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A Model of Human Capital Accumulation in Economic History

Gender Gap, Family Behavior and Economic Growth

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Outline

- Introduction
- Historical Evidence
- Related Theory
- The Model
- Conclusion

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INTRODUCTION

Aim of the Paper

- **Starting point**

- Until very recently: economic growth driven by men
- Centuries needed to observe the integration of women in the production process

- **Stylized facts**

- Gender equality increased
- Fertility rate decreased
- GDP per capita increased

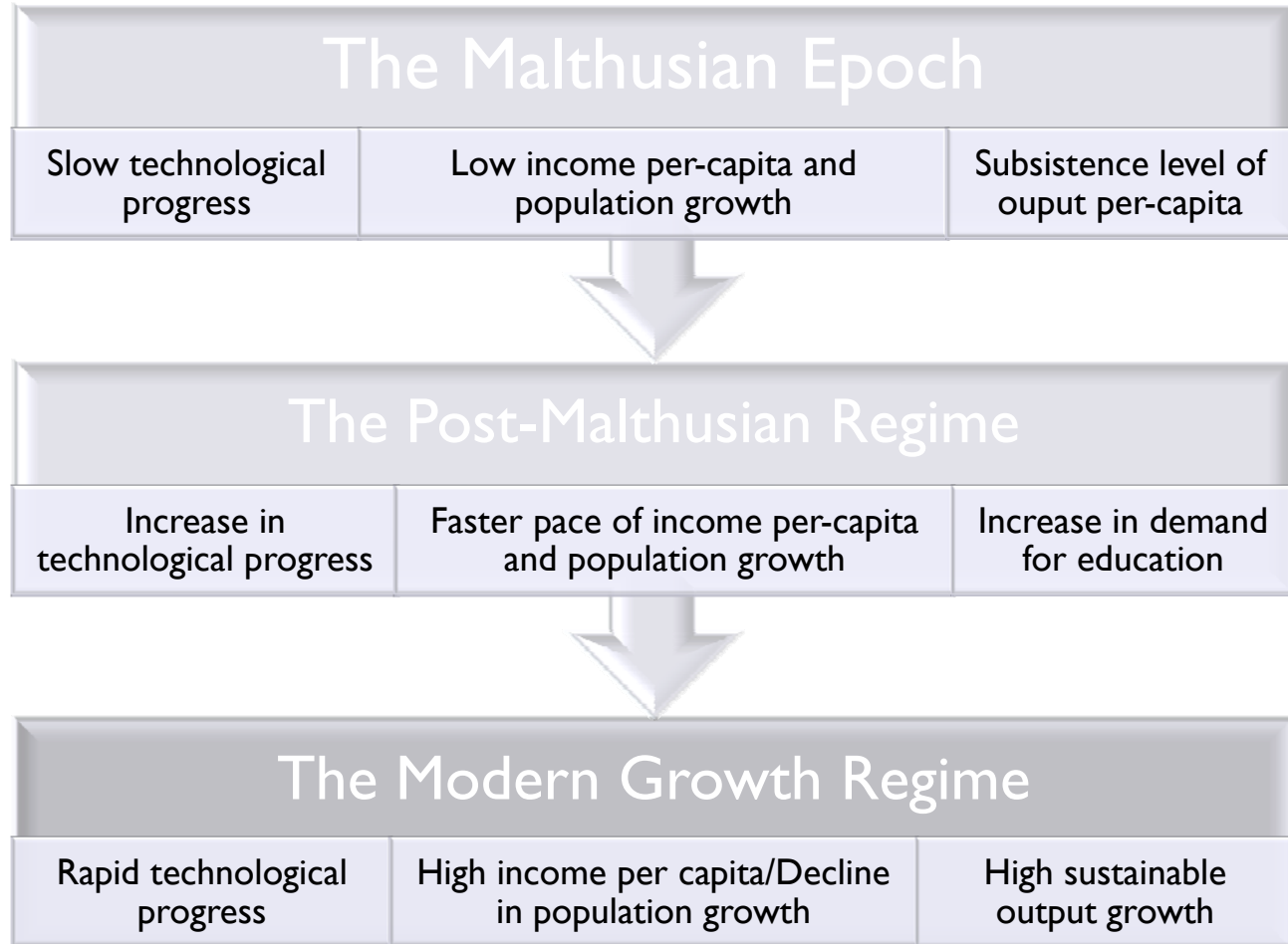
- **Research question**

- Role played by gender equality on the development process

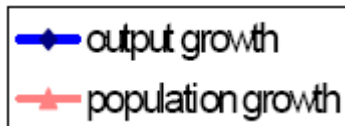


In which extend and through which mechanisms the gender equality acts on the long run economic growth?

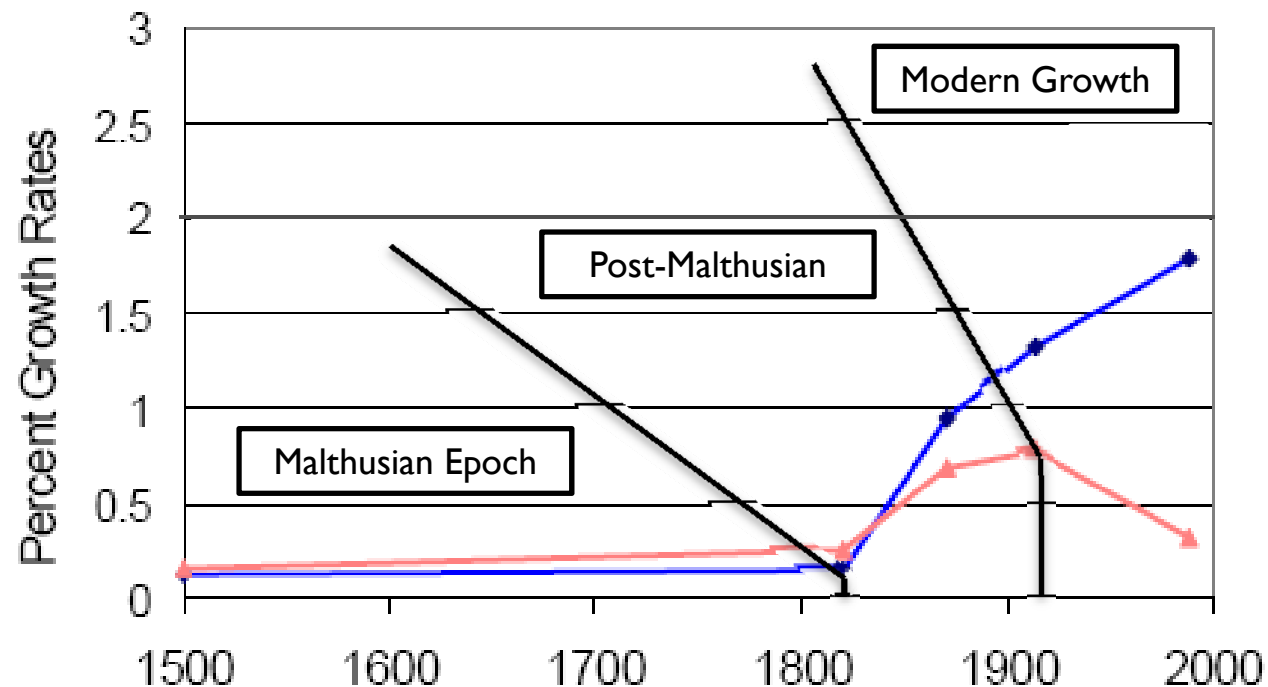
The Historical Process of Development



Growth of GDP per Capita and Population Growth



Western Europe



Related Literature

- Exogenous models

- Malthus (1798)
- Solow (1956)

- Endogenous models

- Becker (1960, 1965)
- Leibenstein (1957)
- Mincer (1963)

➡ Introduction of the effect of family behavior

- Unified growth theory

- Galor and Weil (1999, 2000)
- Hansen and Prescott (2002)

➡ Capture in a single framework the transition from Malthusian stagnation to sustained economic growth

Historical Evidence

- Women and the labor market
- The turning point of the 1960-70's
- The question of demography

Women and the Labor Market

- Married women have always worked:
 - For a long time within the family sphere:
 - Reproduction
 - Housewife
 - Domestic duties → incredibly labor-intensive

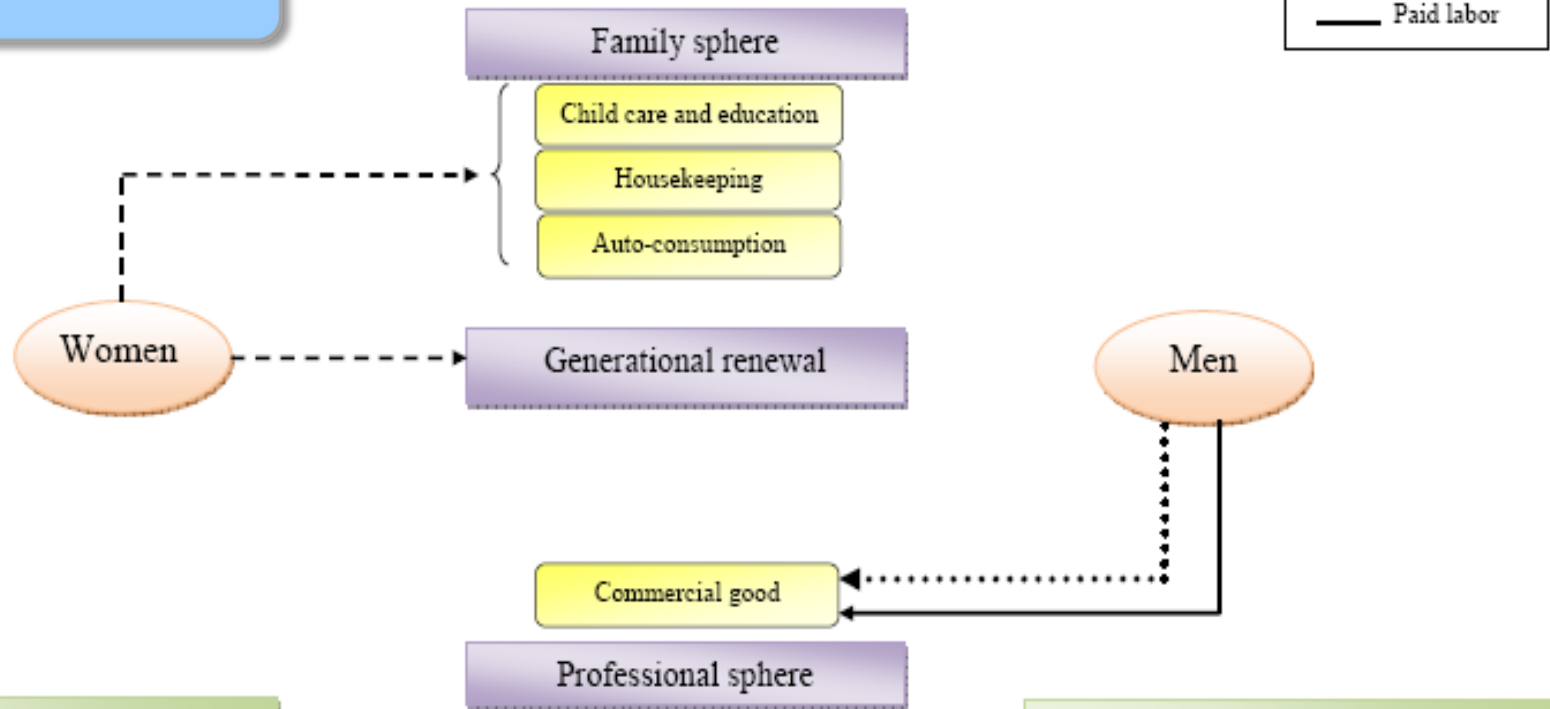
➡ Incompatibility between domestic and professional sphere

- To salaried jobs:
 - With the Household Revolution : labor-saving appliances
 - But, in the continuity of domestic labor (very low wages)

➡ Problem of time for women → Persistence of a clear demarcation between family and labor market

- **The Male-Breadwinner Model** → sexual division of labor

Male-Breadwinner Model



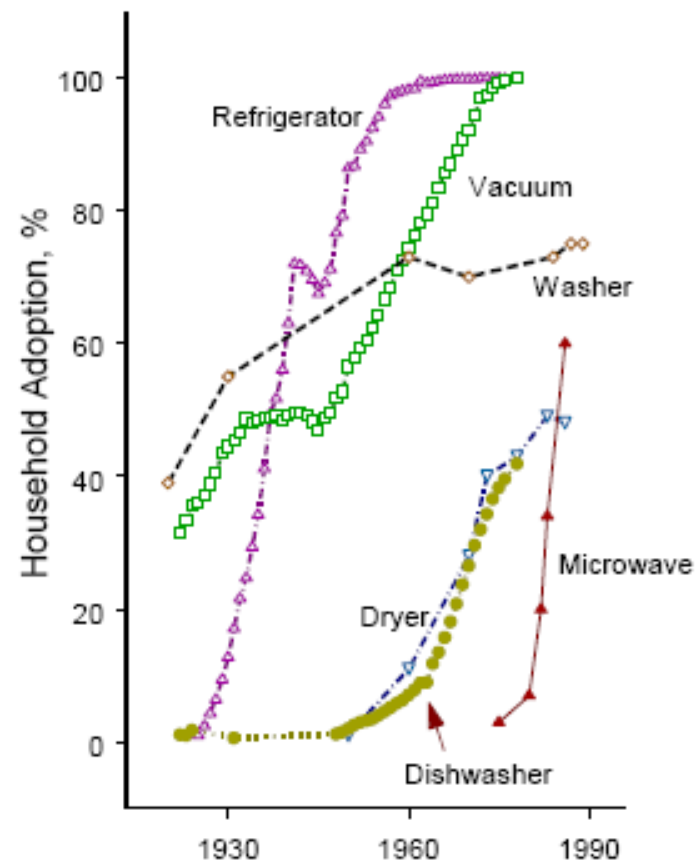
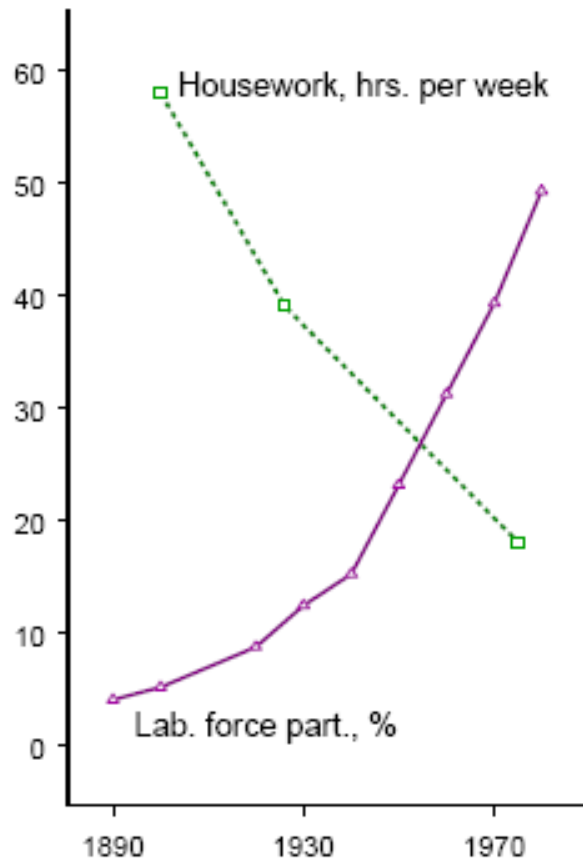
- 1) Education is gender specific
- 2) The workplace is not the primary area of women
- 3) Housekeeping and child care are primary area of women
- 4) Women have a low bargaining power
- 5) Child care and education are essentially made by women. The mother educates its children and take care of them in every way

Sexual division of labor
Public economy/Domestic economy

- 1) High professional qualification is important only for men
- 2) Workplace is the primary area of men
- 3) The participation of men in housekeeping is only partially wanted
- 4) In the decision making, men have the last say
- 5) Men do not take part of the education and the care of children

Technological Progress in the Home

(Source: Greenwood and Seshadri, 2004)



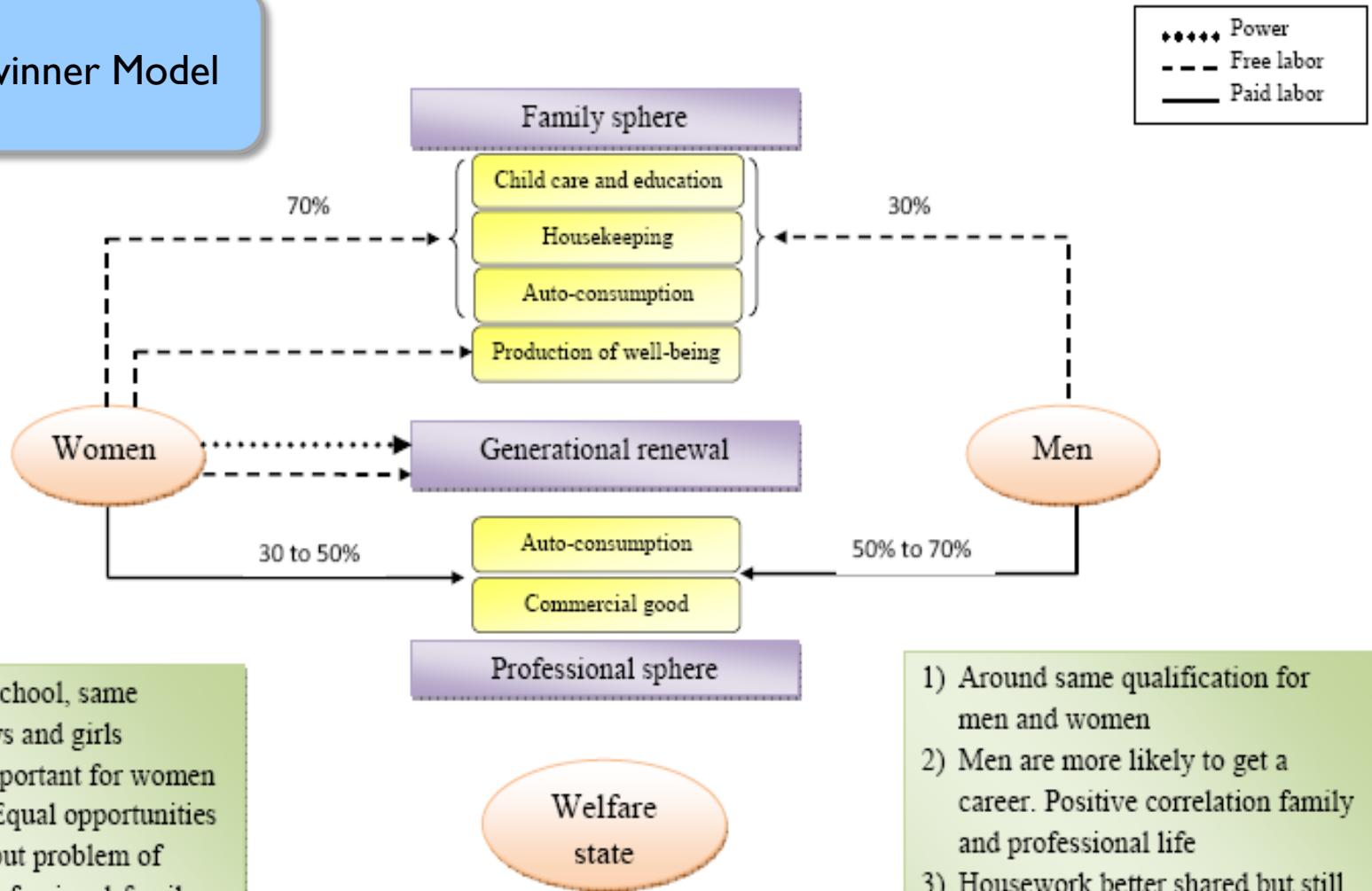
The Turning Point of the 1960-70's

- Cultural and sexual revolution in Western countries
 - Development of the Pill in 1956 by G. Pincus
 - Decriminalization of the abortion

 Birth control

- New desires/New strategies for women
 - Investment in long-run vocational training
 - Build careers
- **The Two-Breadwinner *Model*** → plurality between family and professional sphere for women

Two-Breadwinner Model

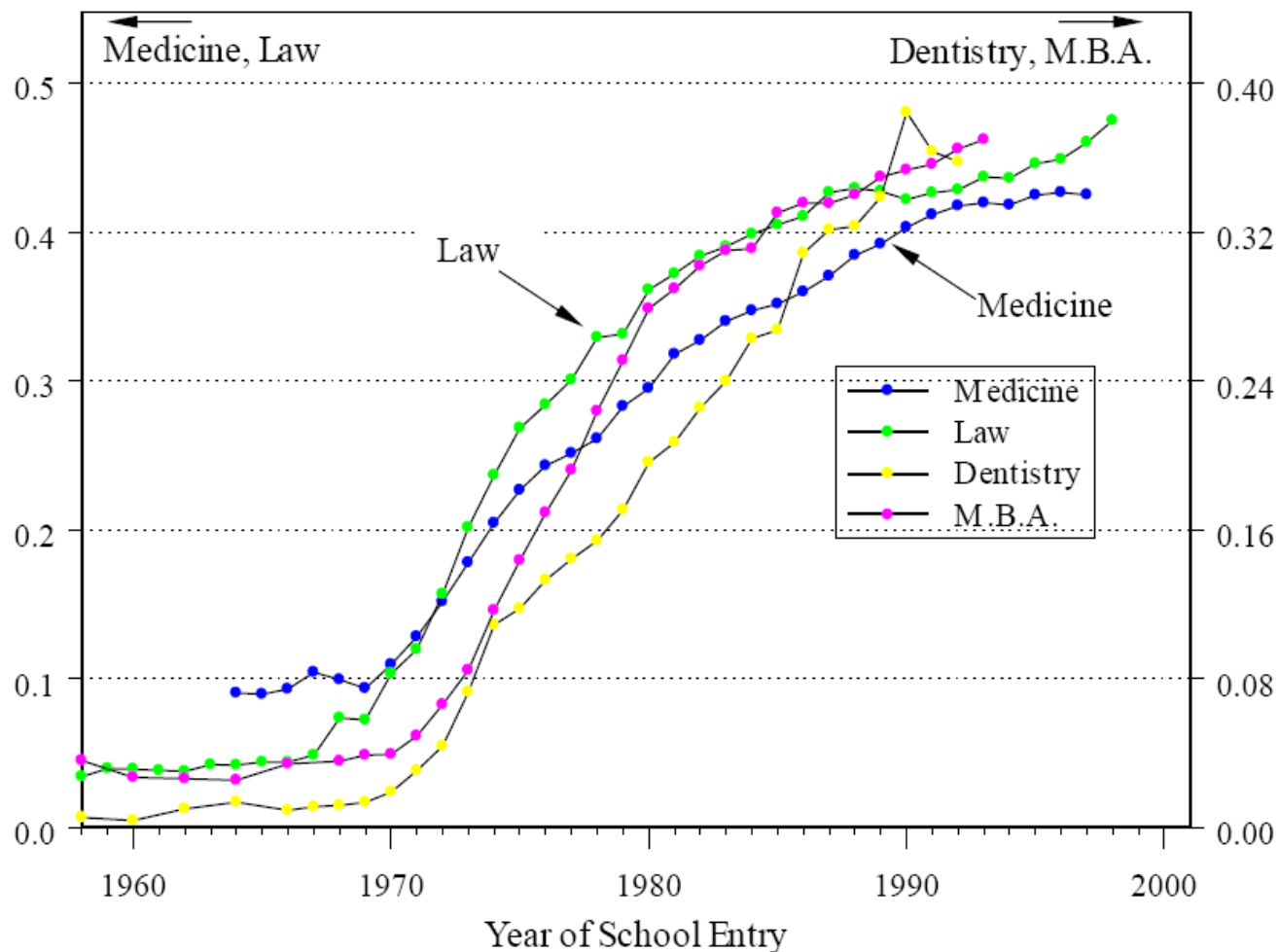


- 1) Co-educative school, same content for boys and girls
- 2) Career is as important for women than for men. Equal opportunities are necessary but problem of conciliation professional-family life
- 3) Housework is done by both parties but not in an equal part
- 4) Partners have both a part of the decision power
- 5) Men and women share more equally child care and education

Double burden for women
 Domestic labor/Commercial labor
 Dissolution between gender roles

- 1) Around same qualification for men and women
- 2) Men are more likely to get a career. Positive correlation family and professional life
- 3) Housework better shared but still unequally distributed
- 4) Solution is found depending on the repartition of the decision power. Try to find the statu quo
- 5) Education of children and child care is better distributed even if women still do more

Female First-Year Students in Selected Professional Programs (Fraction of All Students)



(Source: Goldin, 2004)

The Question of Demography

- Democratization of contraceptive methods
 - Direct effect on fertility:
 - prevents against undesired pregnancy
 - Indirect effect on fertility:
 - encourages women to extend their studies by the possibility of delaying childbearing

 Decrease in the fertility rates

- The three stages of fertility habits
 - The Traditional phase
 - Low rate of female labor force/High fertility rates
 - The Transition phase
 - Increase in the female labor force/Reduction in fertility rates
 - The Modern phase
 - Stable rate of female labor force/Stabilized fertility rates

Set of Questions

- Could gender equality :
 - played a role in the dramatic reversal of the positive relationship between income per capita and population ?
 - triggered to demographic transition ?
 - accounted for the sudden take-off from stagnation to sustained growth in Western countries ?

The Theory

The main elements:

- First part of the story
 - ⇒ Analysis of fertility in terms of female cost of time
- Second part of the story
 - ⇒ Causal link between fertility and female investment in education (evolution of the trade-off)
- Third part of the story
 - ⇒ Analysis of the human capital accumulation and of the evolution of the economy

THE MODEL

From the Male Breadwinner Model
to the Two-Breadwinner Model

towards

From Stagnation to Sustained Growth

The Basic Structure of the Model

- Overlapping-generations economy
 - 2 kinds of people:
 - Men, ♂
 - Women, ♀
 - Each individual is endowed with one unit of time
 - Individuals live for 3 periods:
 - Childhood
 - Youth
 - Adulthood

Individuals

- Live for 3 periods

- 1 Childhood (first period)

- Consume a fraction of their parental unit-time endowment

- 2 Youth (second period)

- Allocate time between:
 - Child rearing AND Domestic duties
 - Investing in education OR Working as unskilled worker

- 3 Adulthood (third period)

- Allocate time between:
 - Child rearing AND Domestic duties
 - Working as skilled worker OR Working as unskilled worker
 - Consume

Human Capital

- The production of human capital

$$h_{t+1} = A_t \left[(zh_t^j)^\rho + e_t^\rho \right]^{1/\rho} = A_t \left[(h_t^\varnothing)^\rho + e_t^\rho \right]^{1/\rho}$$

- With $e_t = \bar{e} + i_t$
- $j = \varnothing, \sigma$

⇒ Individuals' level of human capital is determined by:

- level of human capital of its parents proportionally to the time spent with them, h_t^\varnothing ($z_\varnothing \equiv z \geq z_\sigma = 0$)
- total quantity of human capital the individual accumulate over the course of his life, e_t
 - Fix unit of basic human capital, \bar{e}
 - choices made by the individual regarding education, i_t

The Male-Breadwinner Model

- Sexual division of labor
 - Comparative disadvantage between gender

- Men → on the labor market

$$l_t^{m,\delta} = 1$$

- Women → at home

$$zn_t^{\text{♀}} + l_t^{d,\text{♀}} = 1$$

⇒ Due to social norms time provided at home is supplied by the mother

Transition from the Male Breadwinner Model to the Two-Breadwinner Model

- Exogenous sources of technological change
 - Technological progress in the market good production
 - increase in the productivity of skilled labor
 - Improvement in household technologies
 - influence the opportunity cost of home production
 - Possibility of birth control
 - changes in fertility
- } Direct impact on women's time allocation

Time Savings Analysis

- Household revolution

⇒ What is the effect of technological advance in the home sector, notably on the amount of time devoted to housework?

$$d = [\alpha(k)^{\delta} + (1 - \alpha)(l^d)^{\delta}]^{1/\delta}, \quad \text{with } \delta < 1$$

- → An increase in the market wage will have no effect on the amount of time spent in housework, l^d , while an increase in the stock of household capital, k , will.

$$\frac{\partial l^d}{\partial k} < 0$$

Time Savings Analysis

- Household revolution
 - Time allocation of women

$$zn_t^{\text{♀}} + l_t^{d,\text{♀}} + l_t^{u,\text{♀}} = 1$$

↓ ↑

⇒ Change in the allocation of time :

- Substitution of the time saved from the household revolution
- Still too costly to invest in education given the risk of pregnancy

Time Savings Analysis

- The impact of birth control

⇒ What is the effect of birth control on individuals' behavior regarding fertility? What are the by-products of birth control?

- → Fertility, n , decreases with market wage, w . This effect is strengthened when the return to schooling increases, i.e. when the market wage of skilled labor increases.

$$\frac{\partial n_T}{\partial w} < 0$$

- Henceforth, women can choose with certainty the number of children they desire

⇒ New strategies of life

Time Savings Analysis

- Investment in human capital

- → An increase in the stock of household capital, k , will have a positive effect on the amount of time spent by women in education, i_t° .

$$\frac{\partial i_t^{\circ}}{\partial k} > 0$$

➔ Increase in the interest for women to invest the time saved from the Household Revolution in education

The Two-Breadwinner Model

- Plurality professional/familial sphere
→ double burden for women

- Men → on the labor market

$$i_t^{\delta} = 1$$

$$l_t^{m,\delta} = 1$$

- Women → both at home and on the labor market

$$i_t^{\varphi} = 1$$

$$l^{m,\varphi} + zn^{\varphi} + l^{d,\varphi} = 1$$

Time Savings Analysis

- Fertility choices

- → An increase in the amount of time spent by women in education, i_t° , induces a decrease in fertility, n_T (get complementary information about each period, n_t and n_{t+1}).

$$\frac{\partial n_T}{\partial i_t^{\circ}} < 0$$

- The increase in the time spent in education for women increases the cost of rearing children

➡ Delay in childbearing

The Behavior of Women

- When $h_t^{\circ} \leq \tilde{h}^{\circ}$ \longrightarrow Quantity of children
 - Not optimal for girls to invest in education
 - Optimal to achieve housework, and to have and rear children both in the second and third period
- When $h_t^{\circ} > \tilde{h}^{\circ}$ \longrightarrow Quality of children
 - Girls find it optimal to invest in education
 - Choose to have less children in the second period \rightarrow delay childbearing
 - Total fertility declines but each child will be better educated

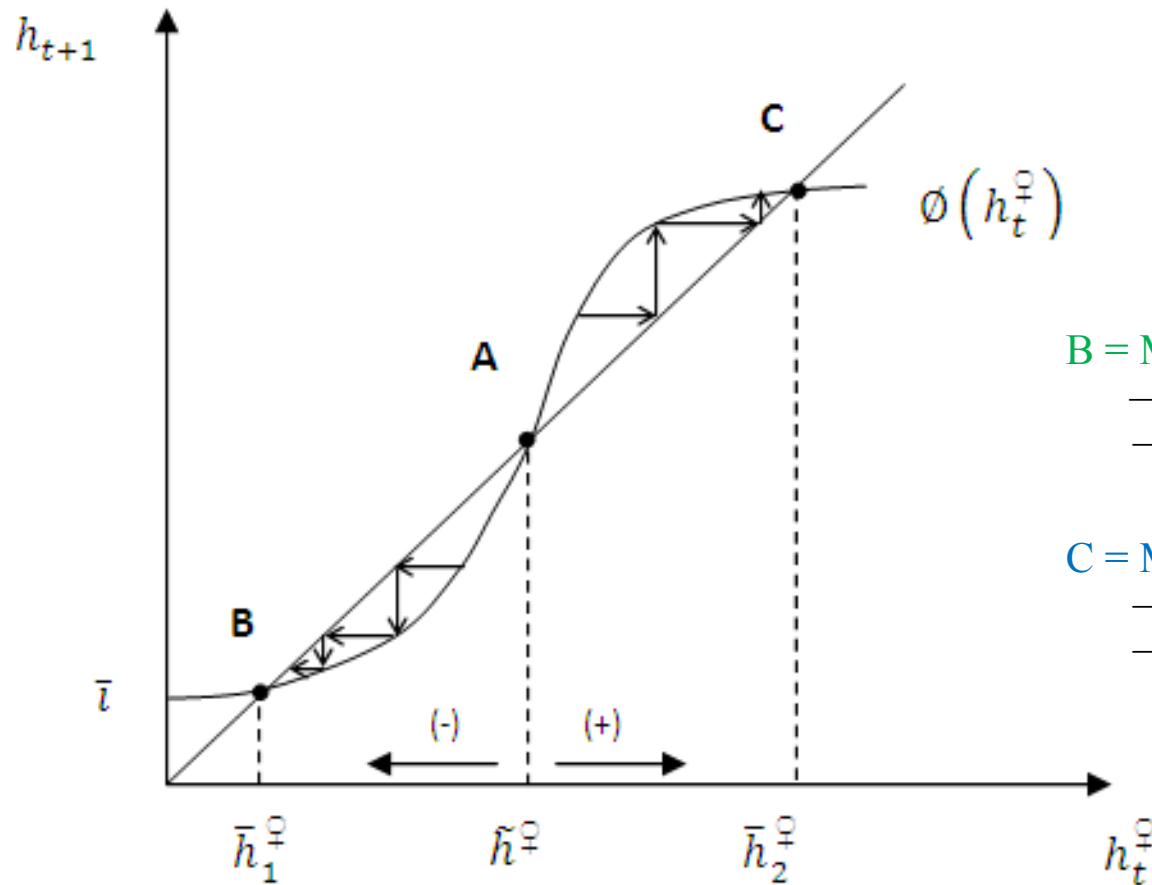
THE JOINT EVOLUTION

Gender Equality, Family Behavior
and Economic Growth

Gender Equality, Family Behavior and Economic Growth

- Constant technology
 - Dynamical path
 - consistent with the inverse relationship between output per capita and fertility
 - coherent with the demographic transition
- Technological progress
 - Without technological change:
 - trapped in a low-output/high fertility equilibrium
 - With technological change:
 - fertility transition/output growth toward the high steady-state

The Dynamic Evolution of the Economy



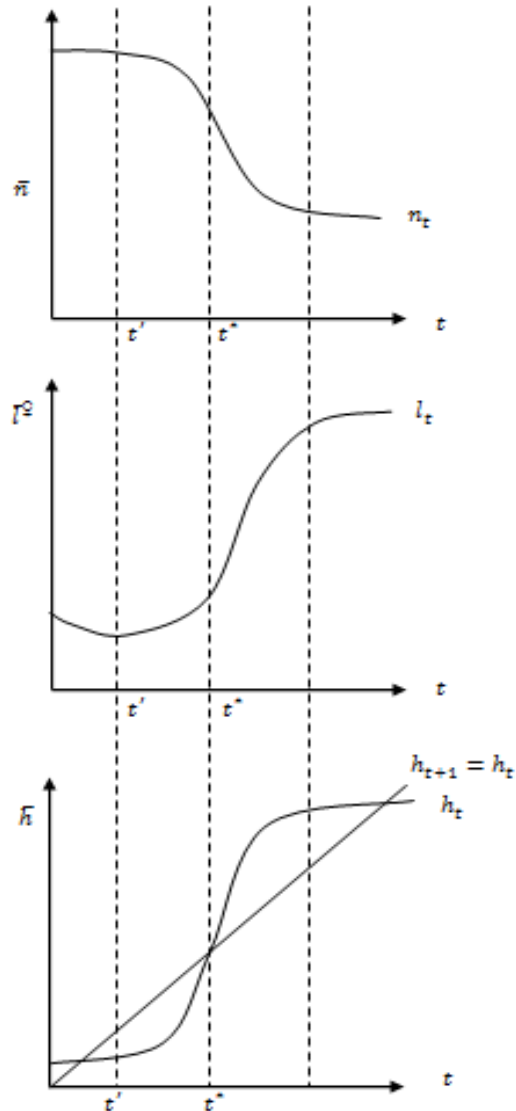
B = Malthusian steady-state

- low output
- high fertility

C = Modern growth steady-state

- high output
- low fertility

Gender Equality, Family Behavior and Economic Growth



Fertility Rate



Female Labor Force Participation



Human Capital Accumulation



Transition from Malthusian Regime to Modern Growth Regime

- High fertility
- Low output
- Low stock of human capital

- Low fertility
- High output
- High stock of human capital

Conclusion

