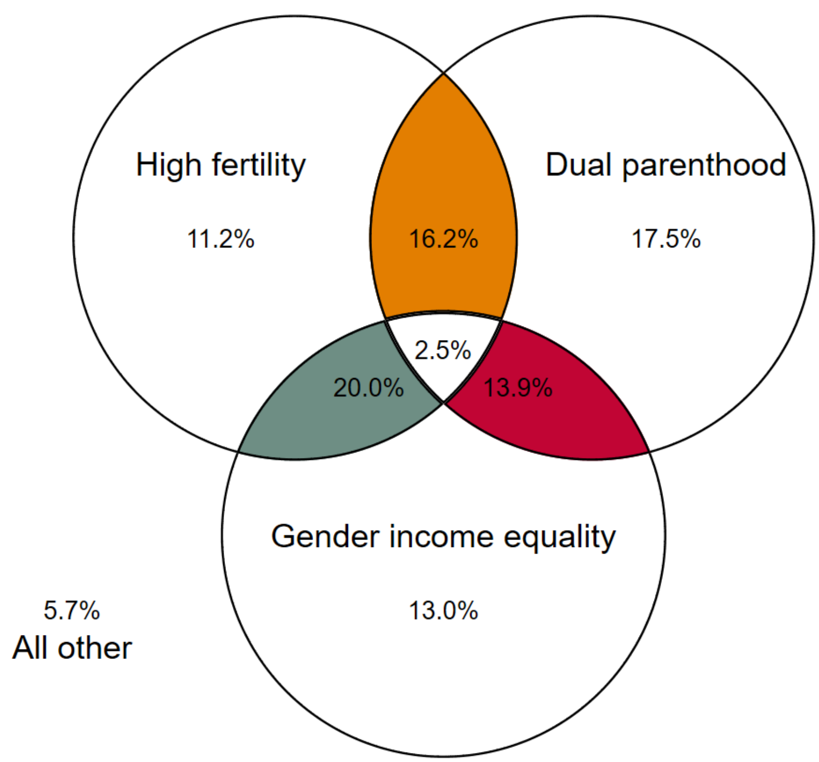


Figure 1: The Tension in the Data

D – dual-parenthood, G – gender income equality, F – high fertility	
Category	Countries
None	Austria, United Kingdom 1995-2003
Only D	Canada, Switzerland, Germany 1992-2006, Japan, South Korea
Only G	Germany 2009-2014, Hungary, Portugal
Only F	United States 1994-2013, Finland
$D+G$	Greece, Italy, Poland
$G+F$	Belgium, Norway, New Zealand, Sweden
$D+F$	United Kingdom 1970-1994, Israel, USA 1973-1993
$D+G+F$	Australia 1992-2002 ($G+F$ afterwards)

Table 1: Examples of Countries

Table 1 provides illustrative examples for each segment of the Venn diagram. Notably, Australia stands out as the primary country that consistently achieved the trinity under the given definition, maintaining this status from 1992 to 2002.[10] After 2003, Australia experienced a sharp rise in single parenthood, causing it to lose its ”dual-parenthood” status and, consequently, its position within the trinity. A comprehensive overview of the number of outcomes achieved by each country over time is presented in Figure A.8, offering a broader perspective on the dynamics of these societal goals.

To test the robustness of the tension, I have:

1. Explored alternative cutoff definitions by

   (i) defining ”high fertility” as cases where $\text{TFR}_{it} > 2$, and

   (ii) using the upper quartiles of each variable to define the categories.

2. Used alternative data sources by

   (i) measuring gender inequality using female share of labor income from the World Inequality Database (WID), and

[10] It is worth noting, however, that Australia's fertility rate during this period was below 1.9, meaning it would no longer qualify for the trinity if a stricter threshold of $\text{TFR} > 2$ were applied.

(ii) measuring out-of-wedlock birth using illegitimate births statistics from the United Nations.

These data complements the baseline measure by providing a greater coverage of low-income countries in Asia and Africa.

The results, presented in Figures A.4-A.7, confirm that the main findings remain consistent across these alternative specifications and data sources.

3.3 Implications

The main takeaway from this tension is that while each of the three outcomes—high fertility, dual-parenthood, and gender income equality—may be desirable policy goals,[11] achieving all three simultaneously is inherently challenging due to the trade-offs among them.

To unpack the intuition behind this result, it is important to highlight two key tensions in the static model. The first tension arises between fertility and gender income equality, mediated by endogenous female labor supply. For example, consider family policies that alter the cost of children, χ (e.g., baby bonuses or child tax credits). If policymakers increase χ, gender equality may improve as female labor supply rises, but this comes at the expense of lower fertility. Conversely, reducing χ may boost fertility, but it also decreases female labor supply, widening the gender income gap.

The second tension exists between dual-parenthood and gender income equality. For instance, anti-discrimination policies that reduce Γ_h and shrink gender wage gaps may lead to lower marriage rates, as the potential for income transfers from males diminishes. On the other hand, an increase in Γ_h could raise marriage rates but worsen gender income equality. These trade-offs illustrate the inherent incompatibility of simultaneously achieving all three outcomes.

To take a step back, the two tensions in the static model may not be fully satisfactory

[11] For instance, numerous policies have been implemented to promote childbirth and gender equality. Additionally, although the model does not explicitly account for cross-sectional inequality, studies such as Kearney (2023) have demonstrated a strong connection between the prevalence of dual-parenthood and inequalities in children's outcomes.

for several reasons. First, due to the model's setup, it might not adequately capture the margins on leisure, thereby overlooking the possibility that certain government policies, such as subsidized childcare, could simultaneously increase both fertility and female labor supply (Baker et al. 2008). This could potentially resolve the first tension. Second, governments have the ability to directly influence the benefits of marriage (e.g. through the tax system), thereby altering $J(\cdot)$ and achieving higher marriage rates without compromising gender income equality, which addresses the second tension.

However, the result in Figure 1 suggests the presence of an additional mechanism. If such mechanisms did not exist, we would expect to see a greater number of countries achieving the trinity, especially given that subsidized childcare and marriage tax benefits are already available to governments and widely adopted in many developed economies.

To explore this further, in Section 4, I extend the model into a dynamic setting to uncover another intrinsic tension between dual-parenthood and the gender income gap through the formation of gender-specific human capital. This dynamic model not only strengthens the argument for the tension but also provides a roadmap for the potential demise of patriarchy.

4. The Autumn of Patriarchy

This section studies the transition from patriarchal societies to egalitarian societies in a dynamic model.

4.1 Human Capital Dynamics

I assume that the gender-specific human capital follows the law of motion

$$h_{t+1}^{\female} = (h_t^{\female})^{\theta} \cdot (\mathcal{M}_t)^{\psi^{\female}} \tag{19}$$

$$h_{t+1}^{\male} = Z \cdot (h_t^{\male})^{\theta} \cdot (\mathcal{M}_t)^{\psi^{\male}} \tag{20}$$

where $Z > 1, \theta \in (0, 1)$ and more importantly, $\psi^{♂} > \psi^{♀} > 0$.[12]

The assumption $Z > 1$ captures the empirical pattern that, in societies with universal dual parenthood, men typically exhibit higher levels of schooling and wages than women. Similar to total factor productivity A, the gender-biased human capital productivity Z may, in a broader model, be endogenous to factors such as social norms, discrimination, or structural change (e.g., Ngai and Petrongolo 2017 and Hsieh et al. 2019). However, for the purposes of this paper, I treat Z as exogenous and assume $Z > 1$. This ensures the existence of a marriage rate threshold $\overline{\mathcal{M}} \in (0, 1)$ at which the gender human capital gap Γ^h equals zero. This assumption aligns with the observed reversal in gender schooling disparities documented by Feng et al. (2023).

The more critical assumption $\psi^{♀} > \psi^{♂}$ is motivated by a large empirical literature that has documented that growing up in a family without biological married parents leads to more adverse consequences for boys than for girls (e.g., see Sommers 2001, Bertrand and Pan 2013, Chetty et al. 2016, Autor et al. 2019, Wasserman 2020, Reeves 2022, and Frimmel et al. 2024). This intriguing result could be due to (1) role model effects operating within genders, (2) differential sensitivity to parental inputs across genders, or (3) differential exposure or sensitivity to inputs from other social institutions such as neighborhoods or schools.

The difference between between $\psi^{♂}$ and $\psi^{♀}$ is economically sizable. For example, Autor et al. (2019) show that the racial differences in the ratio of single motherhood could explain the bulk of the black-white differences in gender gaps. Autor et al. (2023) find that a substantial fraction of the gender gap in high school outcomes can potentially be explained by the differential effect of family socioeconomic status, in particular family structure, on boys' medium-run outcomes.

Under the differential sensitivity assumption, the model implies that the prevailing marriage rates determine gender gaps in human capital in the next generation and

[12] I adopt Galton's approach to the intergenerational transmission of human capital for analytical and aggregation simplicity. As pointed out by Mulligan (1999), explicit modeling of parental human capital investment decisions, e.g., following Becker and Tomes (1979), often yields similar predictions.

hence the evolution of Γ^h. To see this, note that dividing (19) by (20) yields

$$\Gamma^h_{t+1} = Z \cdot (\Gamma^h_t)^\theta \cdot (\mathcal{M}_t)^{\psi^{♂} - \psi^{♀}}$$

which implies in steady-state

$$\Gamma^h = Z^{\frac{1}{1-\theta}} \cdot (\mathcal{M})^{\frac{\psi^{♂} - \psi^{♀}}{1-\theta}} \Longrightarrow \frac{d\Gamma^h}{d\mathcal{M}} > 0 \tag{21}$$

Therefore, higher marriage rates generates larger gender human capital gaps through the channel of human capital formation.

4.2 Mechanism

With all elements in the dynamic system defined, this section discusses the mechanisms that result in the demise of patriarchy.

Lemma 3: The levels of α_t and n^m_t are decreasing in A_t.

Proof: See Appendix.

The logic of Lemma 3 hinges on the trade-off between consumption and fertility in household decision-making. When total factor productivity A increases, it elevates wages, thereby raising the opportunity cost of child-rearing. Since consumption and fertility are substitutes in utility, households respond to higher productivity by prioritizing consumption over having children—the substitution effect (driven by increased costs of child-rearing) outweighs the income effect (which might otherwise encourage more children with higher income). This leads to a decline in marital fertility (n^m_t). Consequently, the share of transfers (α) men offer their wives also decreases, as these transfers are tied to marital fertility. This mechanism is illustrated by the red arrows in Figure 2, linking rising A to falling α.

The demise of patriarchy is further accelerated by a self-reinforcing feedback loop between declining marriage rates and shrinking gender human capital gaps (illustrated by the blue arrows in Figure 2). Here's how this cycle unfolds:

1. Declining transfers reduce marriage incentives

A fall in the transfer share (α) directly reduces the economic surplus women gain from marriage ($\alpha\Gamma^h$), where Γ^h measures the gender gap in human capital (e.g., men's historically higher earnings). As marriage becomes less financially advantageous, fewer women opt to marry, leading to a drop in the marriage rate ($\mathcal{M}$).

2. Disproportionate impact on boys' human capital

   The decline in marriage increases single-parenthood, which disproportionately harms boys' human capital accumulation. This could stem from societal biases (e.g., single mothers facing constraints in investing in sons' education) or labor market dynamics (e.g., boys in father-absent households lacking role models or networks). Consequently, the male advantage in human capital (Γ^h) narrows in the next generation.

3. Feedback loop: smaller gender gap erodes marriage further

   A smaller Γ^h reduces the economic rationale for marriage ($\alpha\Gamma^h$) even more, driving marriage rates ($\mathcal{M}$) down further. This creates a self-reinforcing cycle: lower marriage rates shrink the gender human capital gap, which in turn makes marriage even less appealing.

Rising productivity (A_t) thus sets off a chain reaction: the initial decline in α (from Lemma 3) kickstarts this feedback loop, which amplifies the effects of A_t across generations. The result is a persistent, co-evolving decline in both marriage rates and gender gaps, eroding the structural pillars of patriarchal systems. More rigorously, the impact of the feedback loop is given by Lemma 4.

Lemma 4: Declining α_t reduces long-run $\mathcal{M}$ and Γ^h.

Proof: See Appendix.

Taking stock, Figure 2 indicates that the joint declines in fertility, marriage, and gender income can be explained by a unified framework that solely relies on rising total factor productivity A_t.

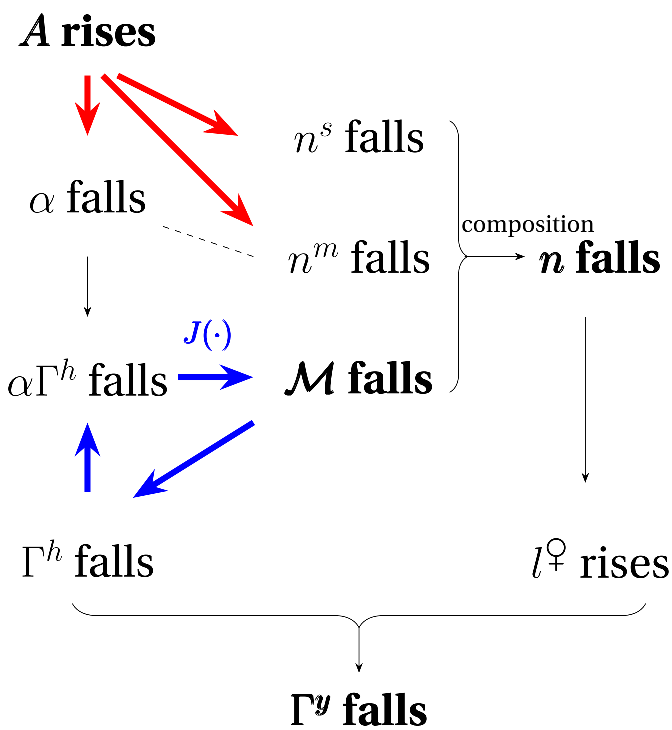


Figure 2: The Autopsy of Patriarchy

4.3 Empirical Correlations

Understanding the quantitative role of rising productivity in driving declines in fertility, marriage rates, and gender income disparities is an important exercise, yet it poses several methodological challenges here. One approach is to adopt a development accounting framework (Caselli 2005), assuming uniform structural parameters across countries. However, this assumption is at odds with empirical evidence, as cross-country heterogeneity in institutions and preferences is substantial—a point I elaborate on in the next subsection. Alternatively, calibrating the model to country-specific preferences and distributions risks overfitting, potentially inflating the model's explanatory power and undermining its generalizability.

To navigate these trade-offs, I pursue an intermediate strategy by estimating the correlations between productivity—proxied by the log of GDP per capita from the Penn World Table—and the key variables of interest: fertility (n), single parenthood, and the gender income gap (Γ^y). I include country fixed effects to isolate within-country variation and report the associated R^2 to assess explanatory power. The standard errors are clustered at the country level.

The results, presented in columns (1)–(3) of Table 2, reveal robust patterns. Productivity exhibits a statistically significant negative correlation with fertility, a positive correlation with single parenthood, and a negative correlation with the gender income gap. In each case, productivity accounts for a substantial fraction of within-country variation, underscoring its economic importance.

In columns (4)–(6), I restrict the sample to observations where all three outcomes are jointly observed. The findings remain largely consistent, with one notable exception: the negative correlation between productivity and fertility weakens. This attenuation, often referred to as the "J-curve" hypothesis, aligns with prior literature on advanced economies (e.g., Doepke et al. 2023) and suggests a nonlinearity in the fertility-productivity relationship at higher income levels, or potentially simply due to the curvature of the utility function.

	(1)	(2)	(3)	(4)	(5)	(6)
	n	Single	Γ^y	n	Single	Γ^y
log(gdppc)	-1.28	18.26	-11.84	-0.11	22.40	-12.20
	(0.09)	(3.14)	(2.49)	(0.09)	(5.22)	(2.25)
# of Obs.	10399	1764	782	721	721	721
Within-group R2	0.36	0.53	0.41	0.04	0.53	0.46
Country FE	✓	✓	✓	✓	✓	✓

Table 2: Correlations with Productivity

4.4 The Role of Social Norms

Figure 2 reveals an important nuance: although the first channel—where rising productivity A_t uniformly reduces marital fertility (n_t^m) and lowers transfer shares (α_t)—operates similarly across countries, the impacts on marriage rates ($\mathcal{M}$) and gender income gaps (Γ^h) diverge significantly in the long run and along the transition path. This divergence stems from cross-country differences in the quantitative strength of the second channel, driven by societal variations in how marriage decisions respond to shifts in economic incentives.

Central to this variation is the relationship between the "transfer potential" ($\alpha\Gamma^h$) and marriage rates ($\mathcal{M}$), which depends critically on the distribution of idiosyncratic shocks $J(\tau)$. These shocks reflect societal and institutional factors—such as cultural attitudes toward marriage, religious norms, or the prevalence of practices like shotgun marriages—that shape individual thresholds for entering marriage. Crucially, the density of individuals near the marriage cutoff τ^* determines the sensitivity of $\mathcal{M}$ to changes in $\alpha\Gamma^h$. In societies where many individuals cluster near τ^* (e.g., cultures with weak marital norms or little stigma against single parenthood), even modest declines in $\alpha\Gamma^h$ can precipitate sharp, nonlinear drops in $\mathcal{M}$. In contrast, more traditional societies exhibit smaller, more gradual responses.

These differences in elasticity cascade into the feedback loop between marriage rates and human capital gaps. Where marriage declines are abrupt, the resulting rise in single parenthood disproportionately stunts boys' human capital accumulation, accelerating the narrowing of Γ^h . This rapid narrowing further erodes the transfer potential ($\alpha\Gamma^h$), intensifying the cycle. Conversely, in societies with gradual marriage declines, the feedback between $\mathcal{M}$ and Γ^h unfolds more slowly, dampening the pace of patriarchal decline.

To provide concrete examples, Figure 3a illustrates the case of the United Kingdom. Following the decline in fertility after the after-war Baby Boom, single parenthood experienced a significant rise starting in the 1980s. From the perspective of the model, this trend can be attributed to two key factors: the increasing female labor supply and the narrowing gender gaps in human capital. Together, these forces contributed to the convergence of gender income gaps in the UK.

In contrast, Figure 3b depicts the case of Japan. While fertility also declined during the rapid economic growth of the 1980s, single parenthood remained relatively stagnant. This can be largely explained by the enduring influence of Confucian traditions, which stigmatize out-of-wedlock births (Myong et al. 2021). Through the lens of the model, only the rising female labor supply played a role in narrowing gender income gaps in Japan. Consequently, the pace of gender gap convergence in Japan has been significantly slower compared to that in the United Kingdom. These differences can be partly attributed to the distinct distributions of $J(\tau)$ in the two countries.

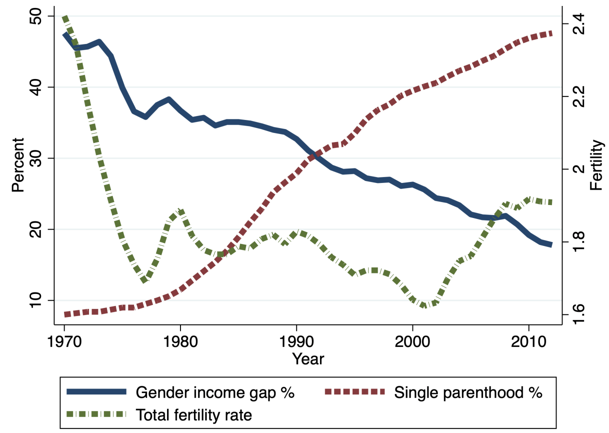
A similar comparative analysis can be extended to other cases, such as Hungary (Figure 3c), South Korea (Figure 3d), Australia (Figure 3e), and Poland (Figure 3f). Each of these examples reveals unique patterns and drivers of gender income gap convergence, shaped by their respective cultural, economic, and institutional contexts.

5. Discussions

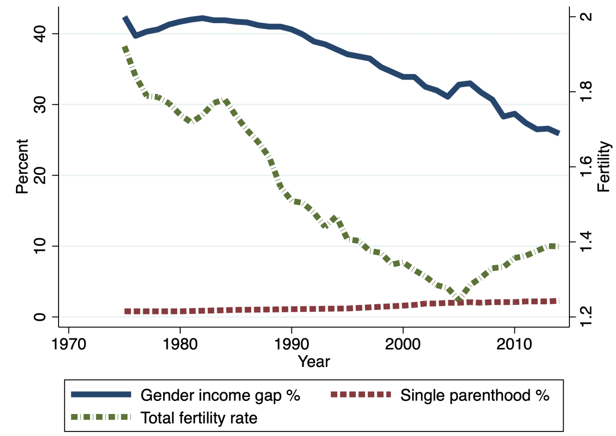
A compelling and complex question arises: Could achieving gender equality in childcare responsibilities—a topic explored in recent studies such as Doepke and Kindermann (2019)—help resolve this tension? Specifically, if childcare responsibilities were more equally shared between men and women, could societies achieve higher fertility rates while simultaneously maintaining dual-parenthood and gender income equality? This question lies at the heart of understanding how shifting gender norms and shared caregiving might address the intertwined challenges of fertility decline, family structure, and economic equity presented in this paper.

Through the lens of the model, if childcare responsibilities are equally shared between genders, the labor supply would be identical across genders regardless of fertility levels. Consequently, the gender income gap Γ^y would depend entirely on the gender human capital gap Γ^h. However, under high marriage rates $\mathcal{M}$, the gender human capital gap Γ^h tends to remain significant due to the differential sensitivity assumption $\psi^{♂} > \psi^{♀}$ and the assumption that $Z > 1$. This implies that, to achieve both dual-parenthood and gender income equality, men would need to take on *more* childcare responsibilities than women. This requirement, however, raises three potential issues.

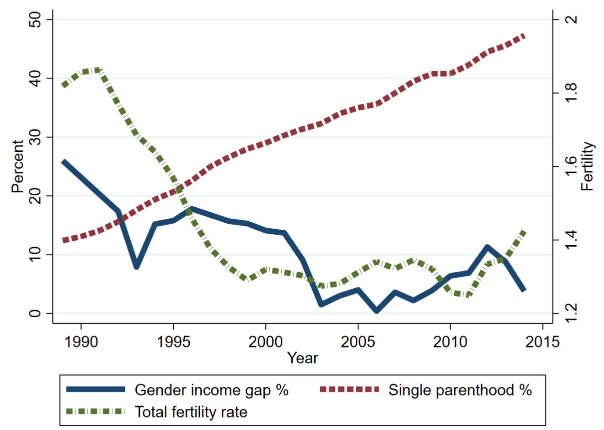
First, what would be the efficiency cost of men working less than women when their human capital is relatively higher? This cost could be further amplified if women possess an absolute advantage in childcare, as reallocating time from higher-productivity



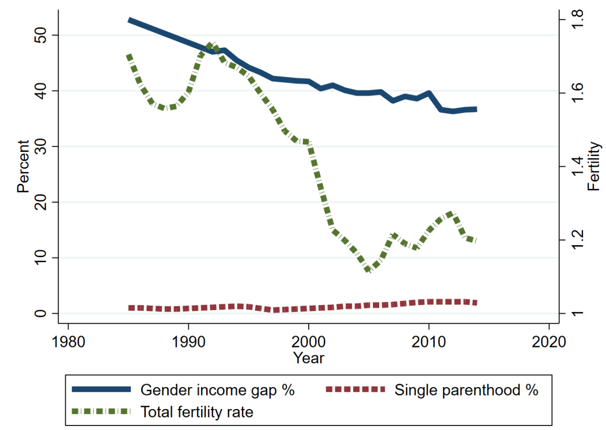
(a) The Case of the U.K.



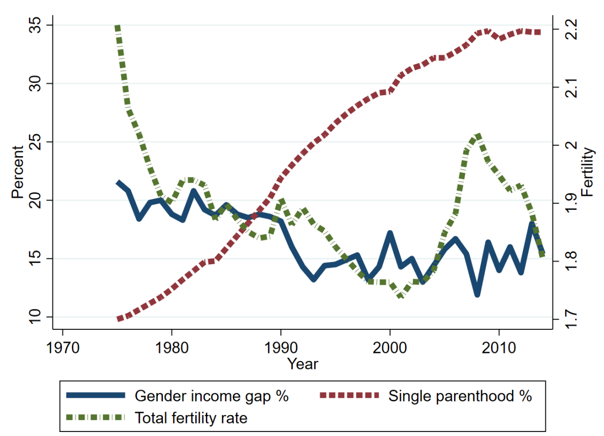
(b) The Case of Japan



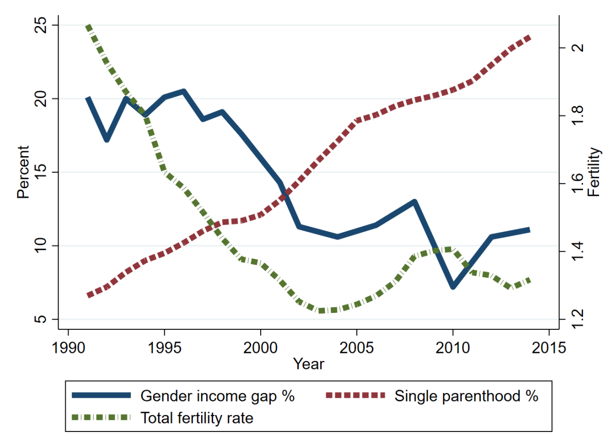
(c) The Case of Hungary



(d) The Case of South Korea



(e) The Case of Australia



(f) The Case of Poland

Figure 3: The Demise of Patriarchy: Some Examples

work to childcare could lead to greater economic inefficiencies.

Second, since men have the outside option of remaining single and childless, the transfer α (representing the economic gains from marriage) would need to be very low to incentivize them to take on additional childcare responsibilities within marriage. However, if α is small, the economic benefits of marriage diminish, making it less attractive for women as well. This could lead to lower marriage rates, undermining the goal of sustaining dual-parenthood.

Third, from an empirical perspective, despite significant progress toward equal childcare sharing, particularly in many European countries, Figure 1 suggests that there is little evidence to support this approach as a viable solution to the tension. The data indicate that even in societies with more egalitarian childcare practices, the challenges of achieving high fertility, dual-parenthood, and gender income equality persist.

For these reasons, I argue that achieving gender equality in childcare responsibilities is unlikely to resolve the tension. While it represents a step toward greater equity, it does not address the underlying structural and economic constraints that perpetuate the trade-offs between fertility, family structure, and gender income equality.

6. Conclusion

Human society is in the midst of a profound and irreversible transformation as the institution of patriarchy, which has shaped economic and social structures for millennia, gradually erodes. This paper develops a unified framework to analyze the dynamic interactions between fertility, dual-parenthood, and gender income gaps during this historic transition. The model yields three central contributions. First, it identifies a fundamental tension in family economics: there exists a tension among high fertility, dual-parenthood, and gender income equality, making it difficult to achieve all three simultaneously—a result that is both theoretically novel and empirically validated. Second, the analysis demonstrates that rising total factor productivity alone is sufficient to drive the decline of patriarchy, challenging the prevailing view that factor or gender-biased technological change is a necessary condition for such a shift. Finally, while the demise of patriarchy appears inevitable in the long run, the pace of this transition is shown to vary significantly across societies, with social norms acting as a critical mediating factor.

This tension underscores the inherent trade-offs faced by modern societies as they strive to balance demographic sustainability, gender equality, and dual parenthood. The role of total factor productivity highlights the importance of broad-based economic growth in reshaping gender dynamics, while the heterogeneity in transition paths emphasizes the enduring influence of cultural and institutional contexts.

This paper not only advances our understanding of the forces driving the decline of patriarchy but also raises pressing questions for future research. How will societies navigate the tension in the face of declining fertility rates and rising gender equality? What institutional innovations might emerge to reconcile these competing objectives? And how will the uneven pace of transition shape global inequality in the decades to come? By shedding light on these questions, this study provides a foundation for rethinking the economic and social structures of a post-patriarchal world.

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Appendix

A. Proofs

Proof of Lemma 1

Define function

$$f_1(\alpha_t) = A_t h_t^{\male} \cdot \left(\frac{1-\beta}{\beta} \cdot [1-(1-\alpha_t)^{\frac{\rho-1}{\rho}}] \right)^{\frac{\rho}{\rho-1}}, \qquad \alpha \in [0,1]$$

For $\rho > 1$, $f_1(\alpha_t)$ is strictly increasing, convex, and $f_1(0) = 0$. Moreover, $n_t^m = f_1(\alpha_t)$ satisfies men's indifference condition (9).

Define function

$$f_2(\alpha_t) = \frac{(1+\alpha_t \Gamma_t^h) A_t h_t^{\female}}{\left(\frac{(1-\beta) A_t h_t^{\female} \chi}{\beta} \right)^{\rho} + A_t h_t^{\female} \chi}, \qquad \alpha_t \in [0,1]$$

For $\rho > 1$, $f_2(\alpha_t)$ is strictly increasing, linear, and $f_2(0) > 0$. Moreover, $n_t^m = f_2(\alpha_t)$ satisfies women's optimality condition (15).

Thus, $f_3(\alpha_t) = f_1(\alpha_t) - f_2(\alpha_2)$ is strictly increasing, convex, and $f_3(0) < 0$. Therefore, there are two possibilities. If $f_3(\alpha_t)$ obtains the value of zero in the domain $\alpha \in [0,1]$, i.e., interior solution, then this solution is unique. Otherwise, there is a corner solution $\alpha_t = 1$, i.e., men strictly prefer marriage over being single and are willing to transfer the entirety of their income – a theoretically possible but empirically irrelevant case.

Figure A.1 provides a graphical illustration of the proof.

Proof of Lemma 2

For married women, the first-order condition is

$$(1-\beta) \cdot (c_t^{\female,m})^{-\frac{1}{\rho}} = \frac{\beta \cdot (n_t^m)^{-\frac{1}{\rho}}}{A_t h_t^{\female} \chi} \Longrightarrow c_t^{\female,m} = n_t^m \cdot \left(\frac{(1-\beta) A_t h_t^{\female} \chi}{\beta} \right)^{\rho} \tag{22}$$

Substituting (22) into the budget constraint, n_t^m satisfies

$$n_t^m \cdot \left(\frac{(1-\beta) A_t h_t^{\female} \chi}{\beta} \right)^{\rho} = \alpha_t \Gamma_t^h A_t h_t^{\female} + A_t h_t^{\female} (1 - \chi n_t^m)$$

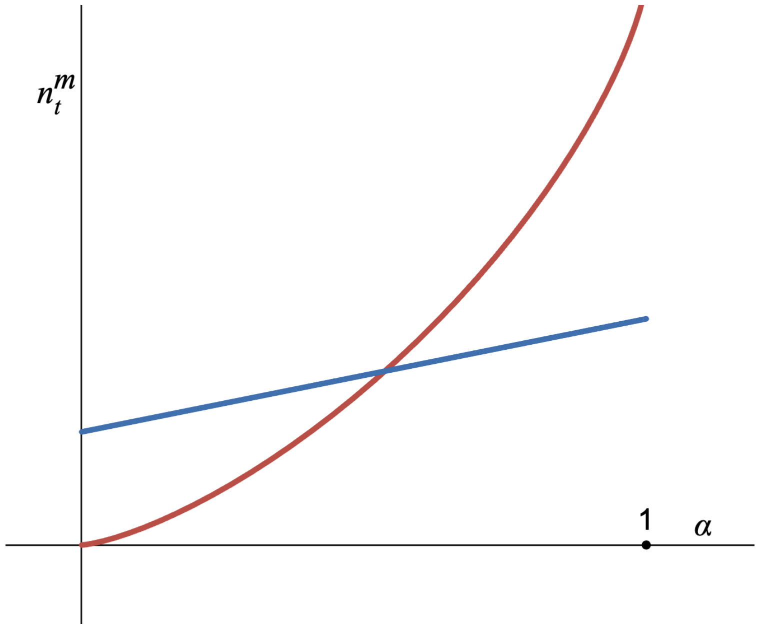

Figure A.1: $n_t^m(\alpha_t)$ (blue) and $\alpha_t(n_t^m)$ (red)

which is equivalent to

$$n_t^m \cdot \left[\left(\frac{(1-\beta)A_t h_t^{\female} \chi}{\beta} \right)^{\rho} + A_t h_t^{\female} \chi \right] = (1 + \alpha_t \Gamma_t^h) A_t h_t^{\female} \tag{23}$$

For single women, the first-order condition is

$$(1-\beta) \cdot (c_t^{\female,s})^{-\frac{1}{\rho}} = \frac{\beta \cdot (n_t^s)^{-\frac{1}{\rho}}}{A_t h_t^{\female} \chi} \Longrightarrow c_t^{\female,s} = n_t^s \cdot \left(\frac{(1-\beta)A_t h_t^{\female} \chi}{\beta} \right)^{\rho} \tag{24}$$

Substituting (24) into the budget constraint, $c_t^{\female,s}$ satisfies

$$n_t^s \cdot \left(\frac{(1-\beta)A_t h_t^{\female} \chi}{\beta} \right)^{\rho} = A_t h_t^{\female} (1 - \chi n_t^s)$$

which is equivalent to

$$n_t^s \cdot \left[\left(\frac{(1-\beta)A_t h_t^{\female} \chi}{\beta} \right)^{\rho} + A_t h_t^{\female} \chi \right] = A_t h_t^{\female} \tag{25}$$

Take the ratio between (23) and (25) gives

$$\frac{n_t^m}{n_t^s} = 1 + \alpha_t \Gamma_t^h \tag{26}$$

which is independent of A_t.

On the other hand,

$$V_t^{♀,m}(\tau) = \tau \cdot n_t^m \cdot \left((1-\beta) \cdot \left(\frac{(1-\beta) A_t h_t^{♀} \chi}{\beta} \right)^{\rho-1} + \beta \right)^{\frac{\rho}{\rho-1}} \tag{27}$$

$$V_t^{♀,s} = n_t^s \cdot \left((1-\beta) \cdot \left(\frac{(1-\beta) A_t h_t^{♀} \chi}{\beta} \right)^{\rho-1} + \beta \right)^{\frac{\rho}{\rho-1}} \tag{28}$$

Combining (27), (28), and (26),

$$\tau^* = \frac{V_t^{♀,s}}{V_t^{♀,m}} = \frac{n_t^s}{n_t^m} = \frac{1}{1 + \alpha_t \Gamma_t^h} \tag{29}$$

Proof of Lemma 3

When A_t increases, $f_1(\alpha_t)$ shifts up while $f_2(\alpha_t)$ shifts down. Therefore, $f_3(\alpha_t) = f_1(\alpha_t) - f_2(\alpha_2)$ shifts up. As a result, the interior solution, i.e., the value of α_t such that $f_3(\alpha_t) = 0$, necessarily decreases.

Figure A.2 provides a graphical illustration of the proof.

Proof of Lemma 4

When α_t falls, $\mathcal{M}(\Gamma^h; \alpha)$ shifts down while $\Gamma^h(\mathcal{M})$ is unaffected. As a result, the intersection (α, Γ^h) falls.

Figure A.3 provides a graphical illustration of the proof.

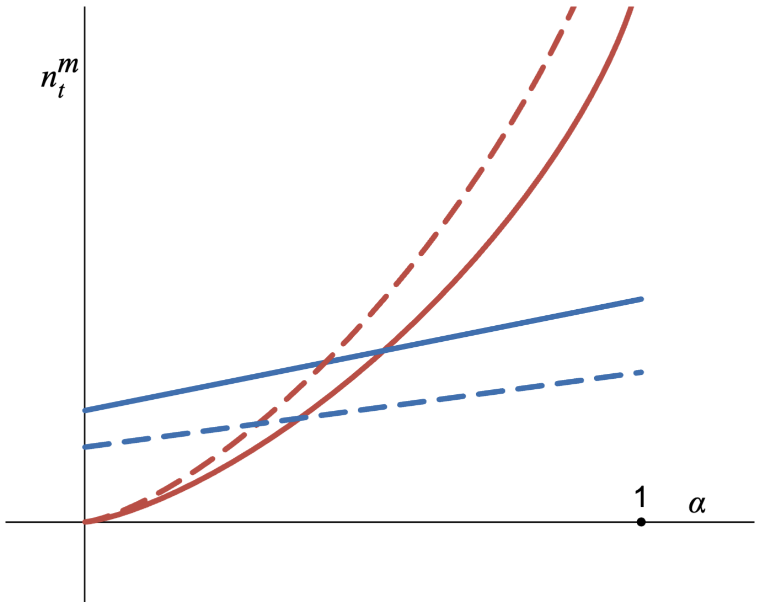

Figure A.2: $f_1(\alpha_t)$ (red) and $f_2(\alpha_t)$ (blue). Solid (before) and dashed (after)

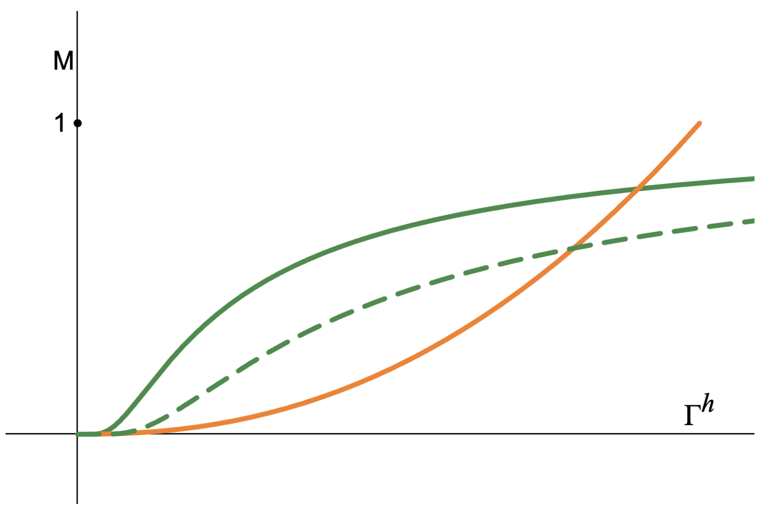

Figure A.3: $\mathcal{M}(\Gamma^h; \alpha)$ (green) and $\Gamma^h(\mathcal{M})$ (orange)

B. Figures

Figure A.4 plots the Venn diagram when I define "high fertility" category as those observations with the total fertility rate (TFR) greater than 2 children per woman.

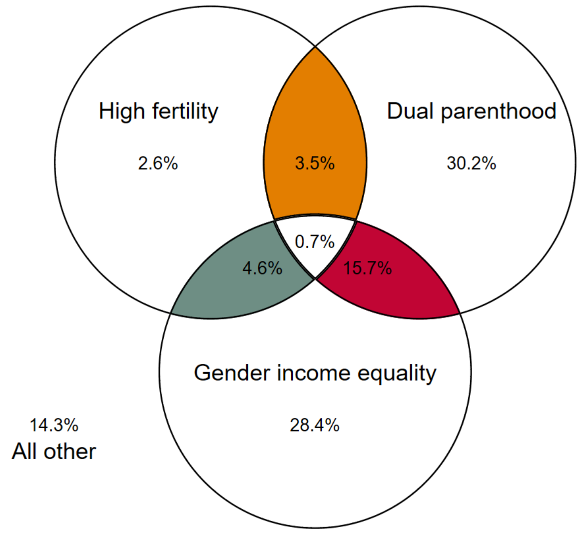

Figure A.4: Tension: "High fertility" if TFR>2

Figure A.5 plots the Venn diagram when I define "high fertility", "dual parenthood", and "gender income equality" using the upper quartiles of each variable respectively.

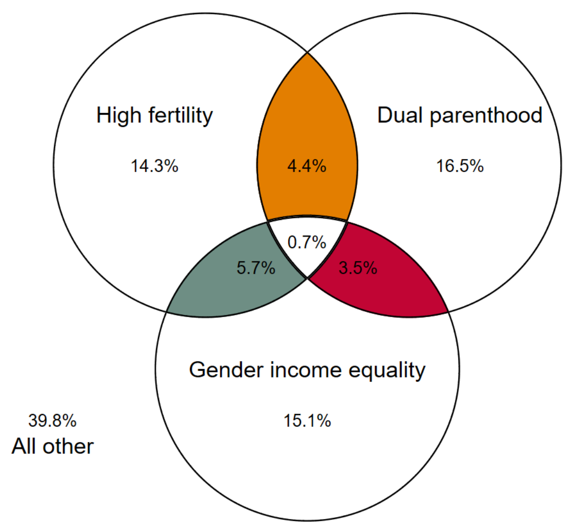

Figure A.5: Tension: Define Categories using Upper Quartiles

Figure A.6 plots the Venn diagram when I define the category of "gender income equality" using data from the World Inequality Database. In particular, I collect the variable measuring the female share of pre-tax labor income. Then, I merge this variable with fertility data from the United Nations and the proportion of children born outside of marriage from the OECD database. In accordance with the baseline categorization, I define a country-year observation as achieving "gender income equality" if its female share of pre-tax labor income is higher than the sample median, i.e., 36% in the sample.

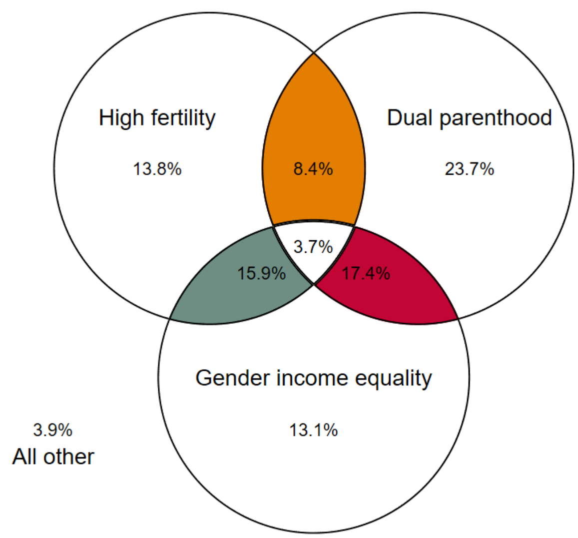

Figure A.6: Tension: Use Gender Gap Measure from the World Inequality Database

Figure A.7 plots the Venn diagram when I define the category of "dual parenthood" using data from the United Nations Statistics Division (UNSD). In particular, for a large sample of countries, the UNSD provides data on live births by legitimacy status, and percent illegitimate for as many years as possible between 1990 and 1998. Legitimate refers to persons born of parents who were married at the time of birth in accordance with the laws of the country or area. I merge this variable with fertility data from the United Nations and the gender inequality data from the World Inequality Database (WID). In accordance with the baseline categorization, I define "high fertility", "dual parenthood", and "gender income equality" using the median of each variable respectively.

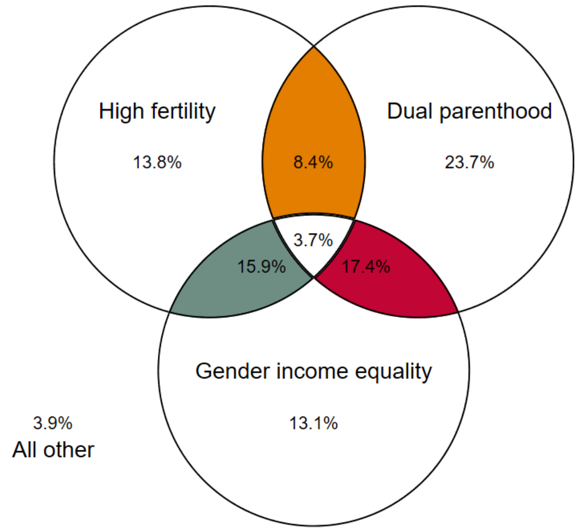

Figure A.7: Tension: Use Out-of-Wedlock Birth Measure from the United Nations

Lastly, Figure A.8 plots number of outcomes among "high fertility", "dual parenthood", and "gender income equality" (in the baseline definition) achieved by each country-year level observation.

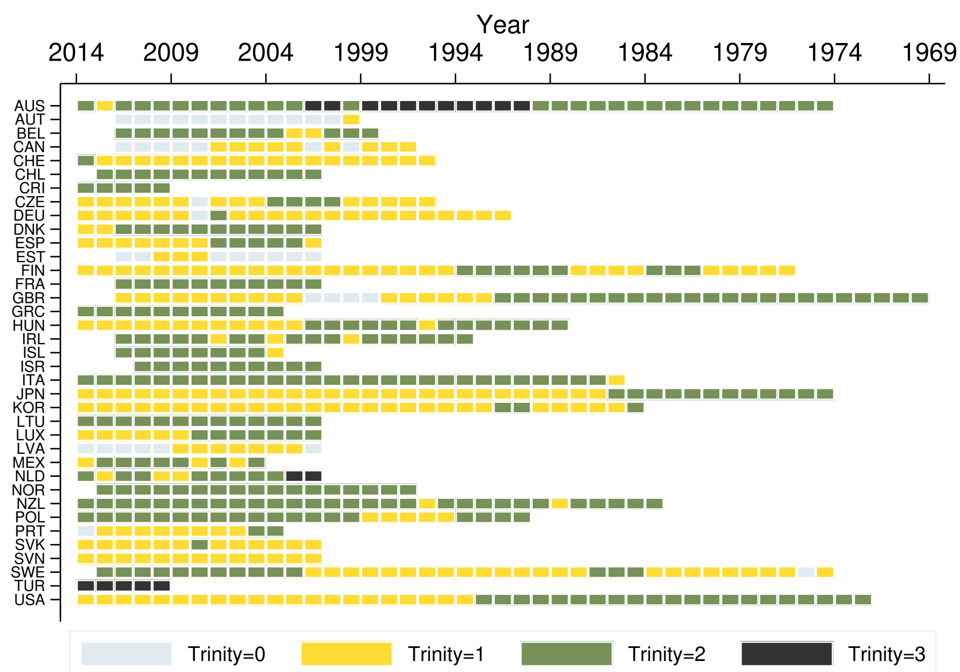

Figure A.8: Number of Outcomes Achieved by Country and Time