The Demographic Transition

Ömer Özak

Department of Economics
Southern Methodist University

Economic Growth and Comparative Development

Phases of Development: Standard of Living

- The Malthusian Epoch

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- The Post-Malthusian Regime

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- The Post-Malthusian Regime
- The Modern Growth Regime

Phases of Development: Timeline of the Most Developed Economies

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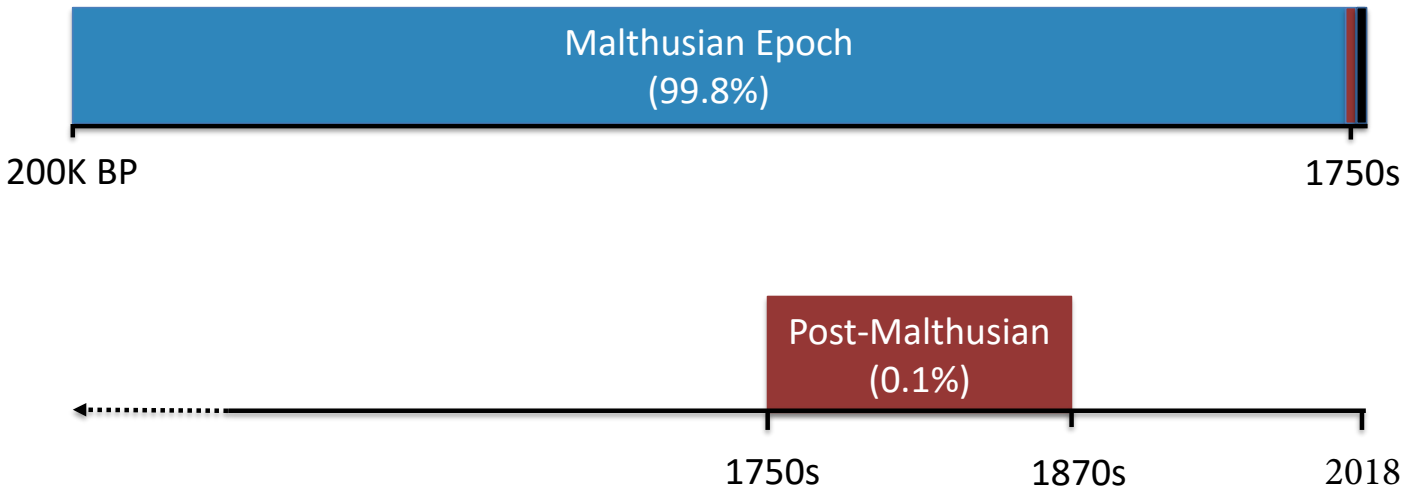

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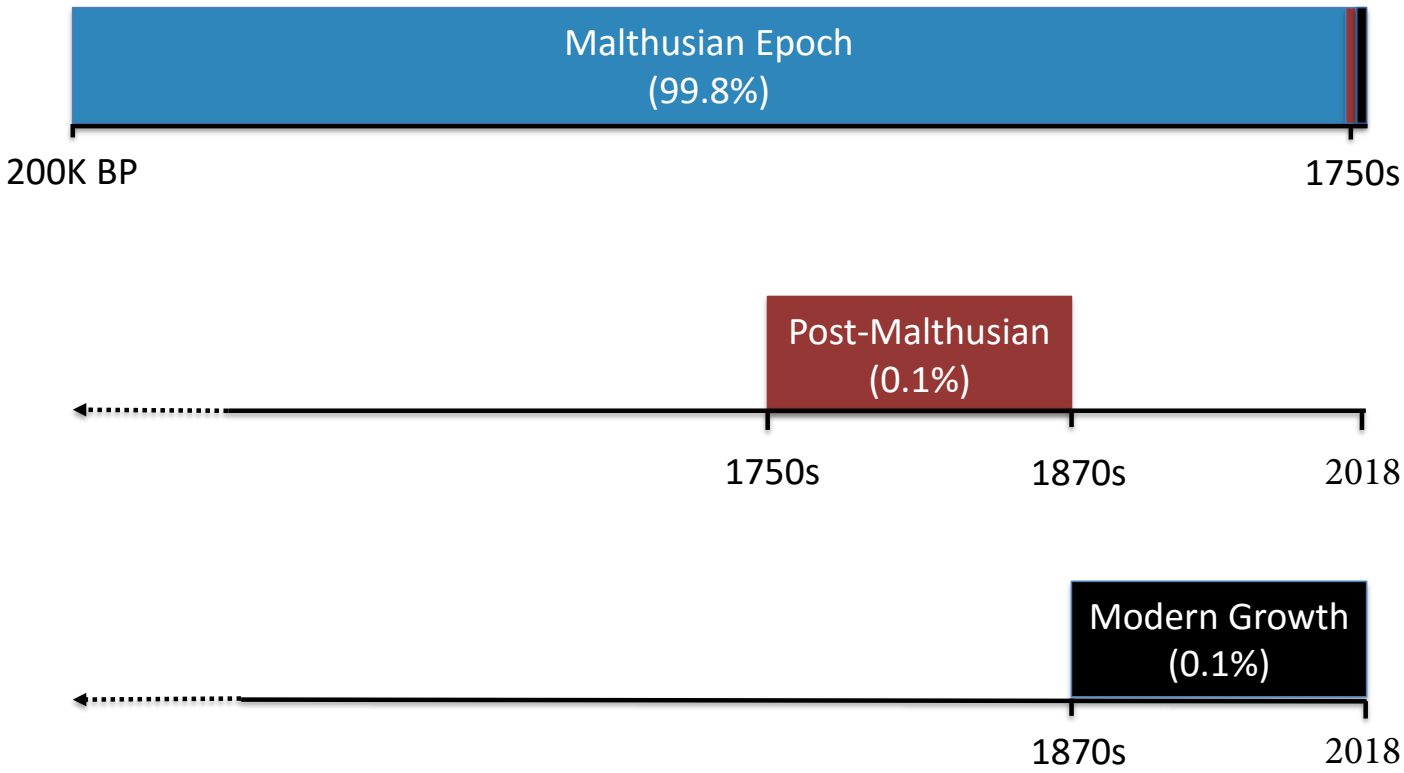

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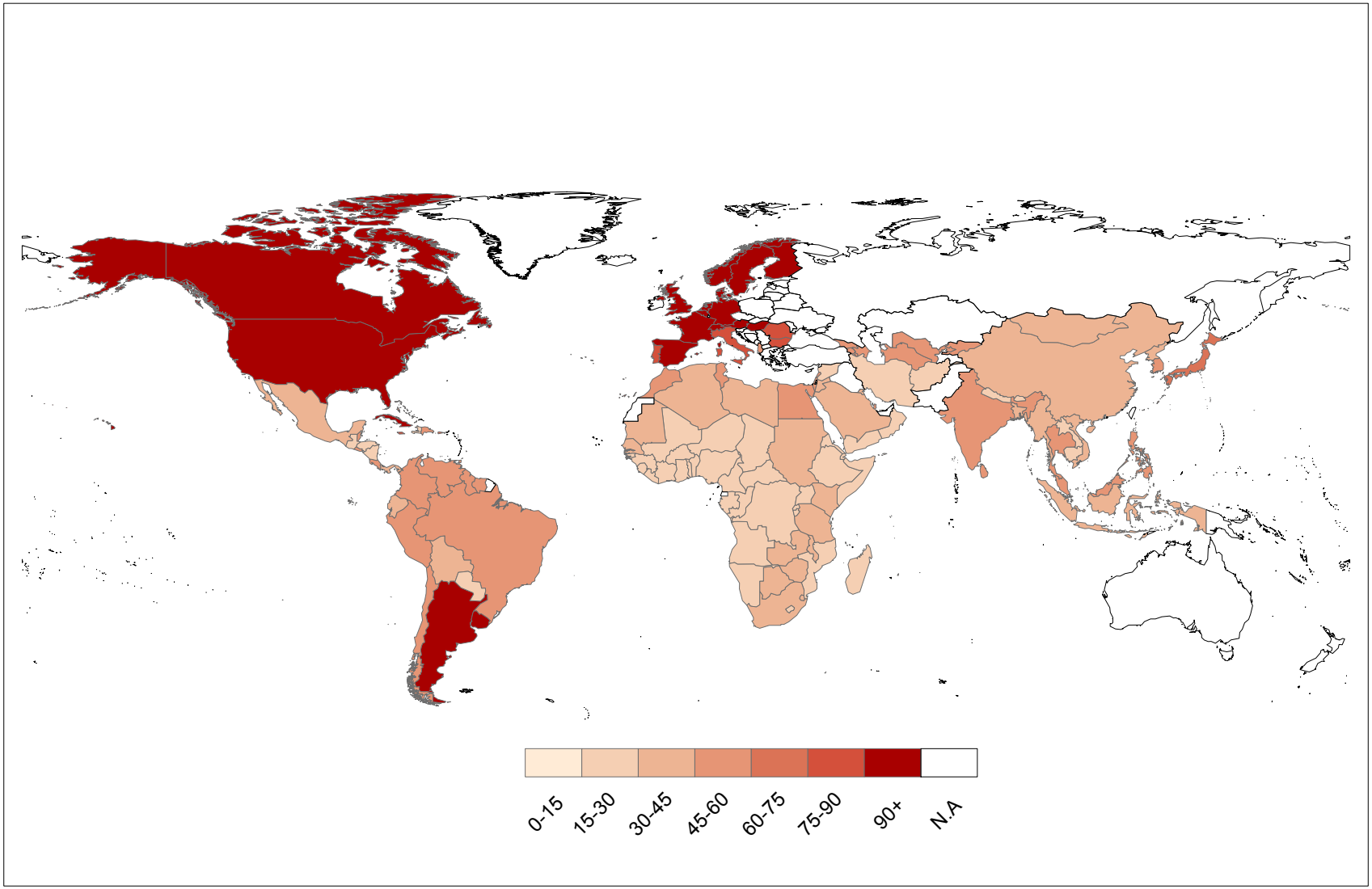
- Transition to Modern Growth

Variation in years elapsed since the Onset of the Fertility Decline



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$\Longrightarrow$ population growth excluding migration

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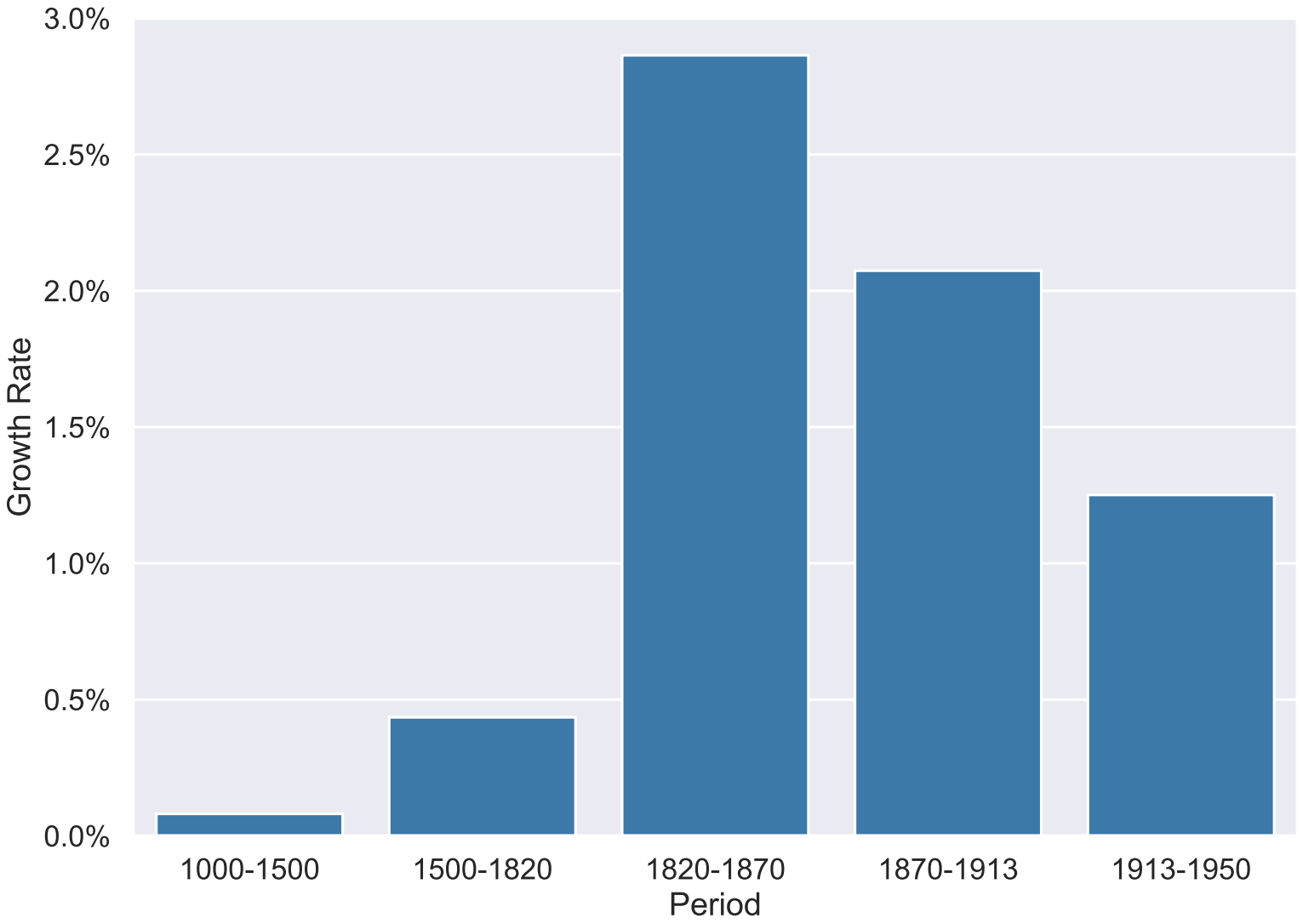
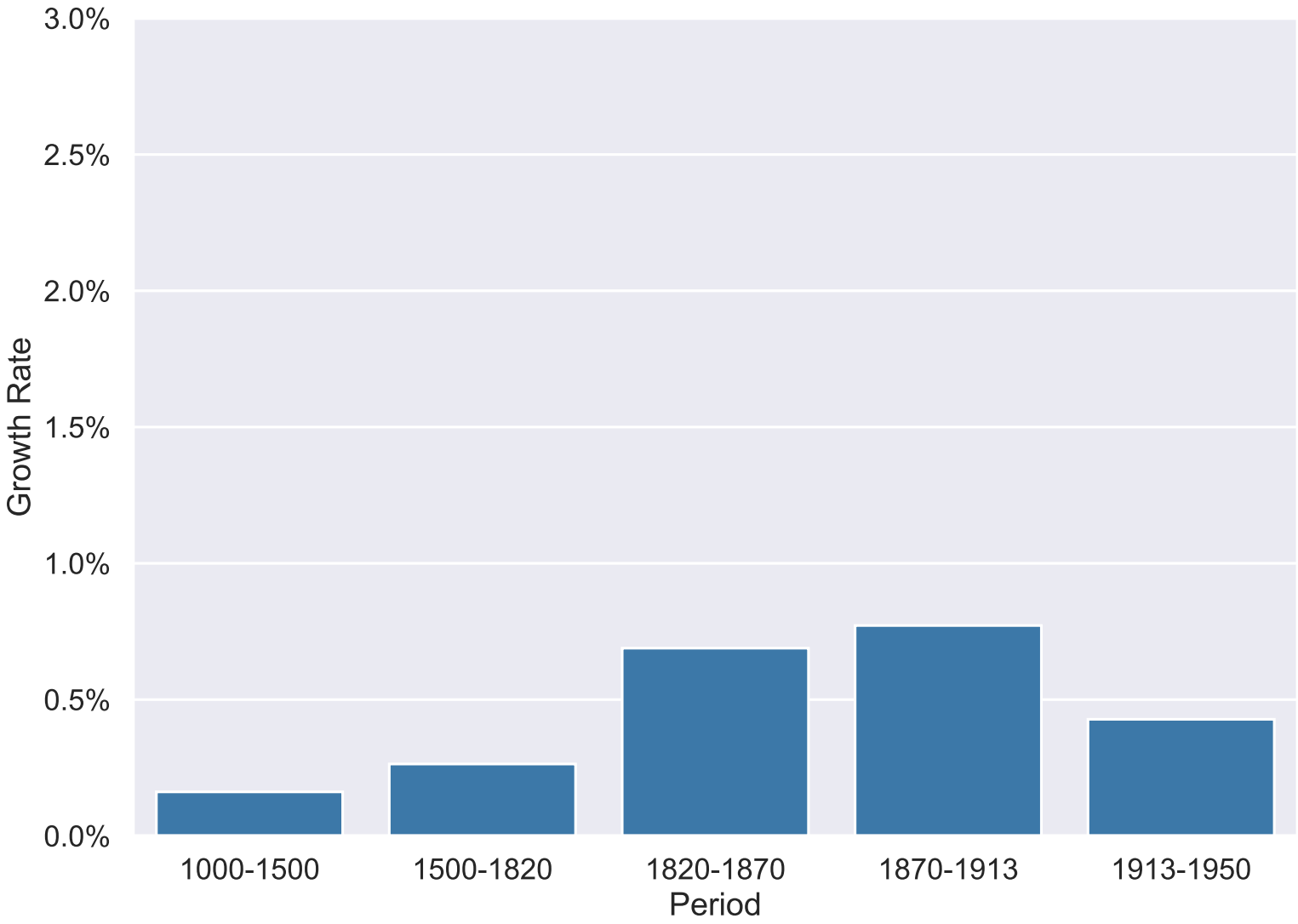
- TFR & NRR are synthetic rates

Early Fertility Decline – Western Offshoots



Early Fertility Decline – Western Europe



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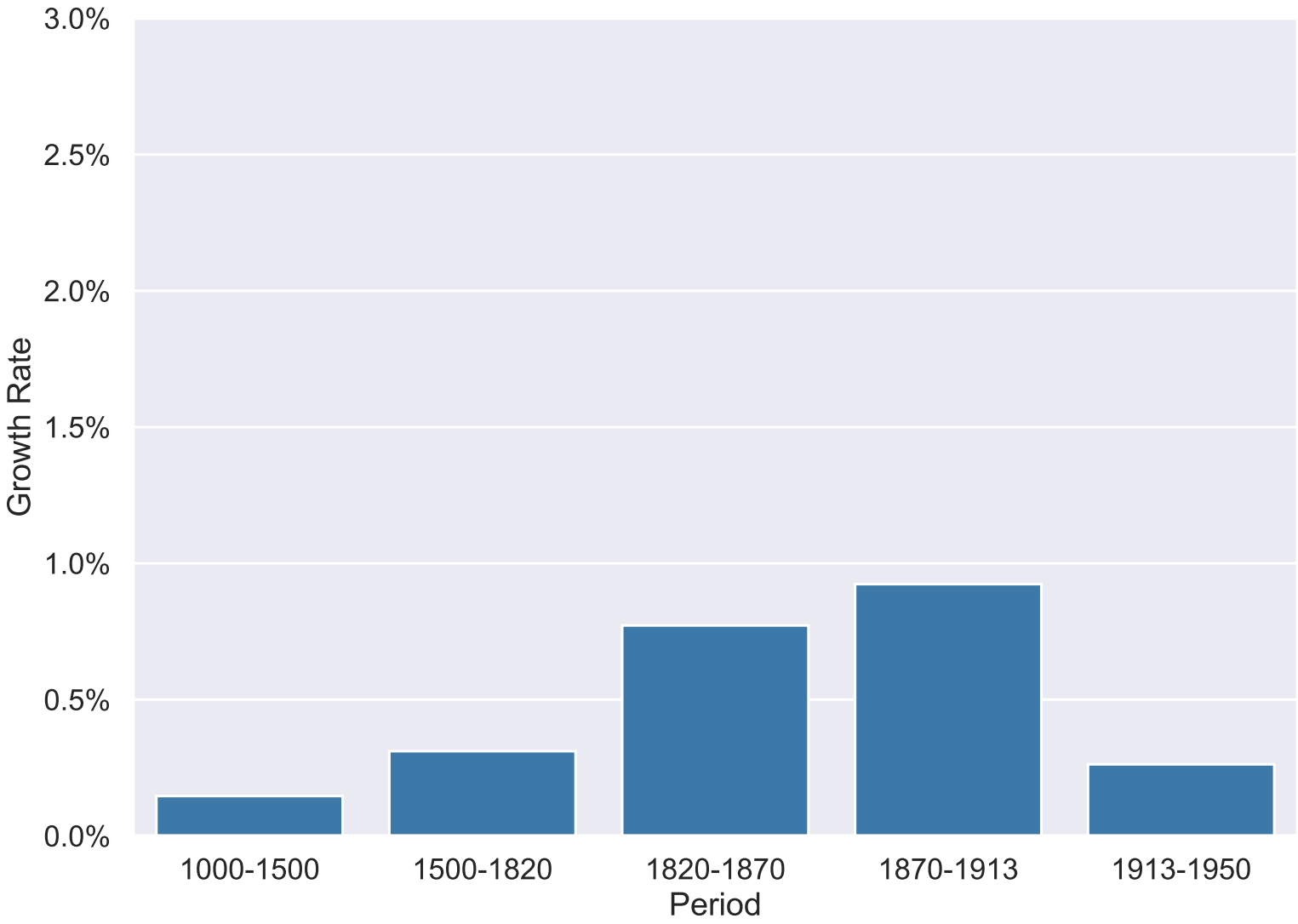
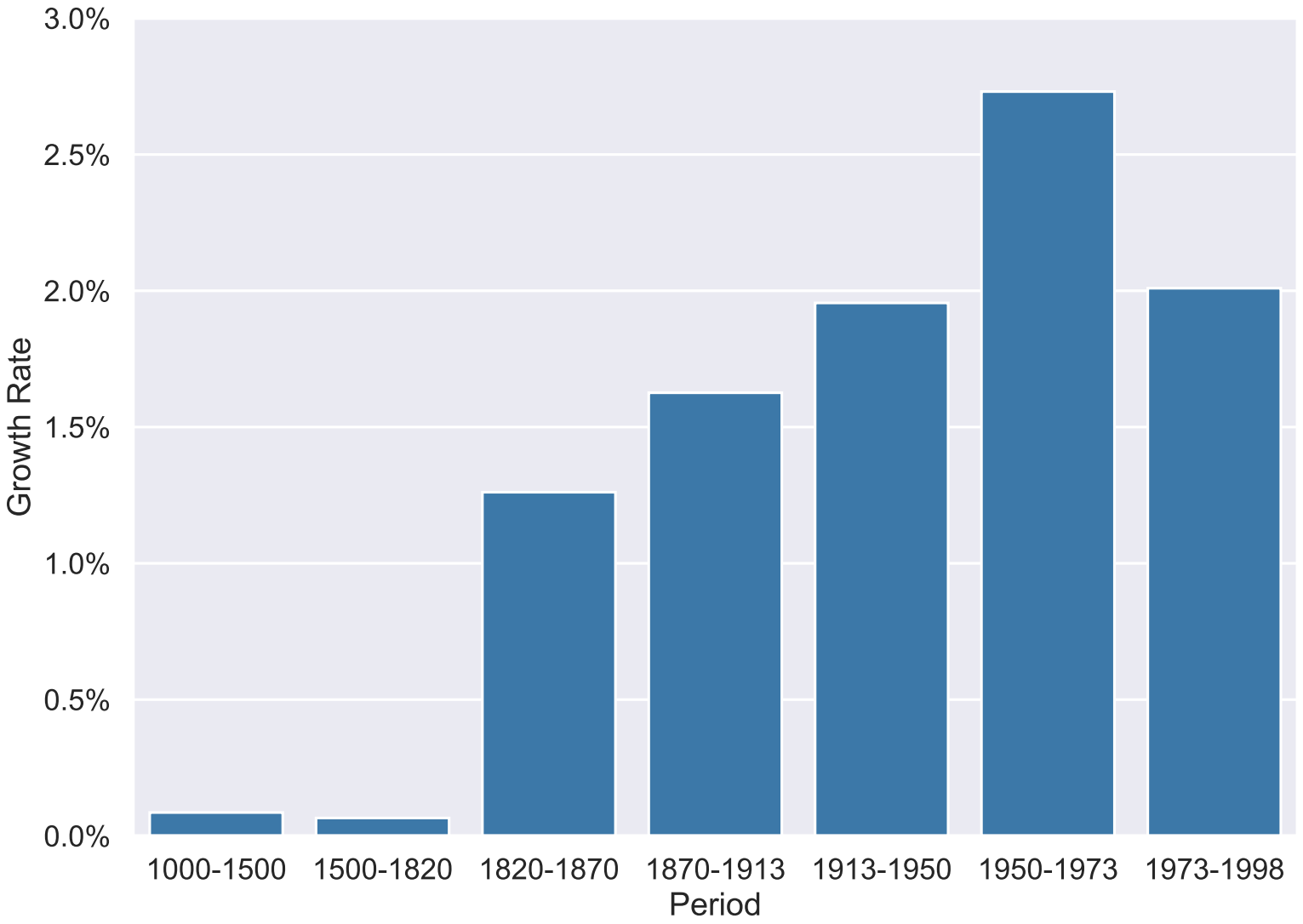
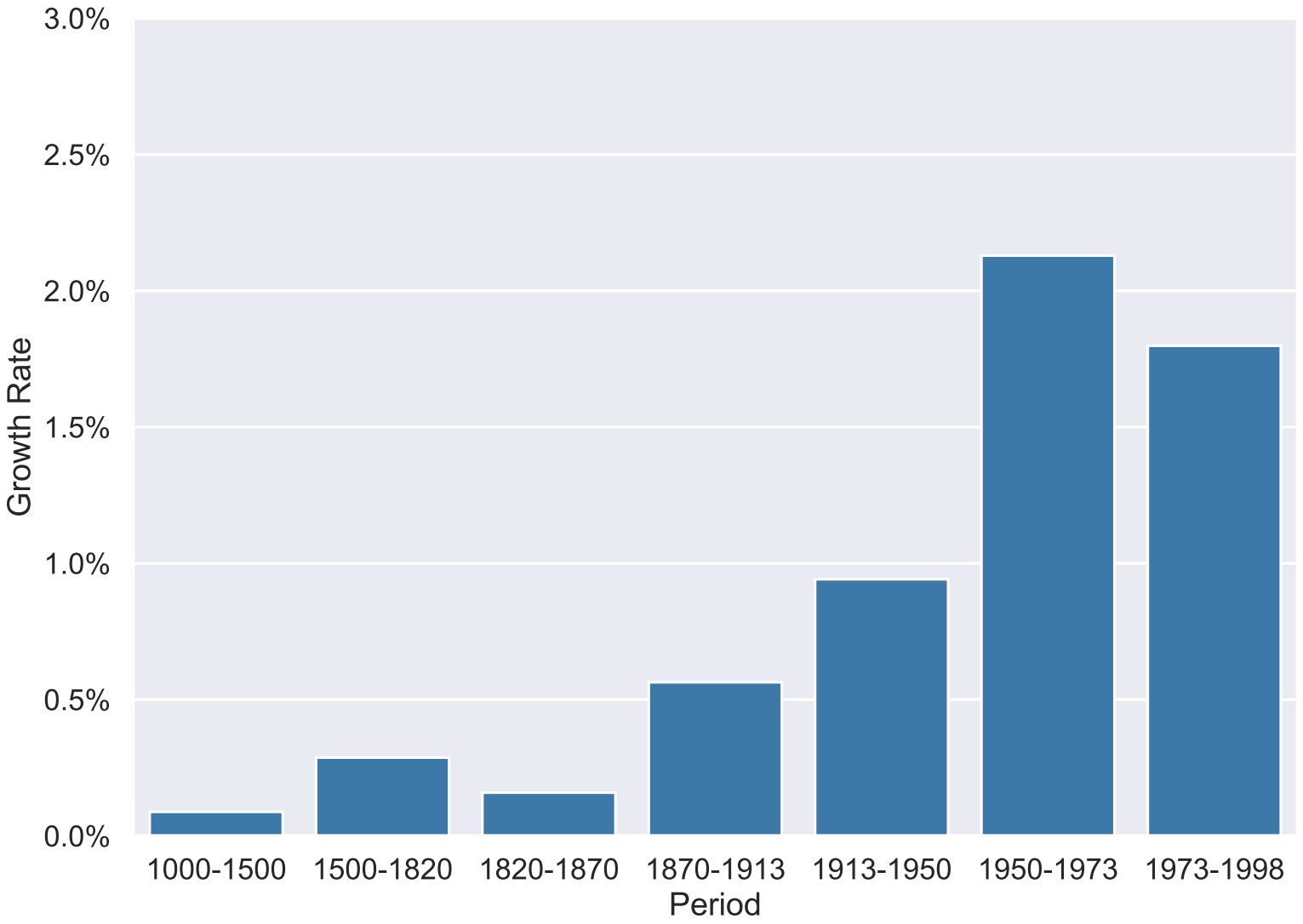


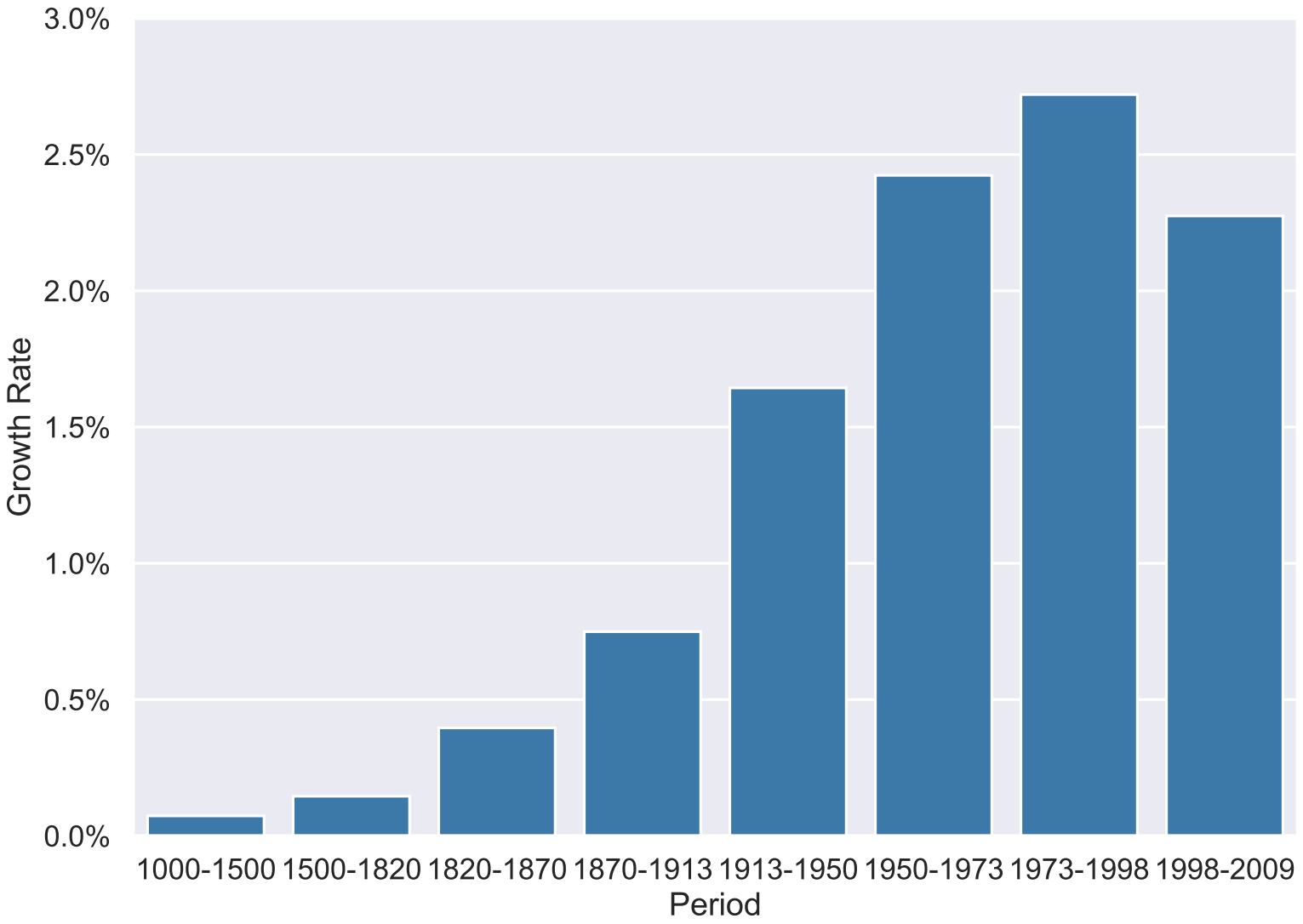
Late Fertility Decline – Latin America



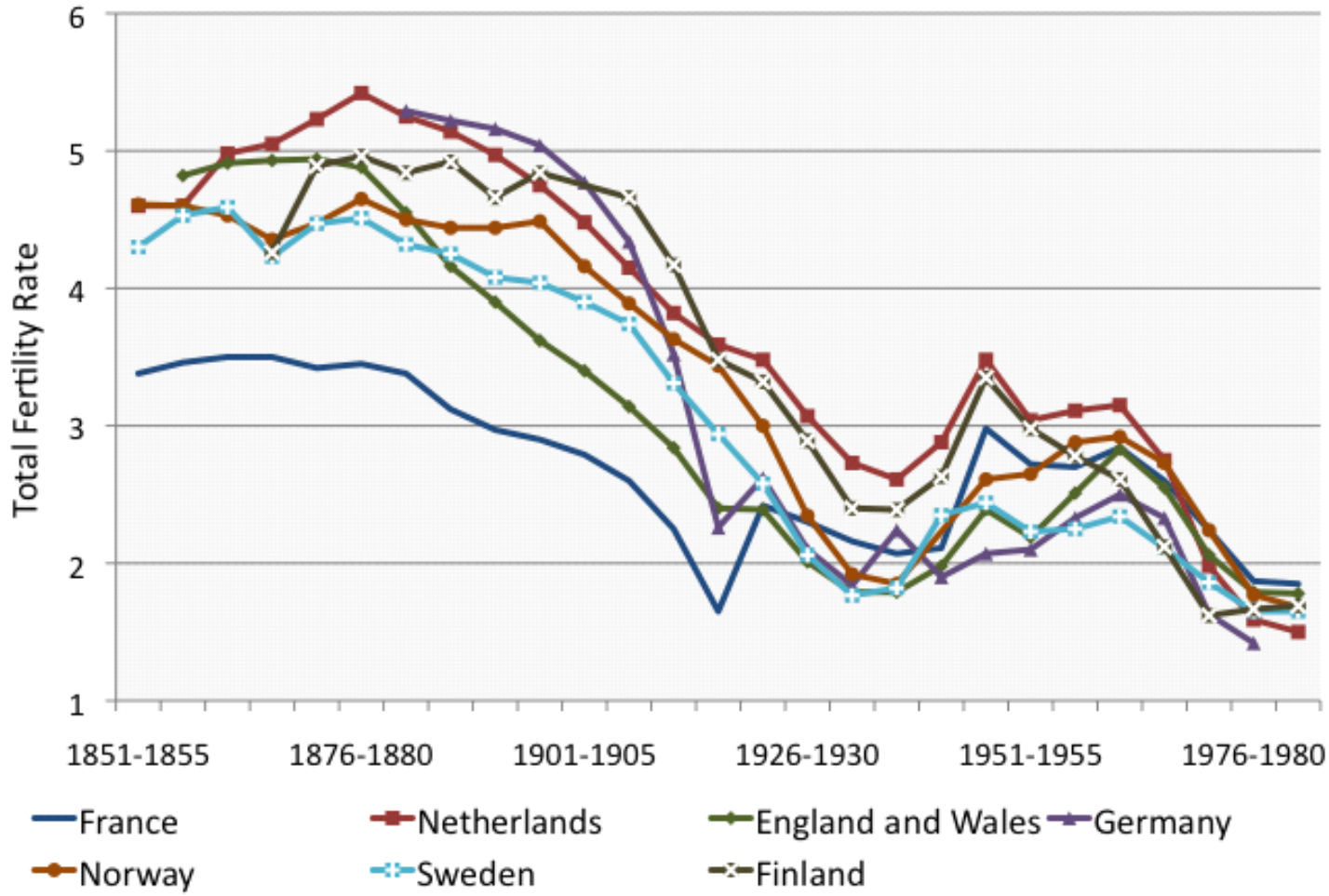
Late Fertility Decline – Asia



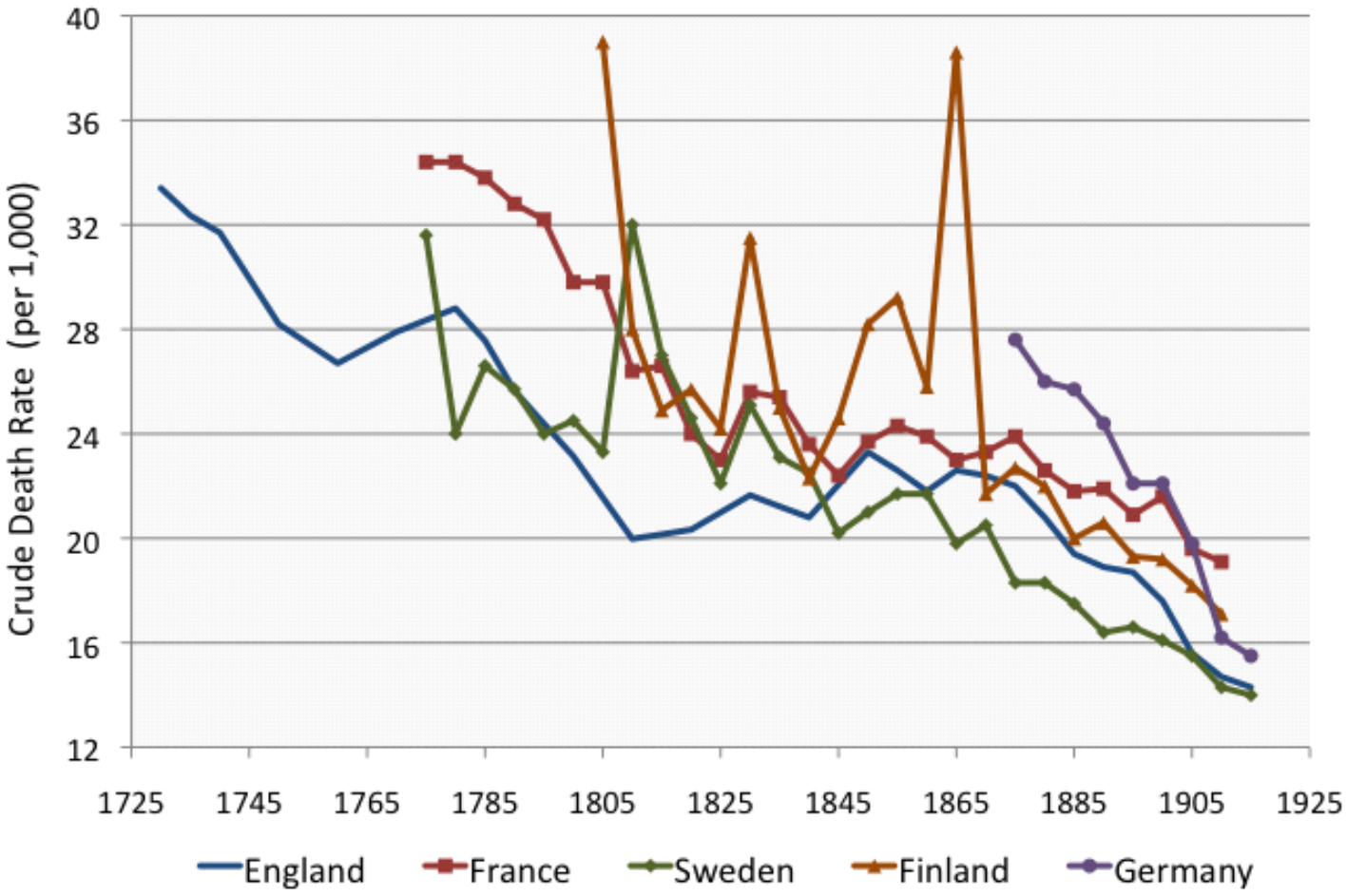
Late Fertility Decline – Africa



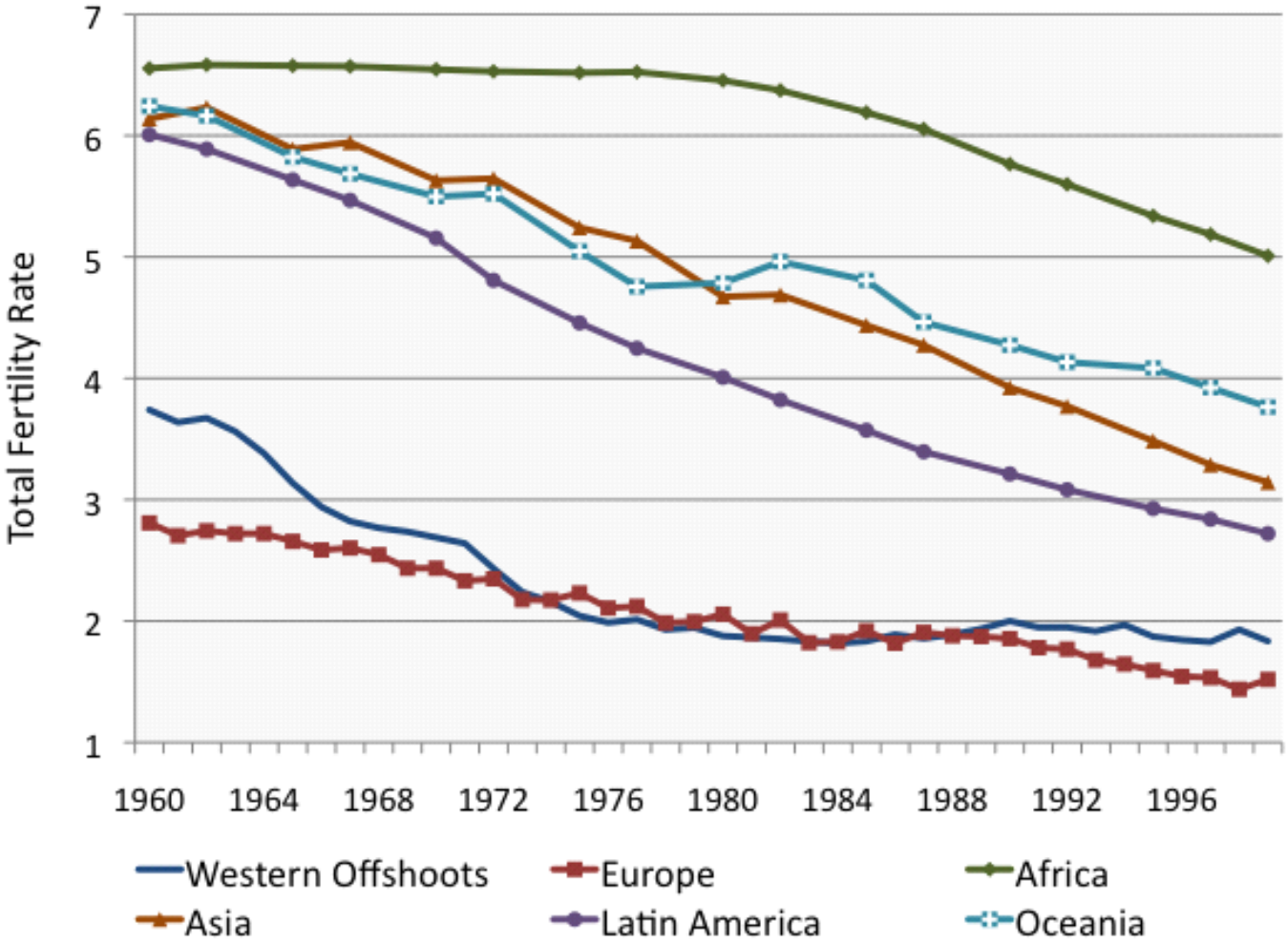
The Demographic Transition in Western Europe: Total Fertility Rates



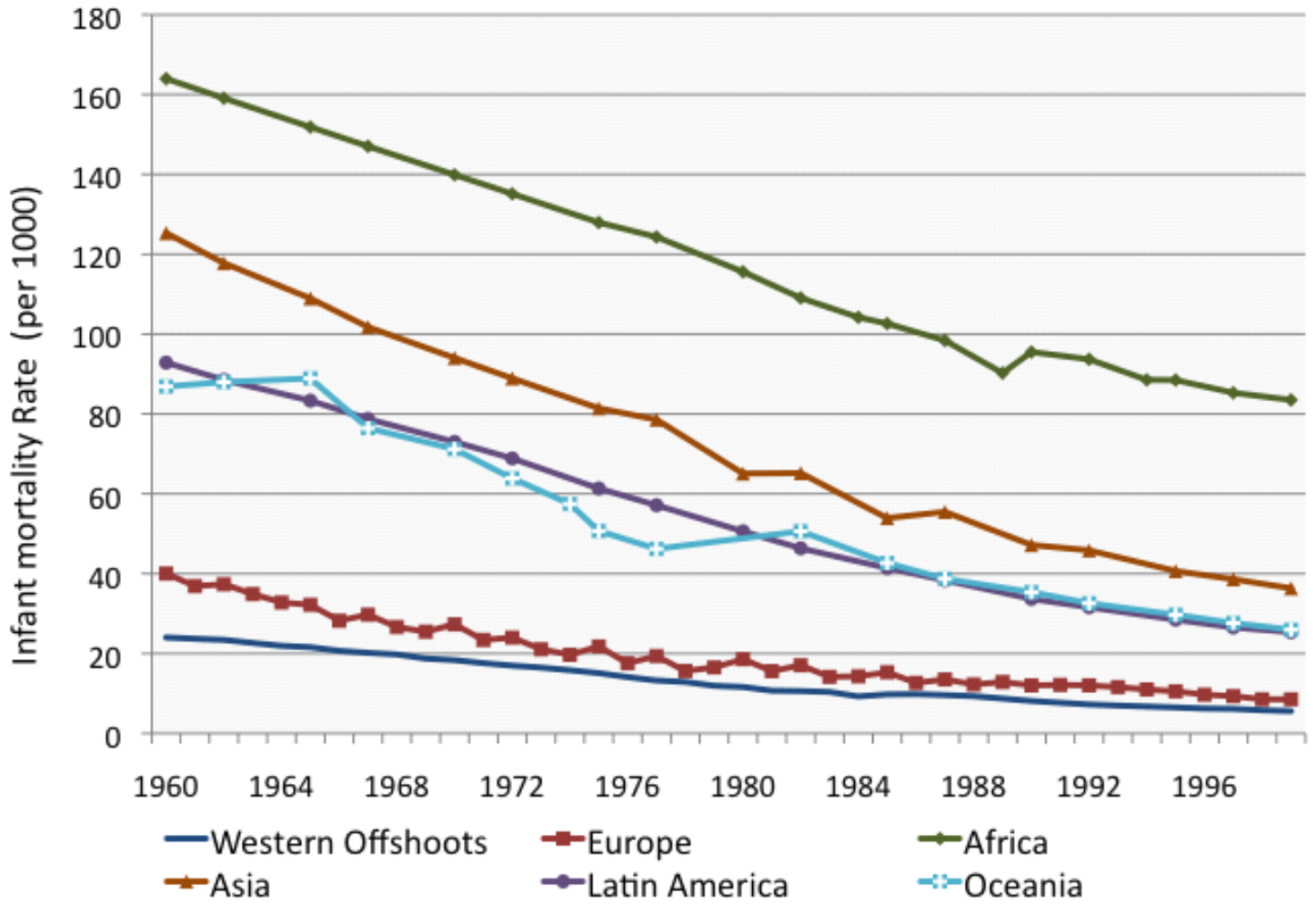
Mortality Decline Western Europe: 1730-1920



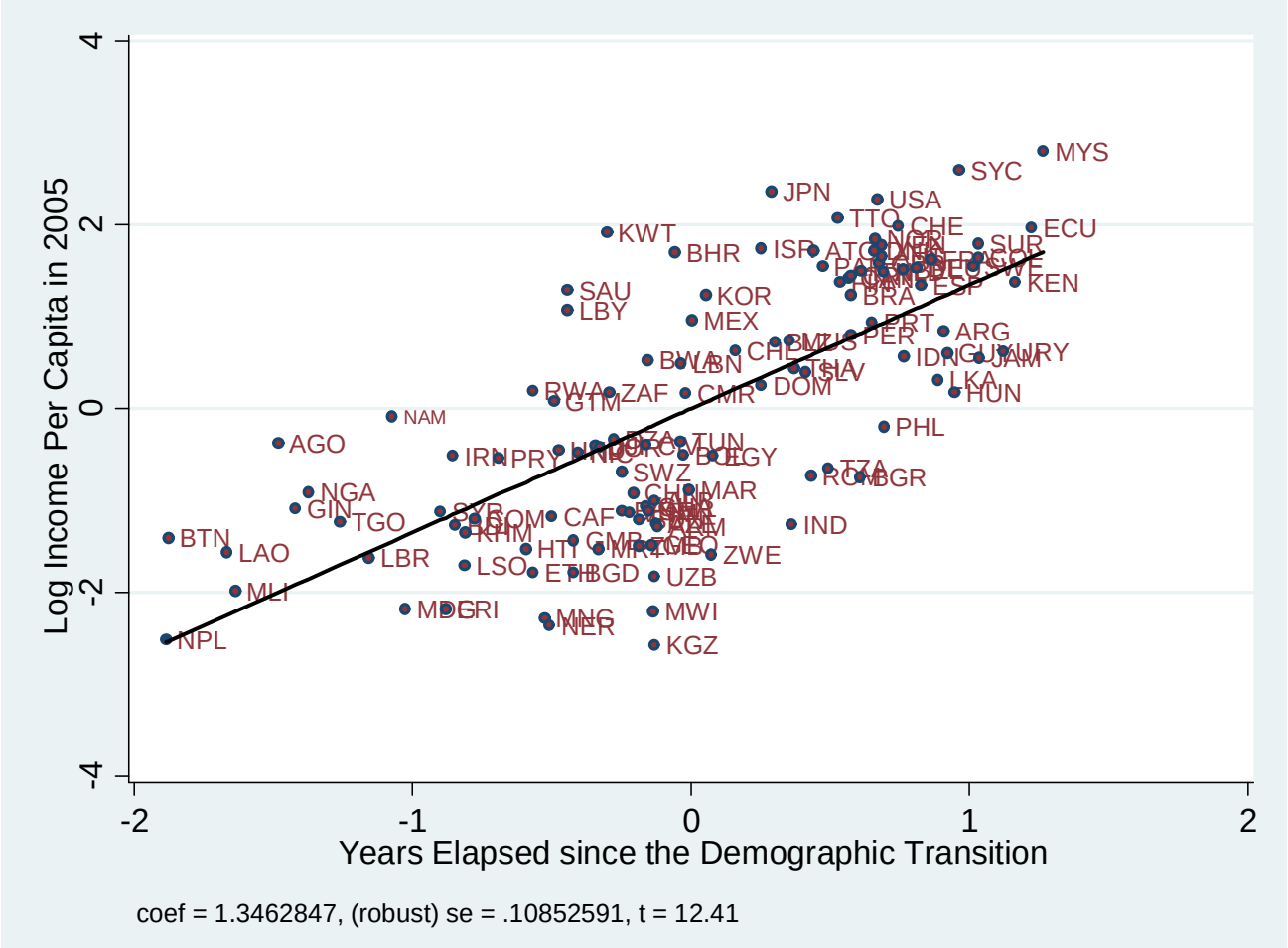
The Evolution of Total Fertility Rate across Regions, 1960-1999



Decline in infant mortality rates across regions, 1960-1999



Timing of the Demographic Transition and Current Income per Capita



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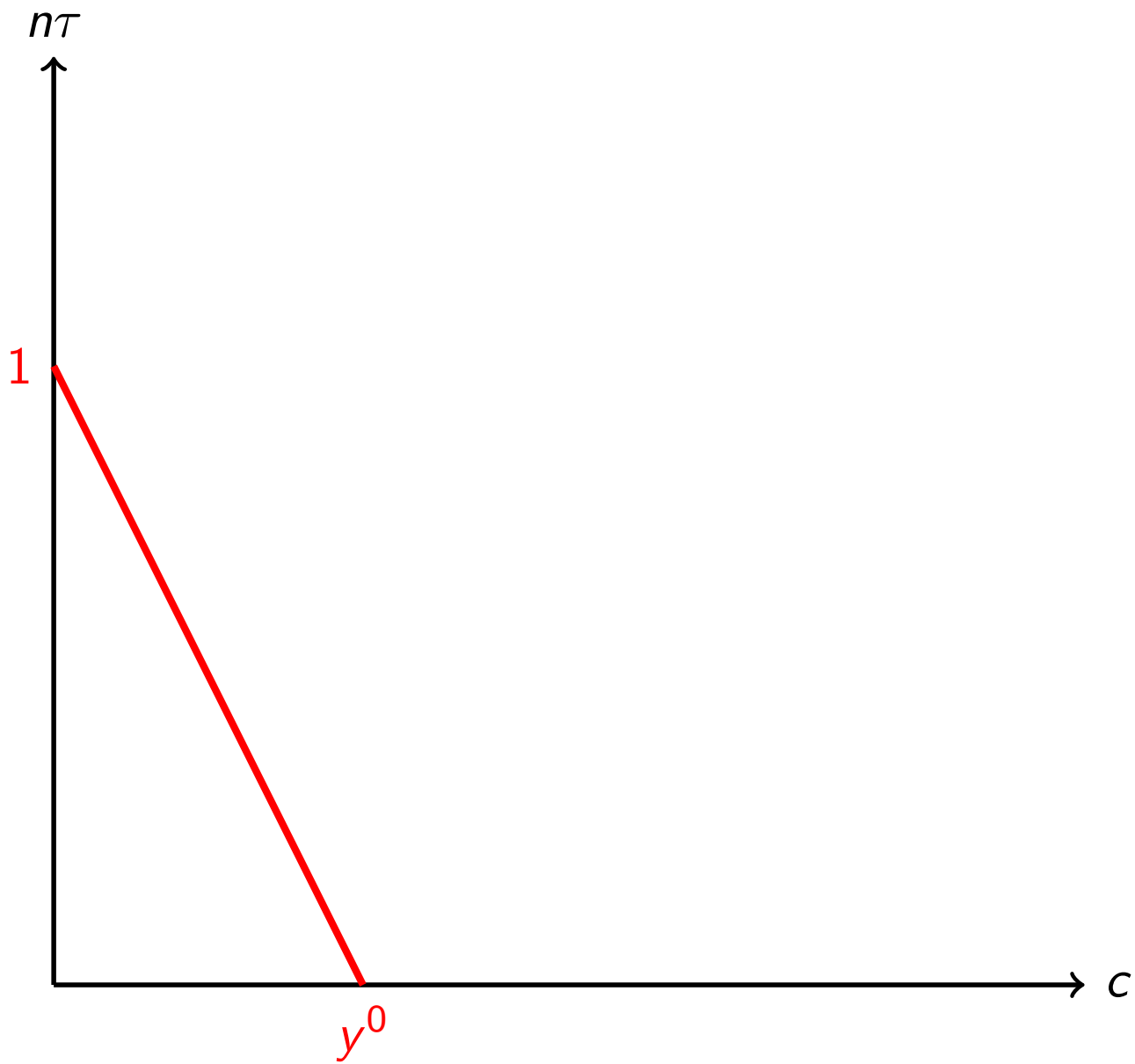
Rise in Income: Optimal Choice



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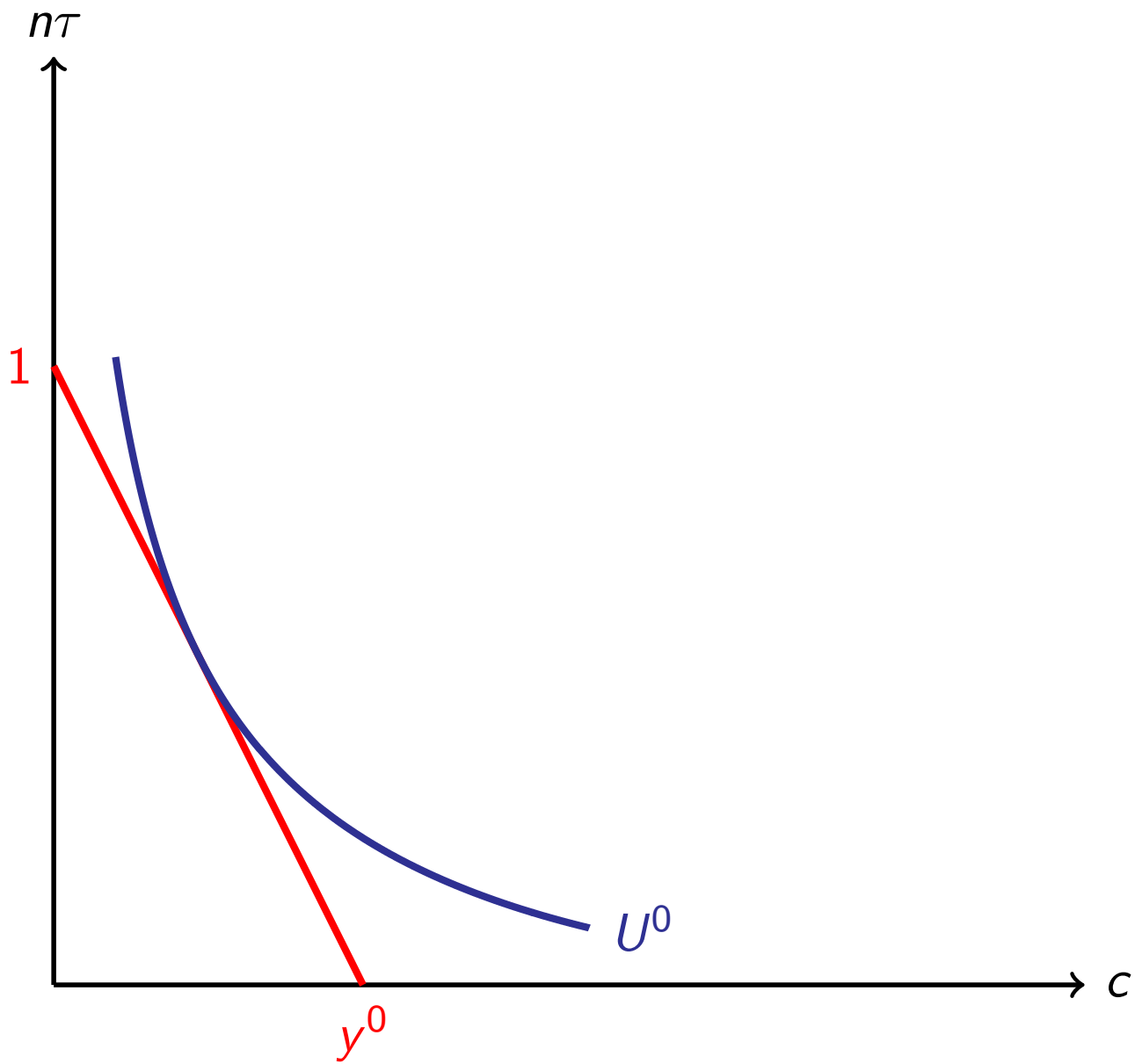

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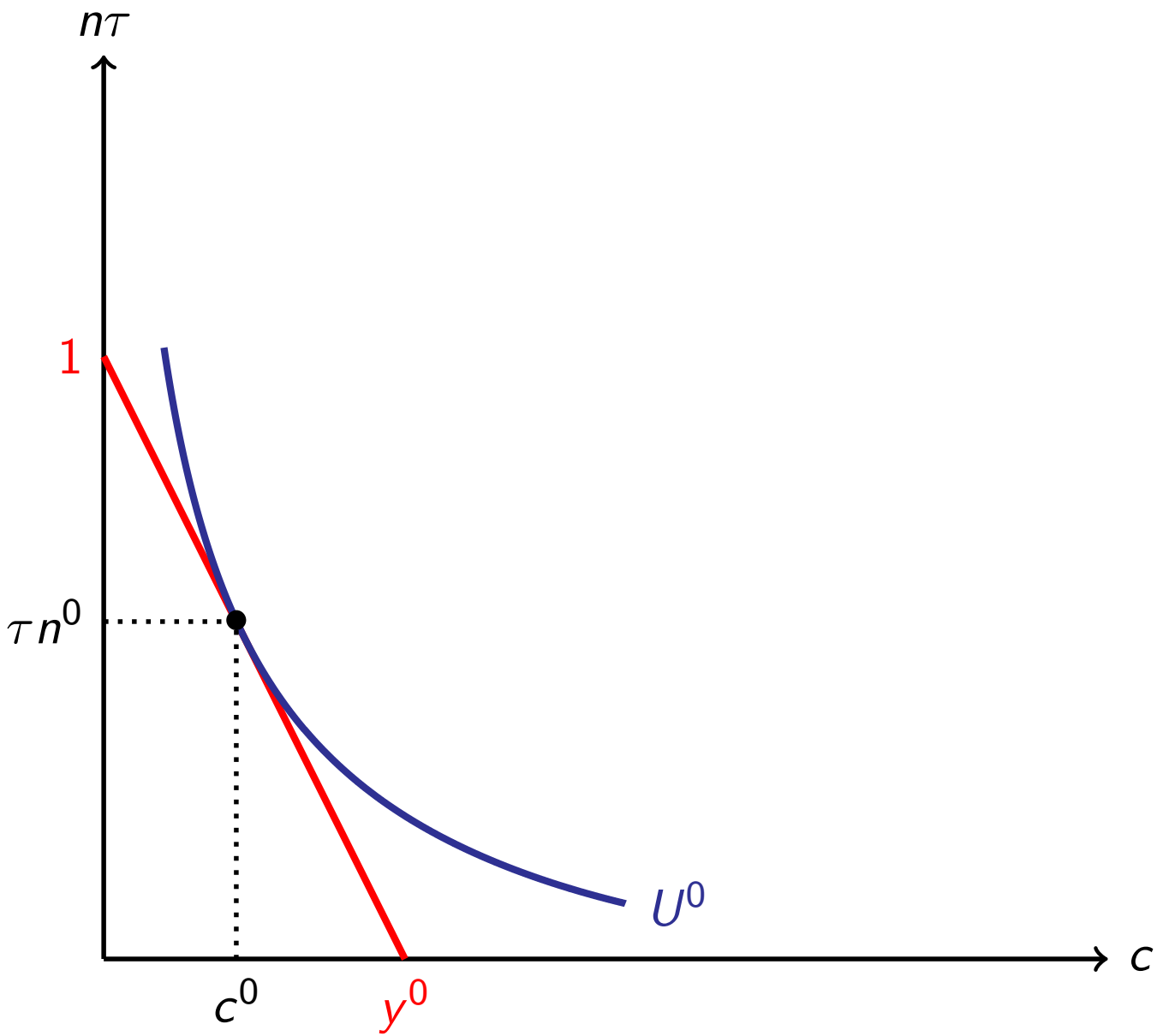

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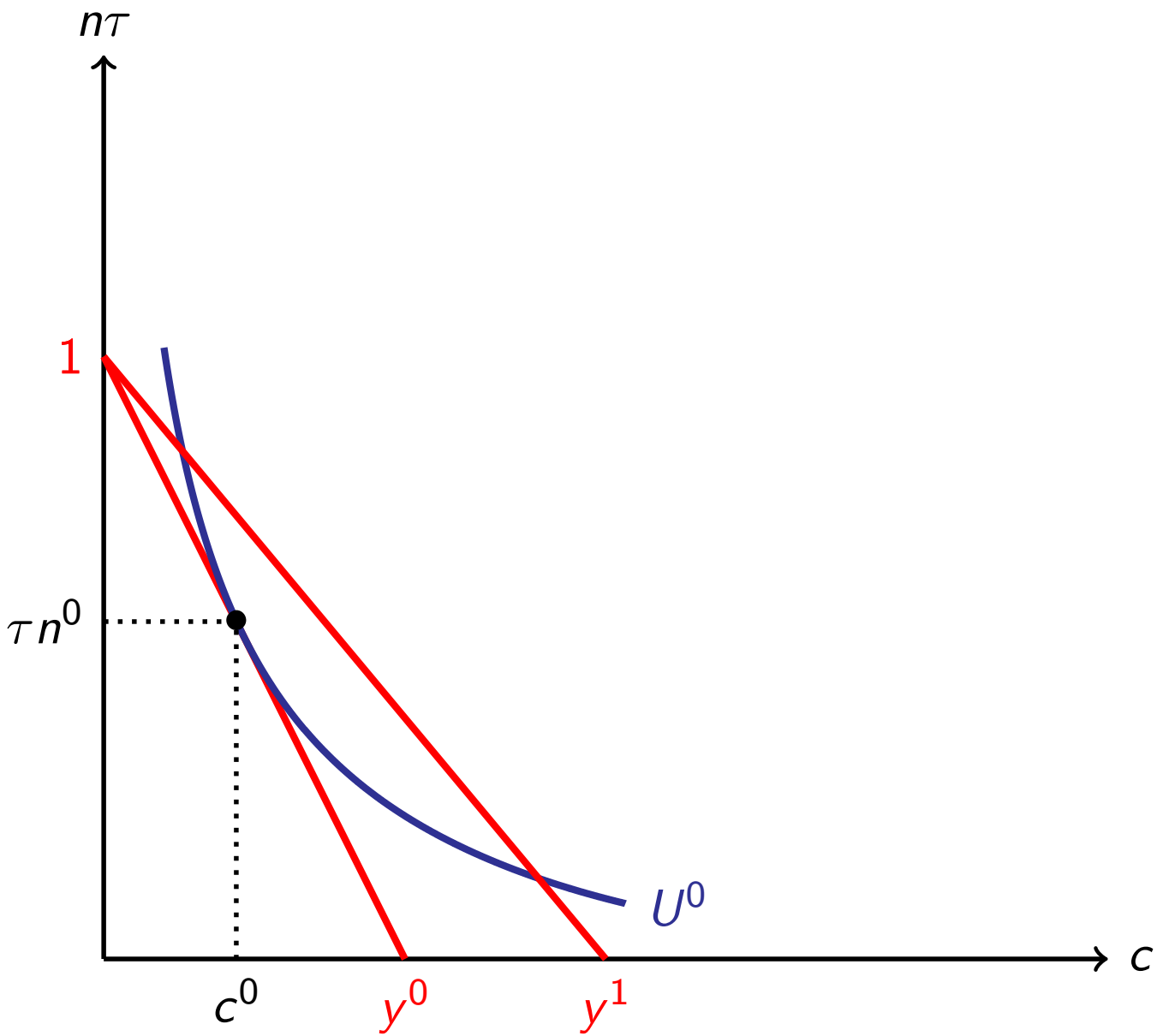

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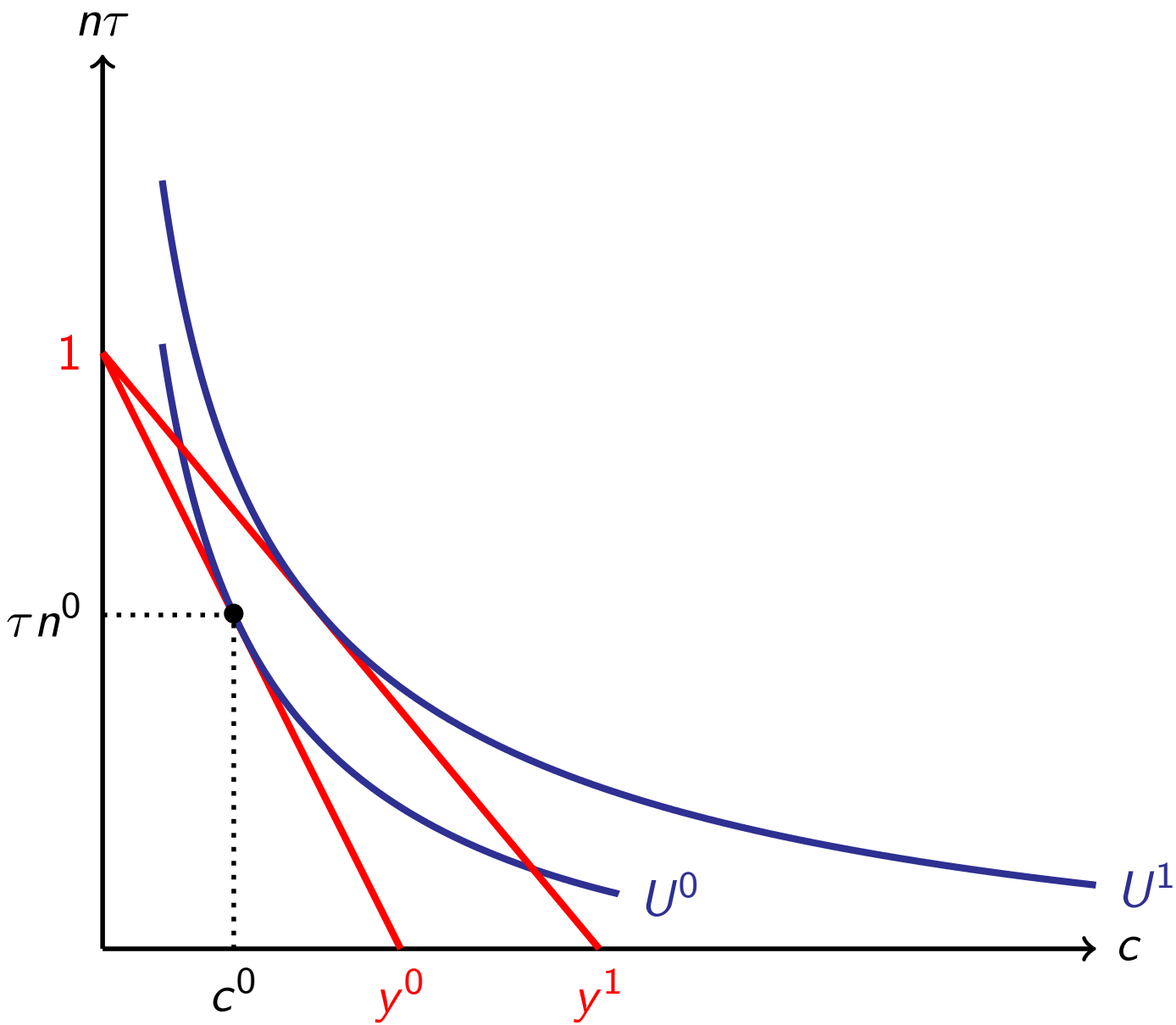

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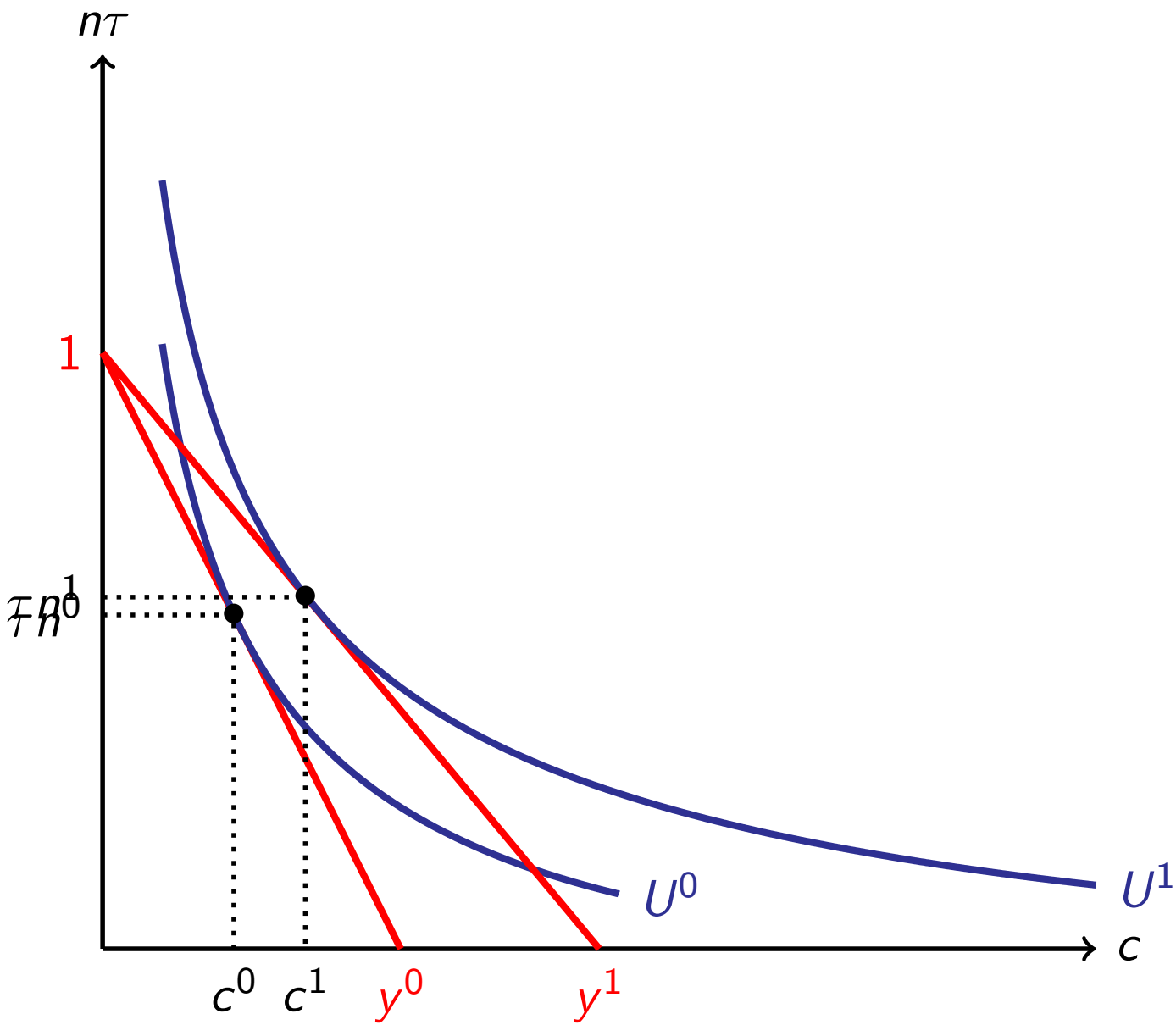

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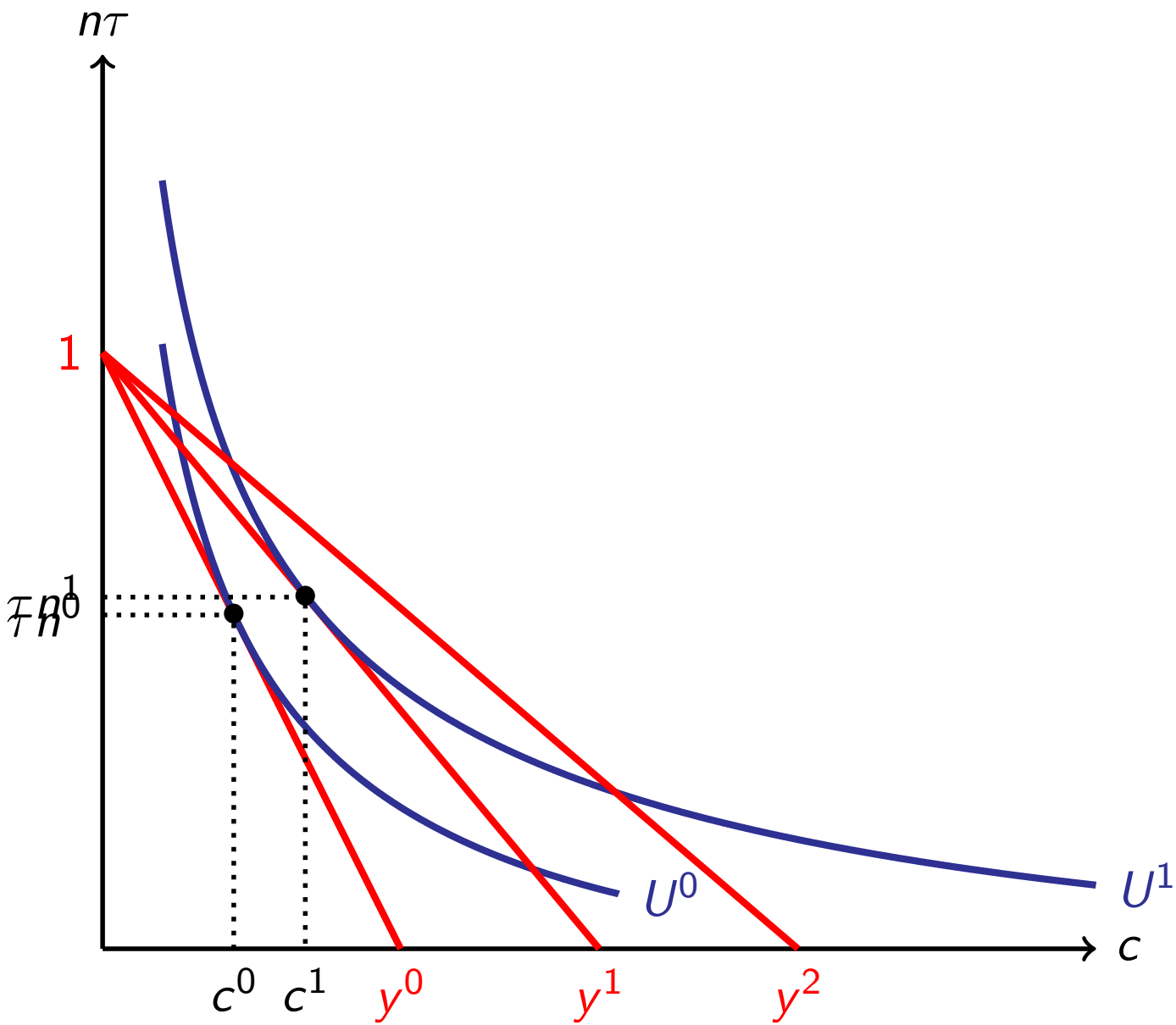

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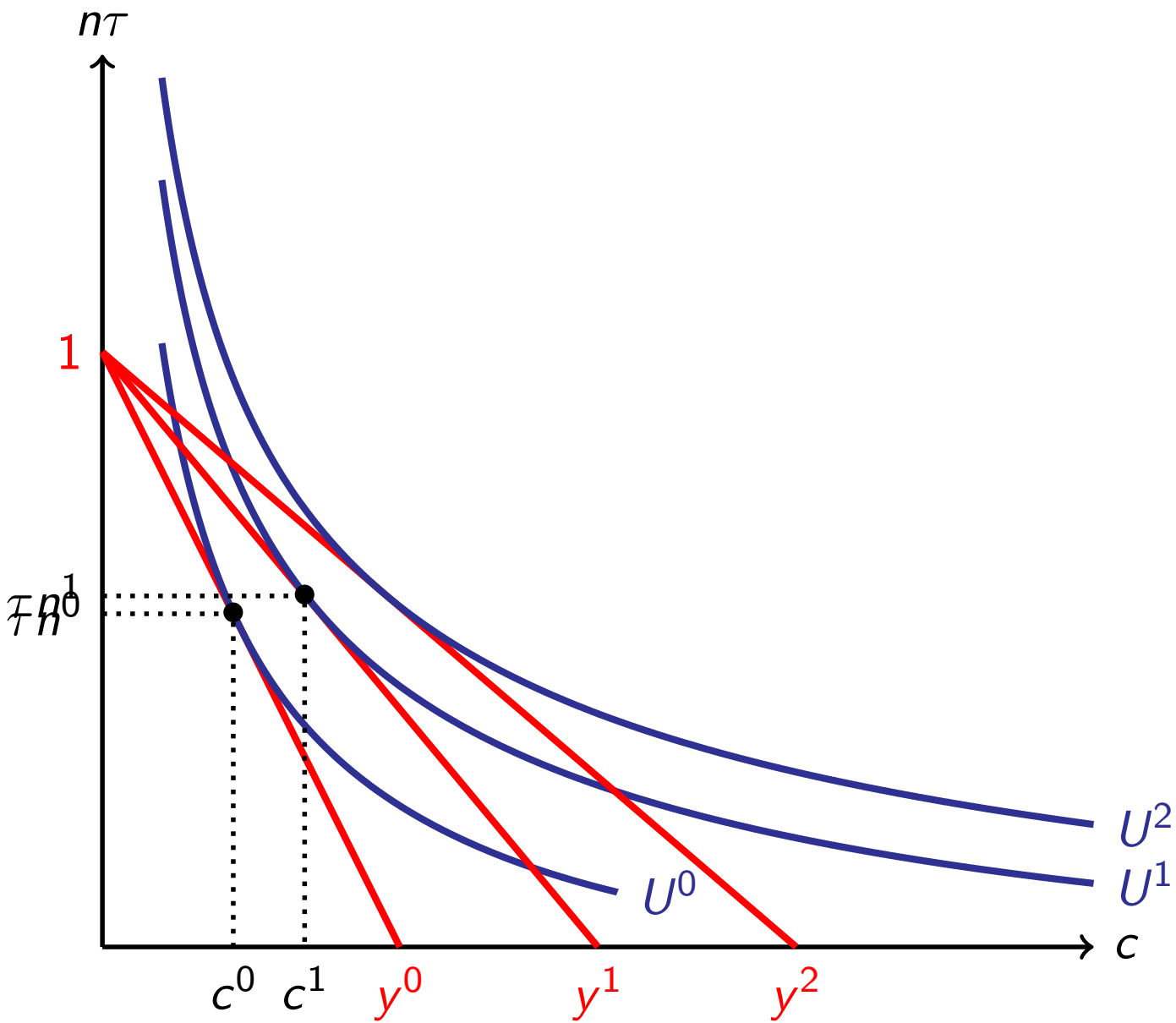

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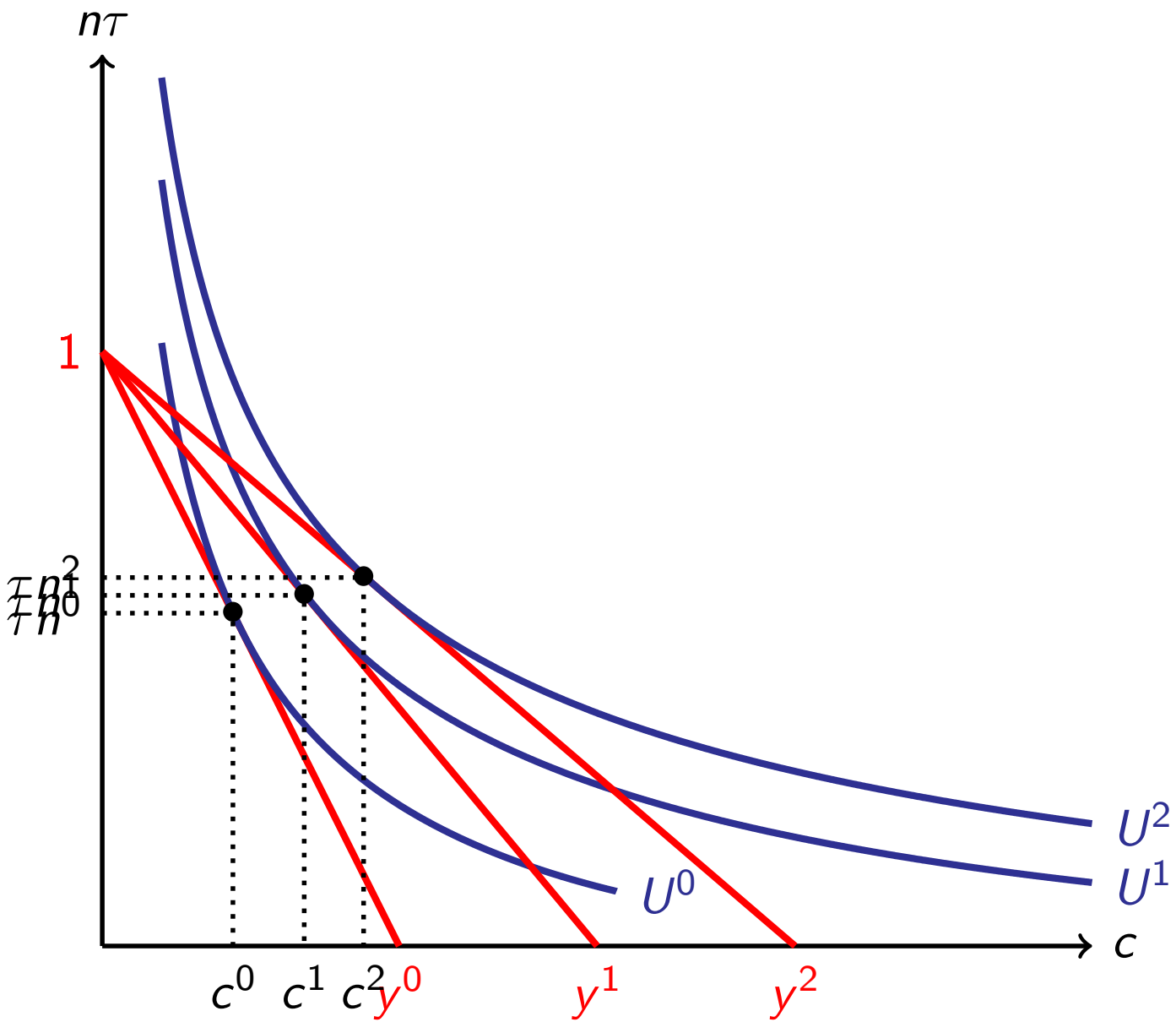

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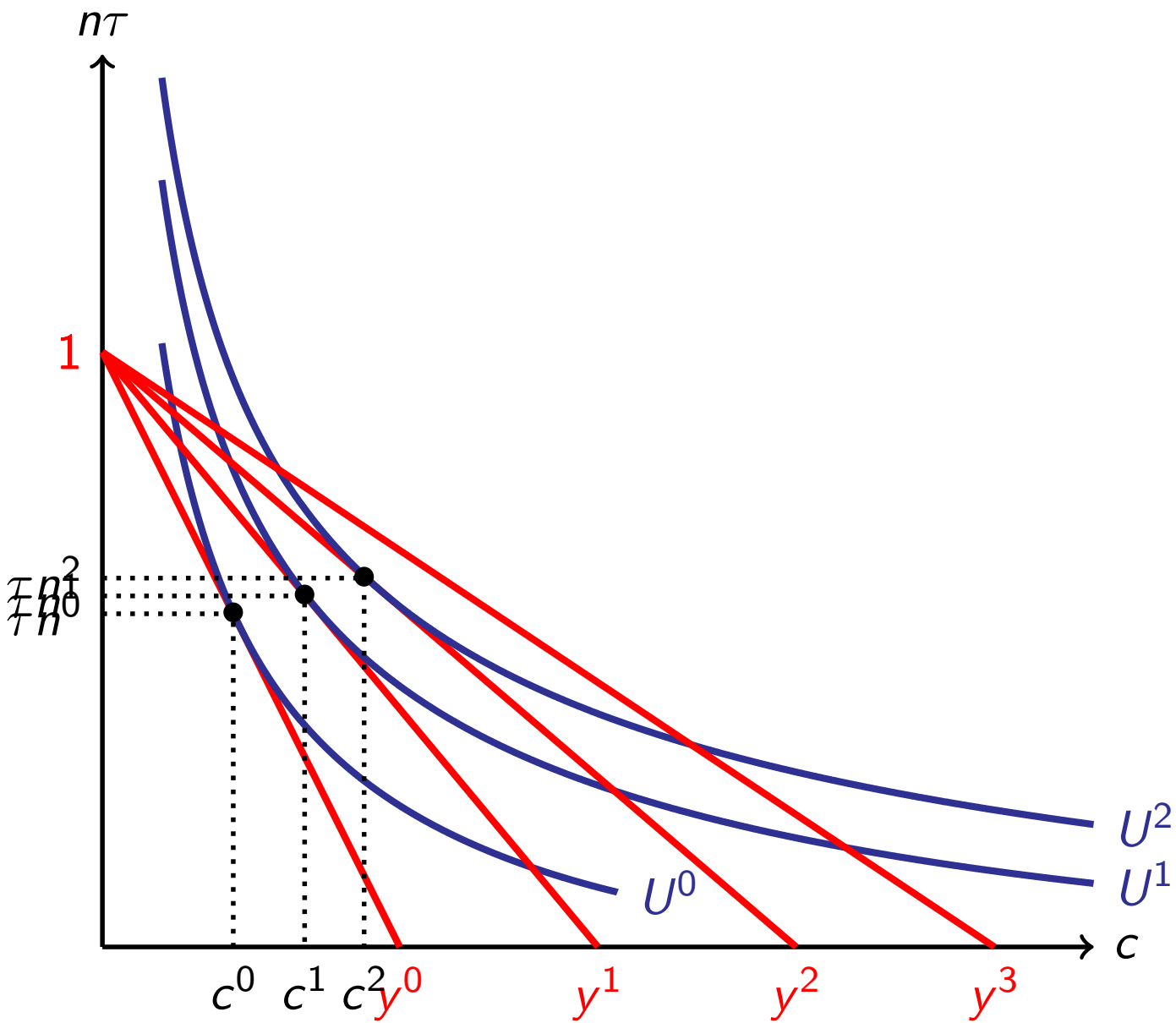

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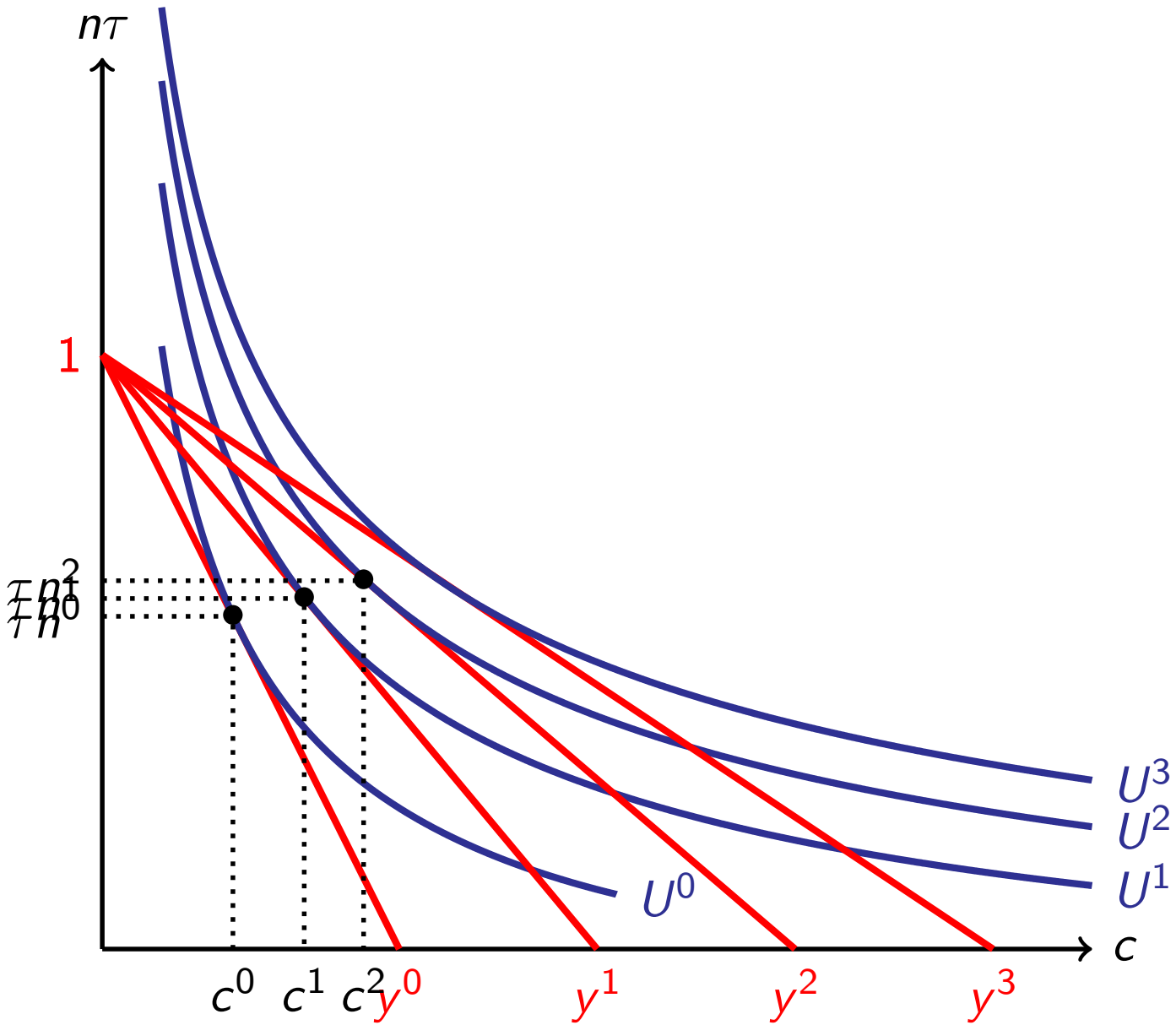

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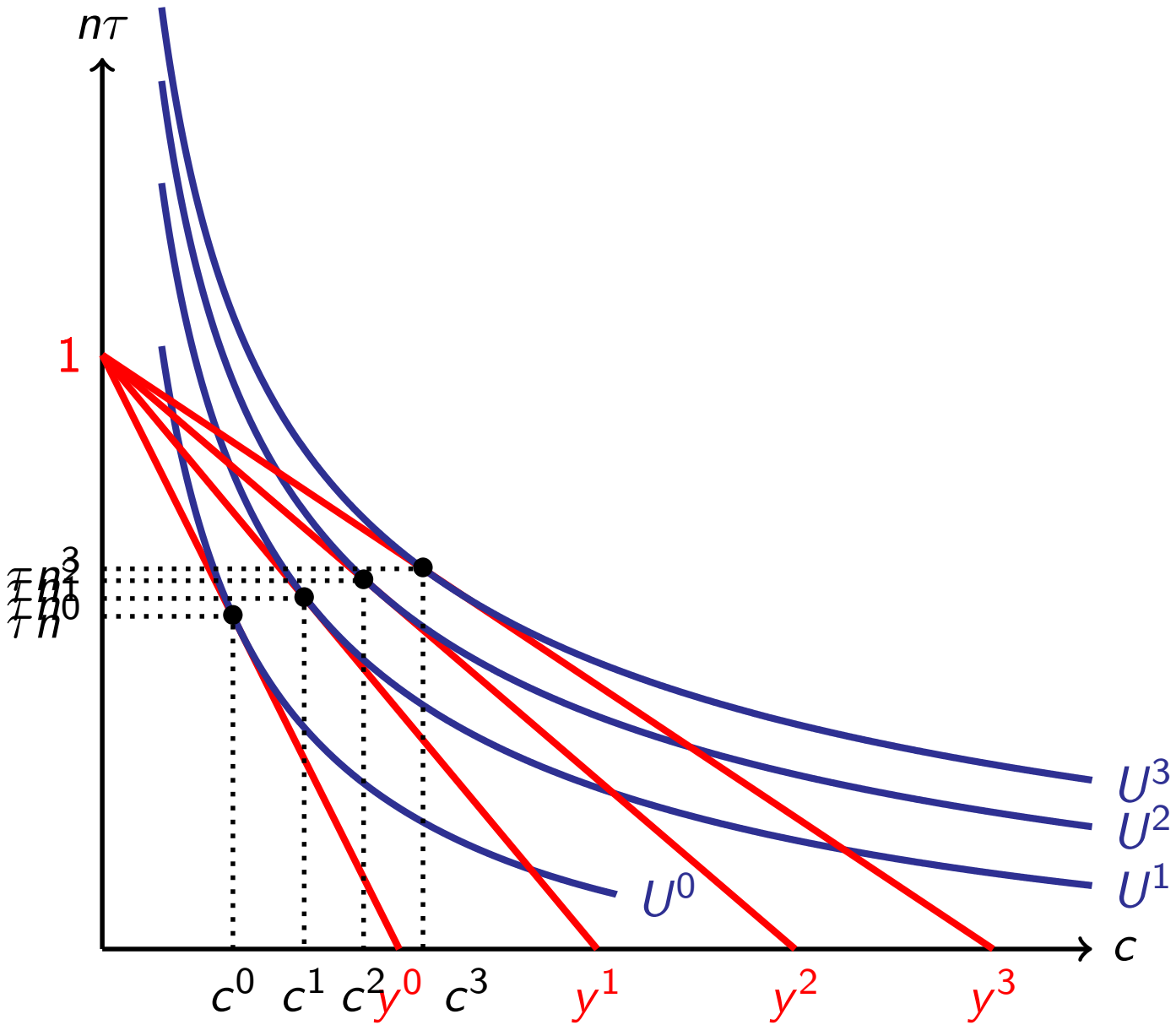

The Rise in Income: Mechanism

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The Rise in Income - Homothetic Preferences

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$$u = n^{\gamma} c^{(1-\gamma)} \qquad 0 < \gamma < 1$$

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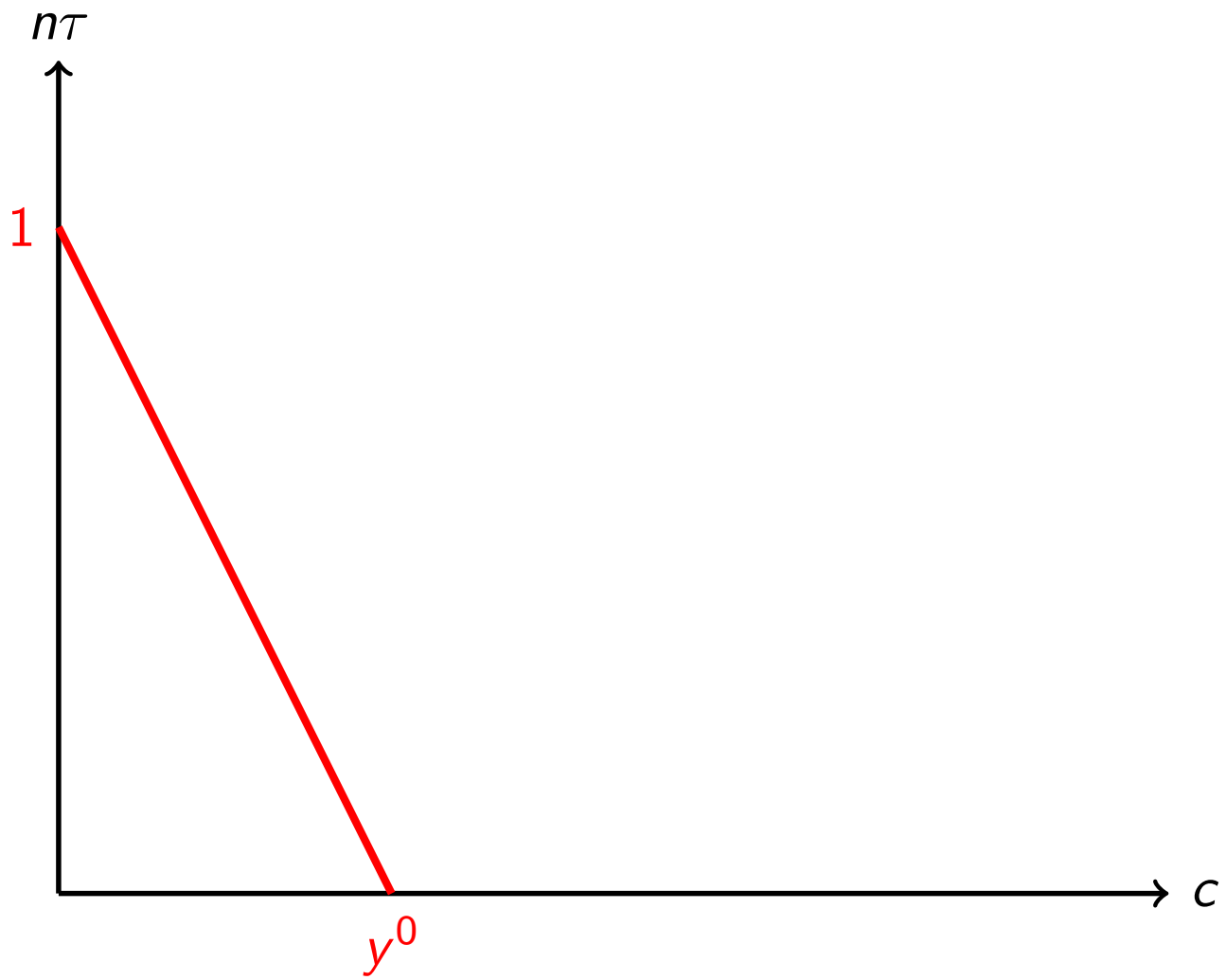

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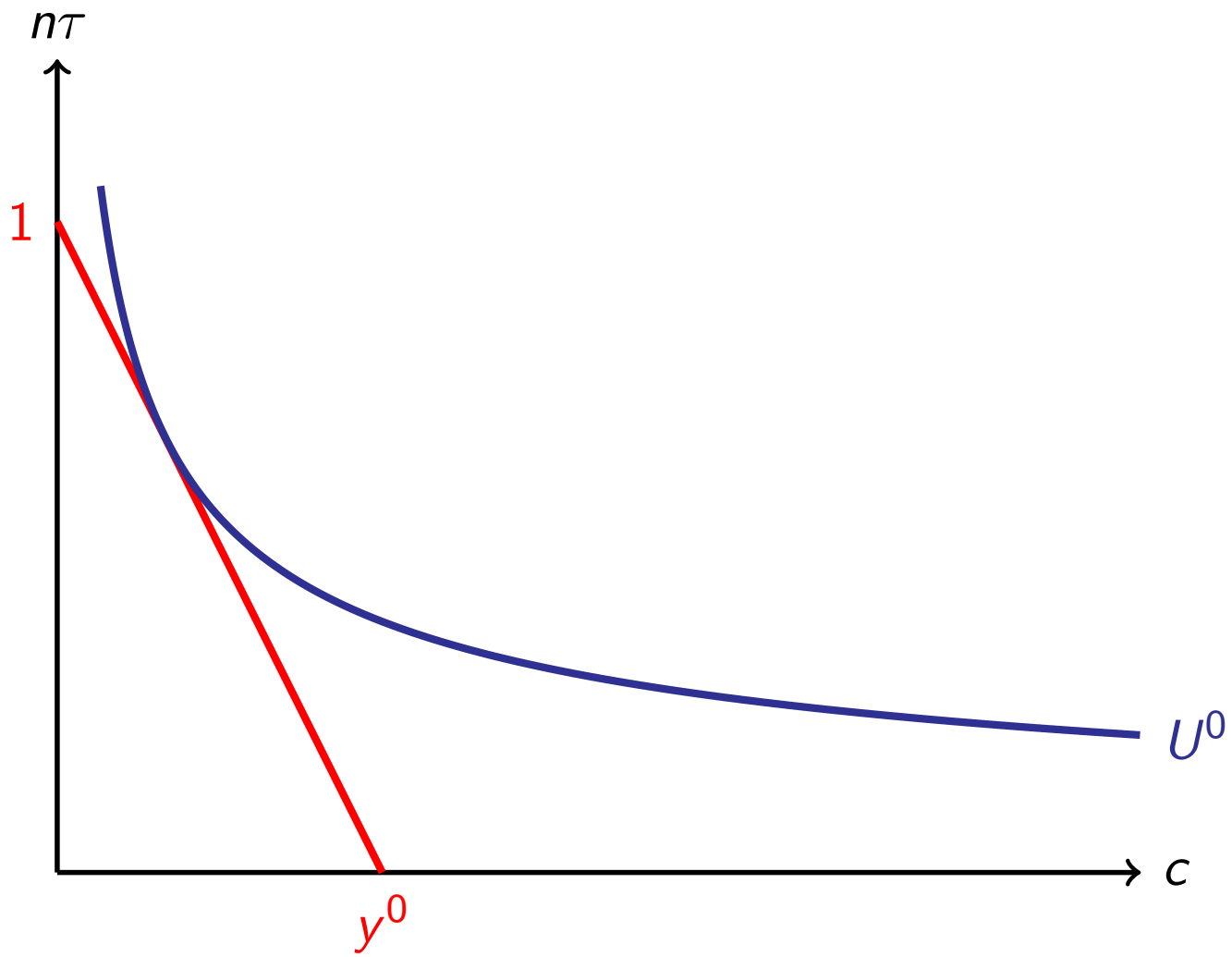

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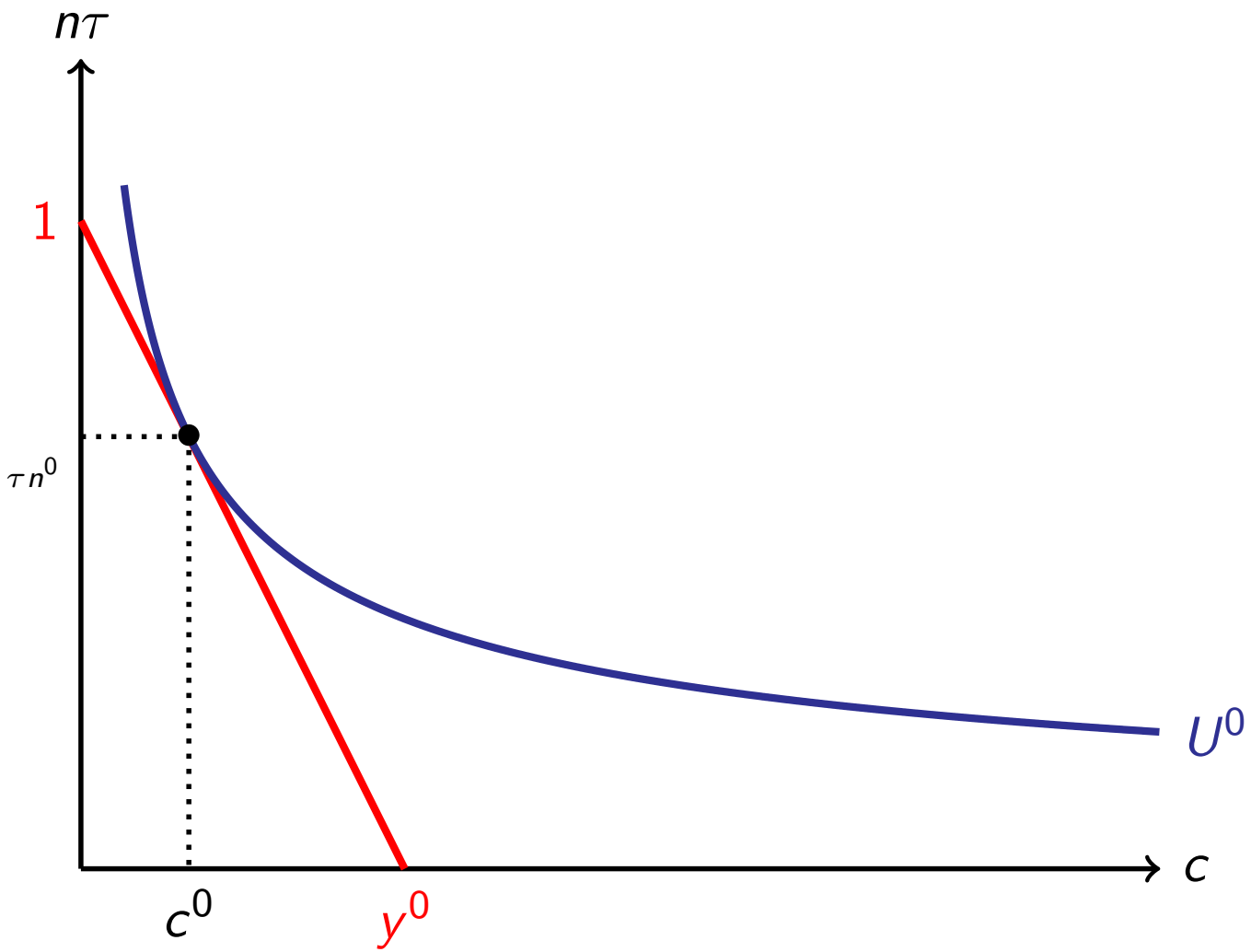

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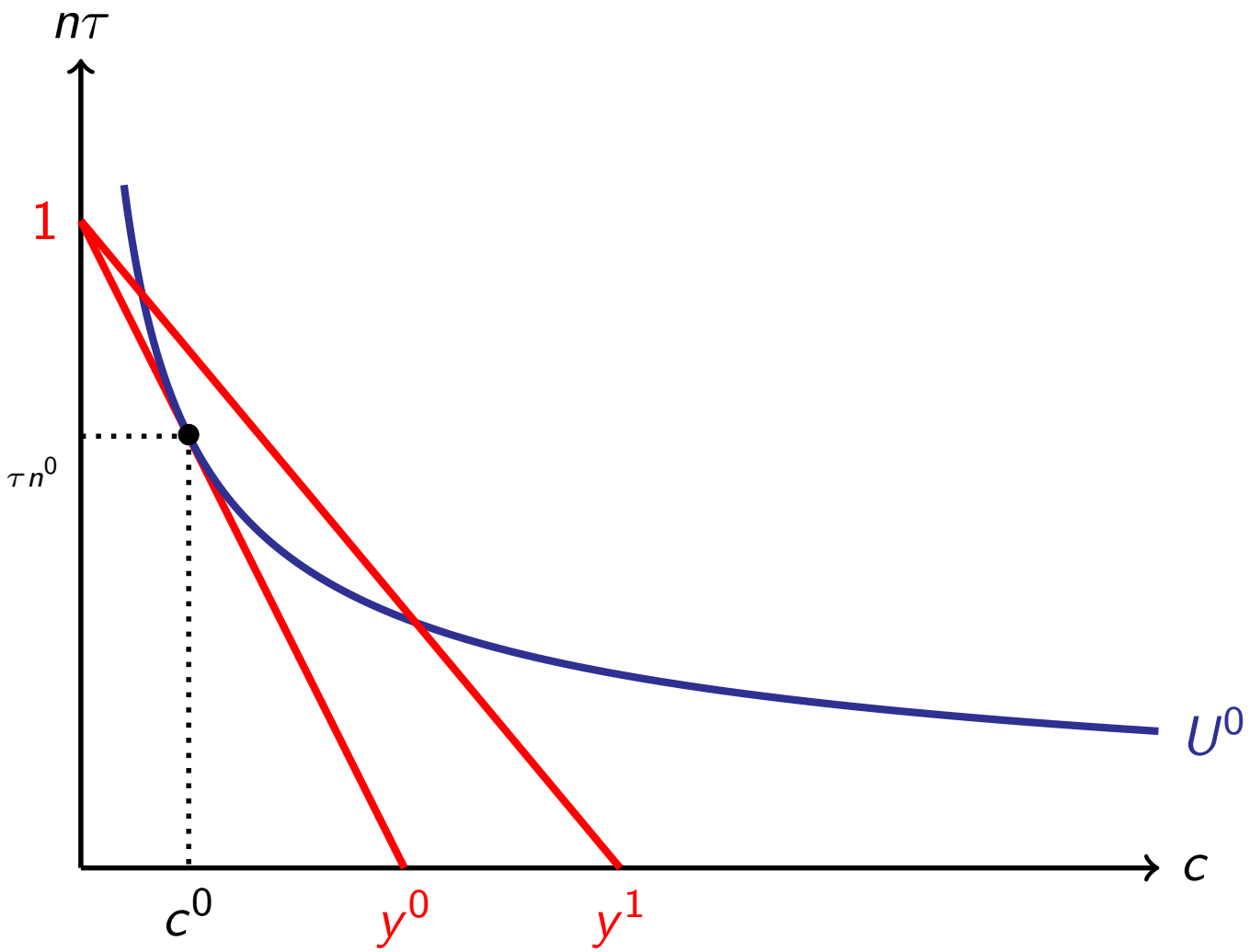

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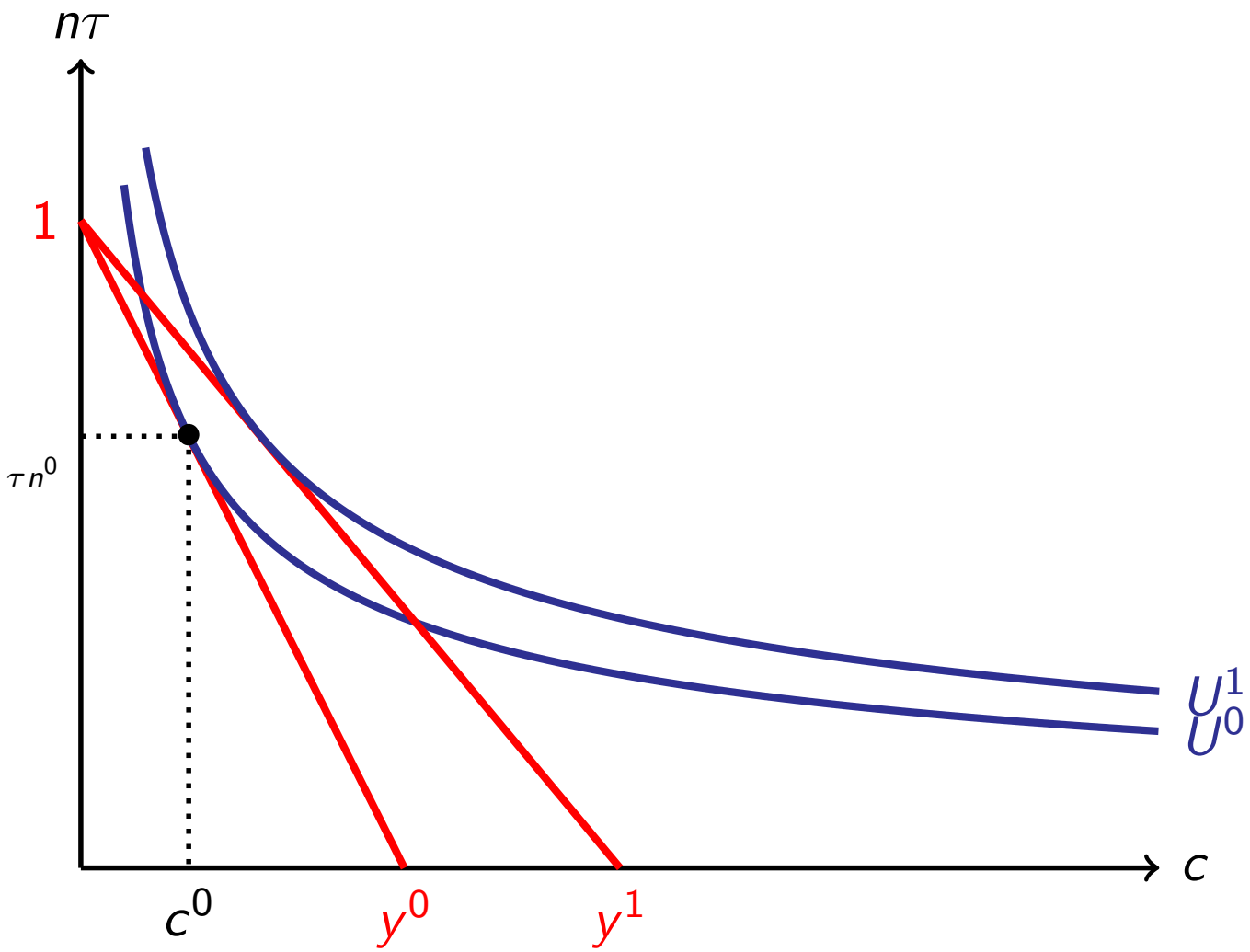

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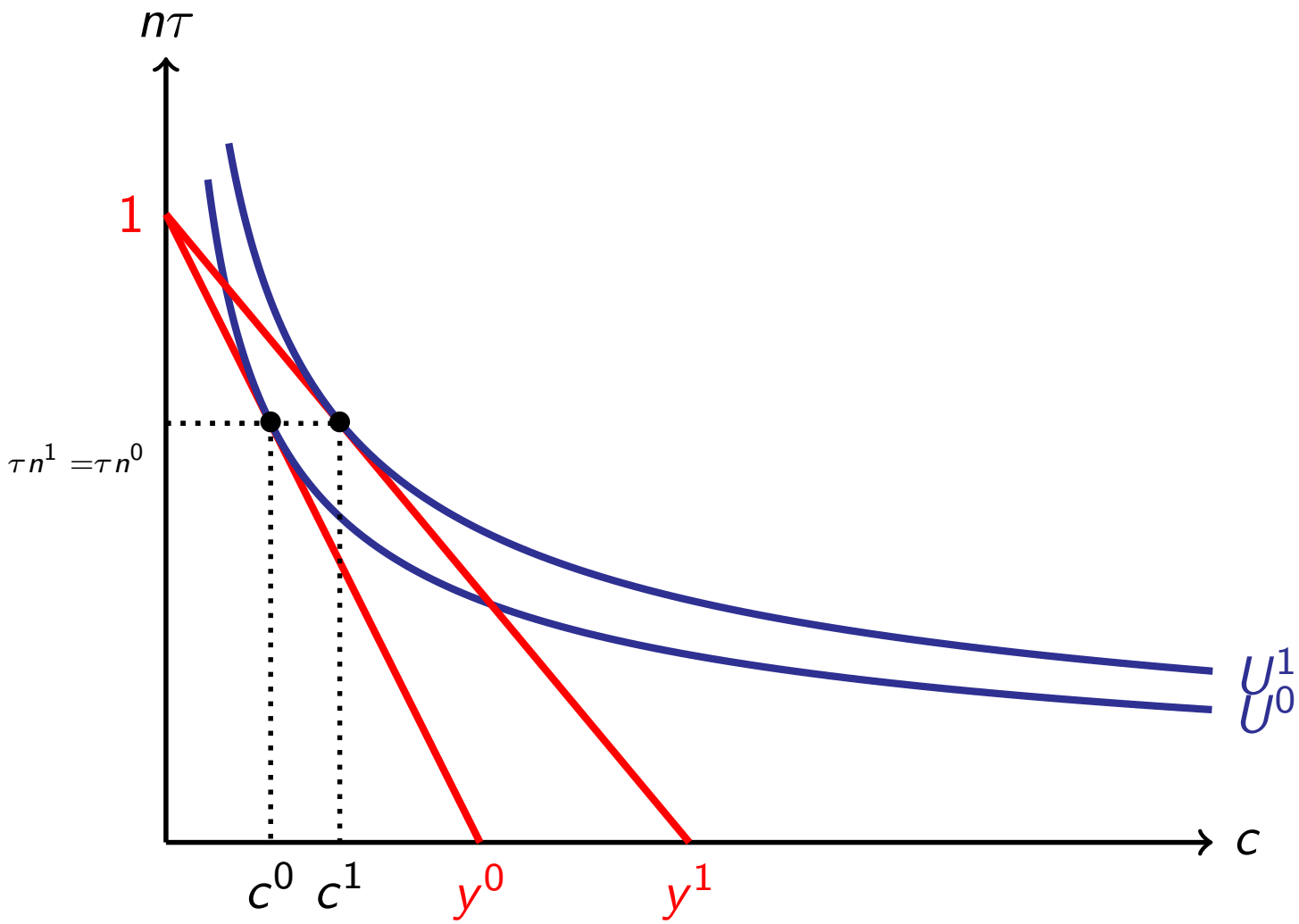

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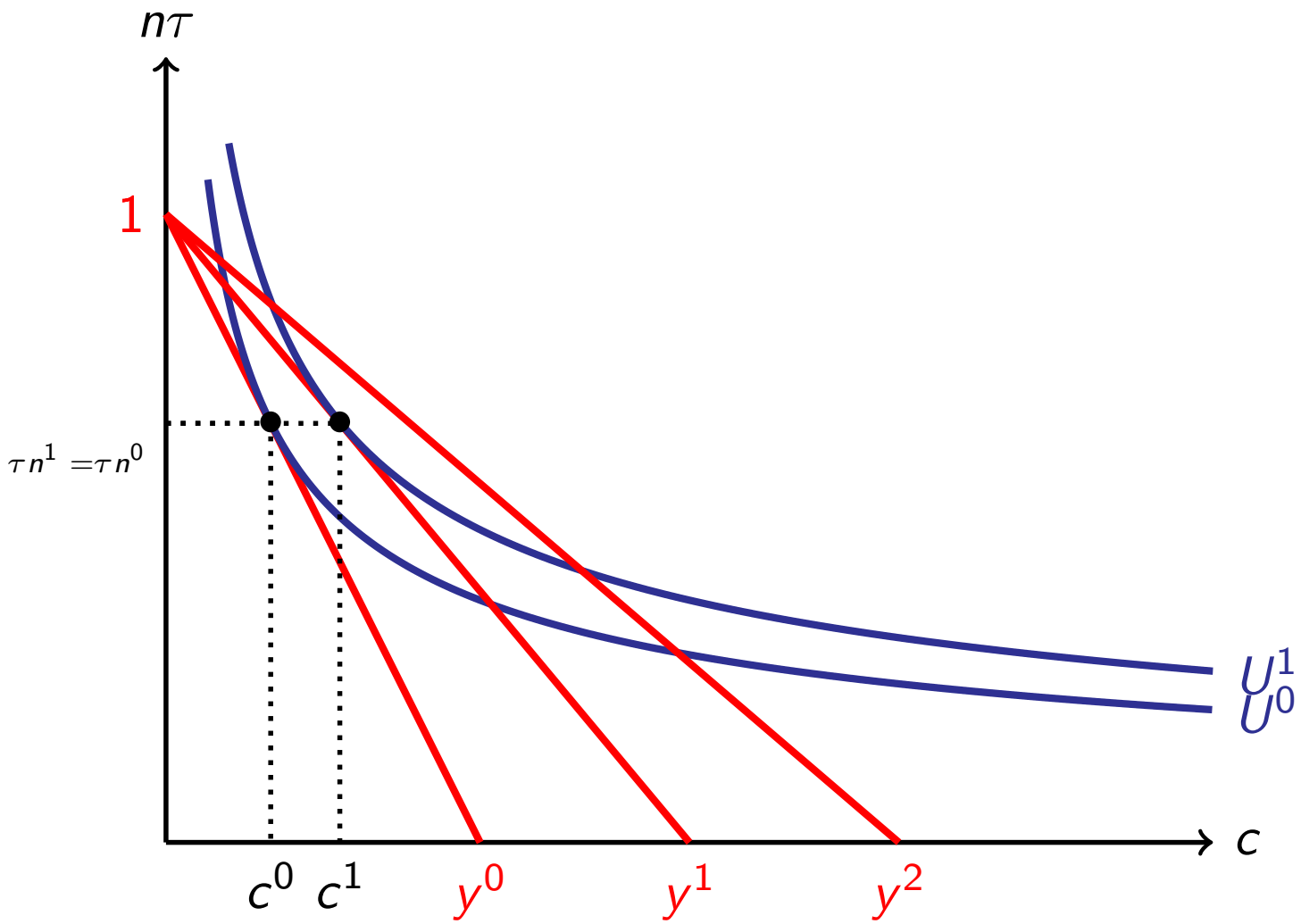

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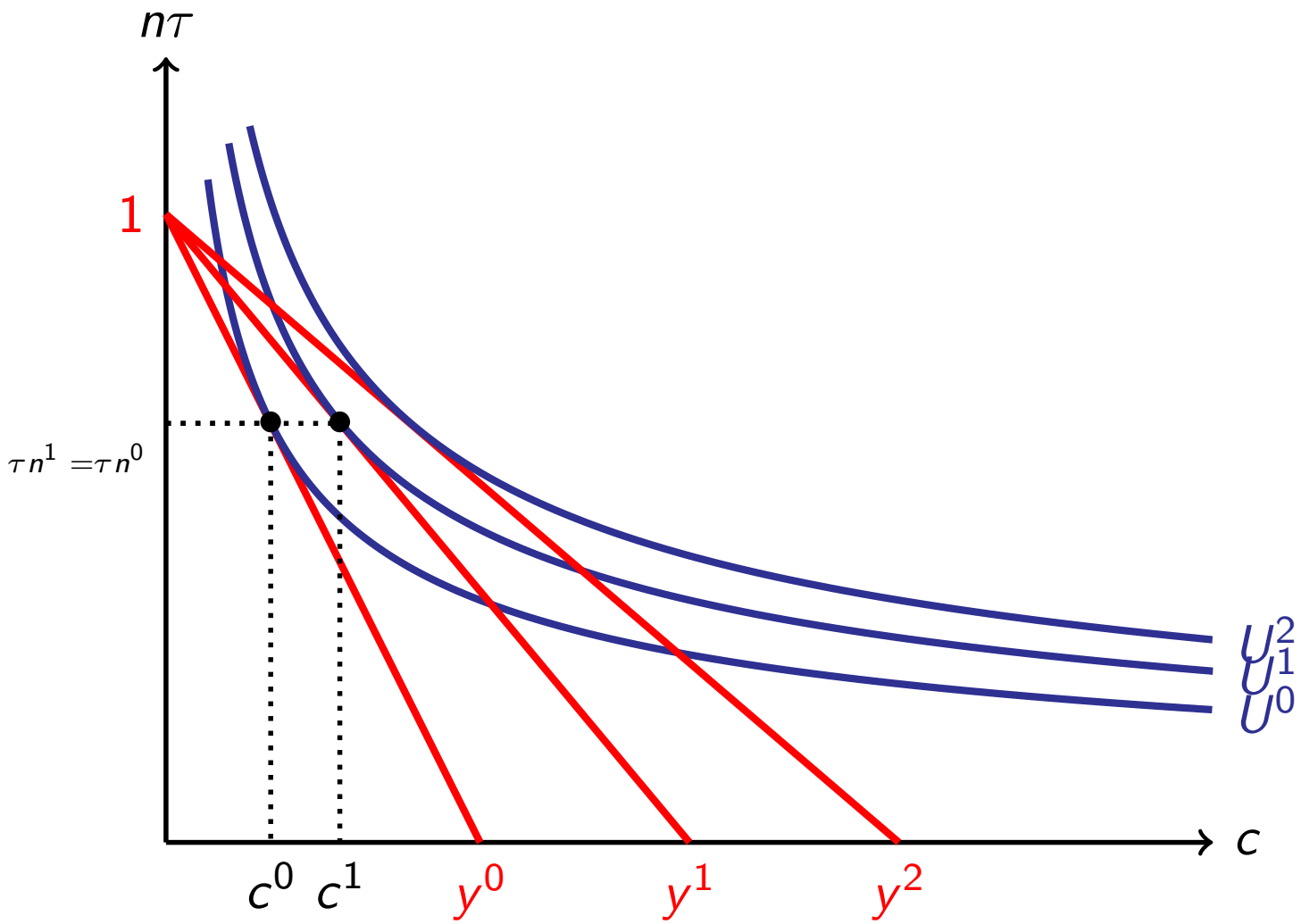

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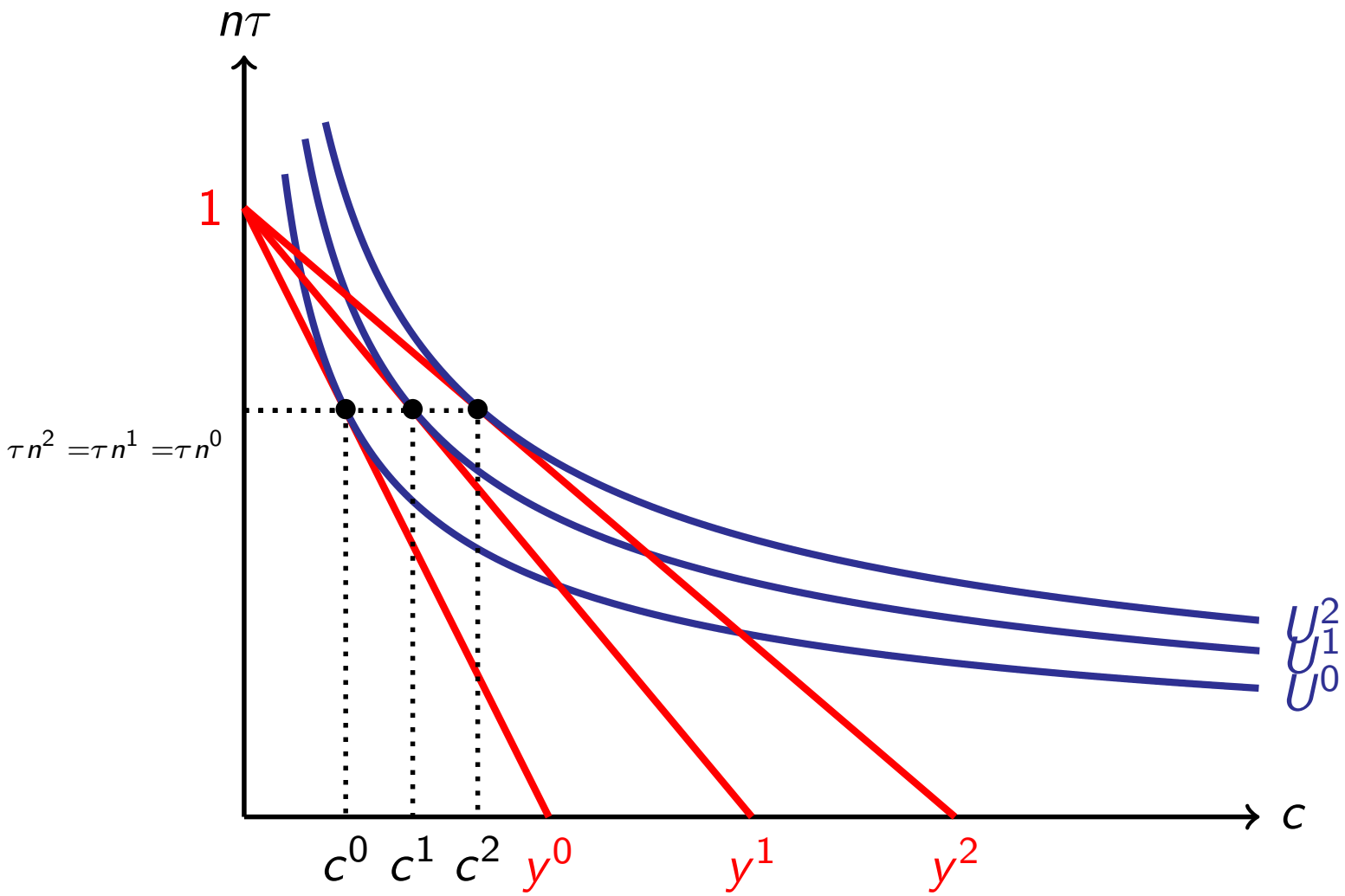

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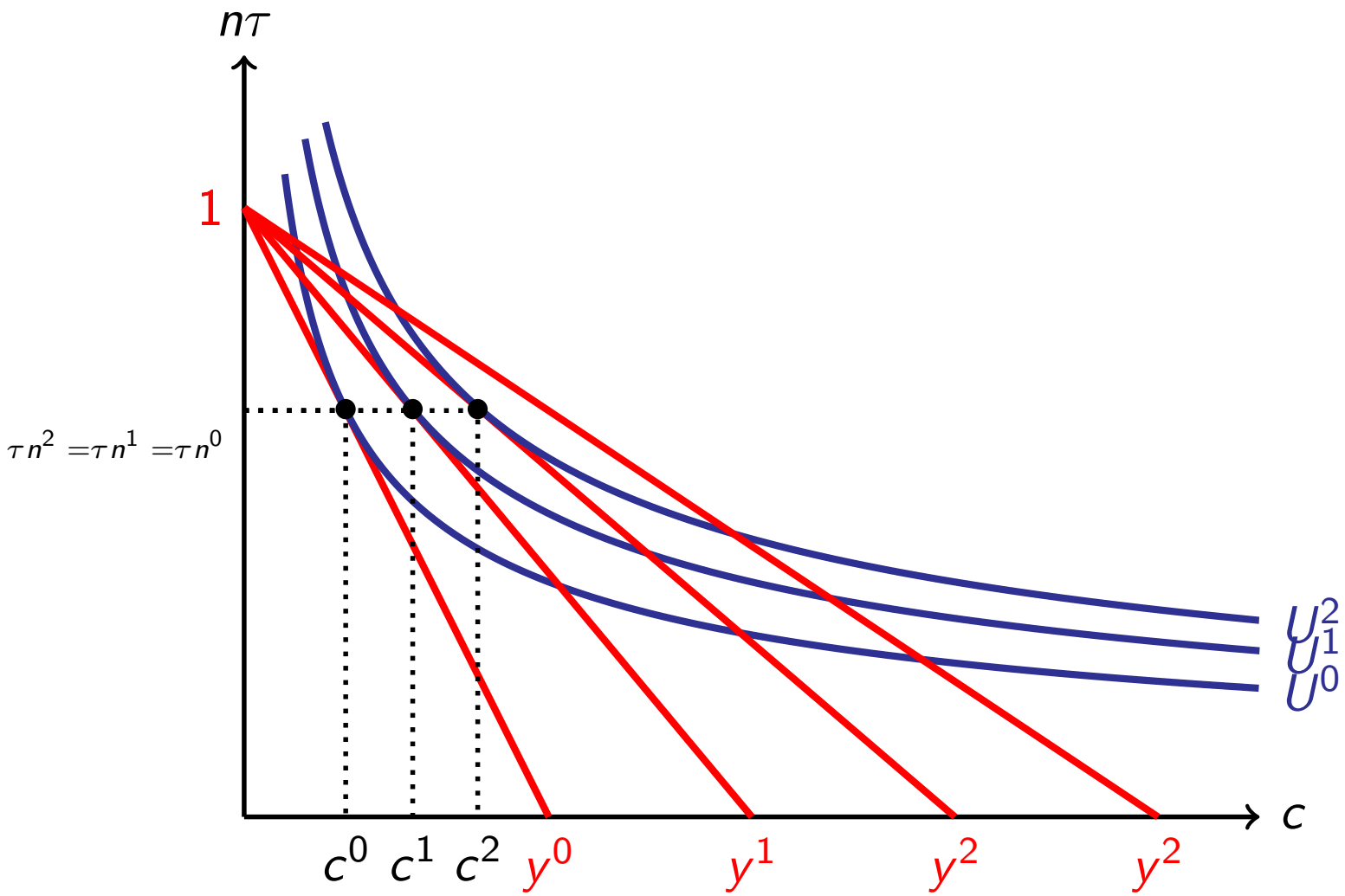

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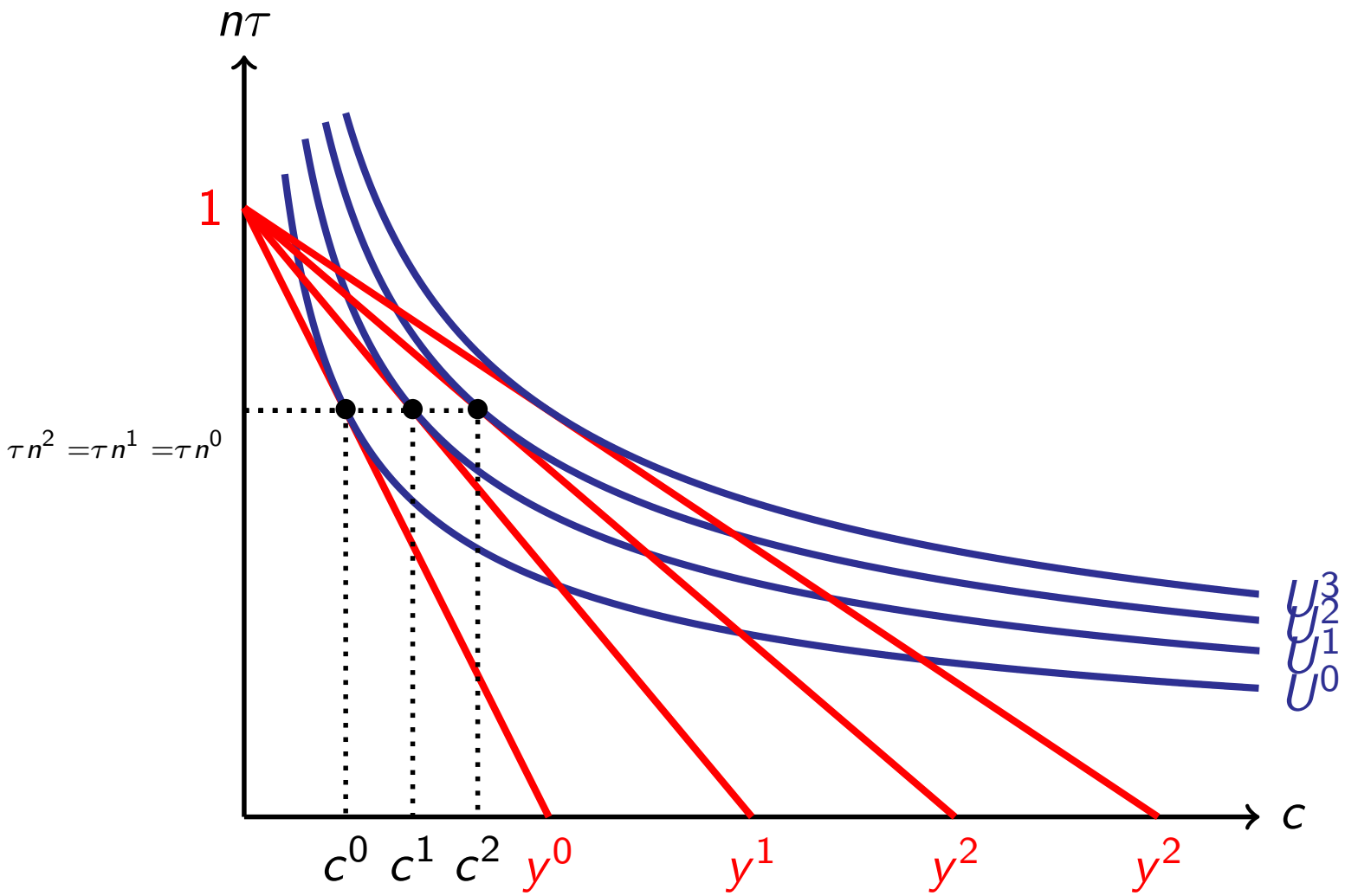

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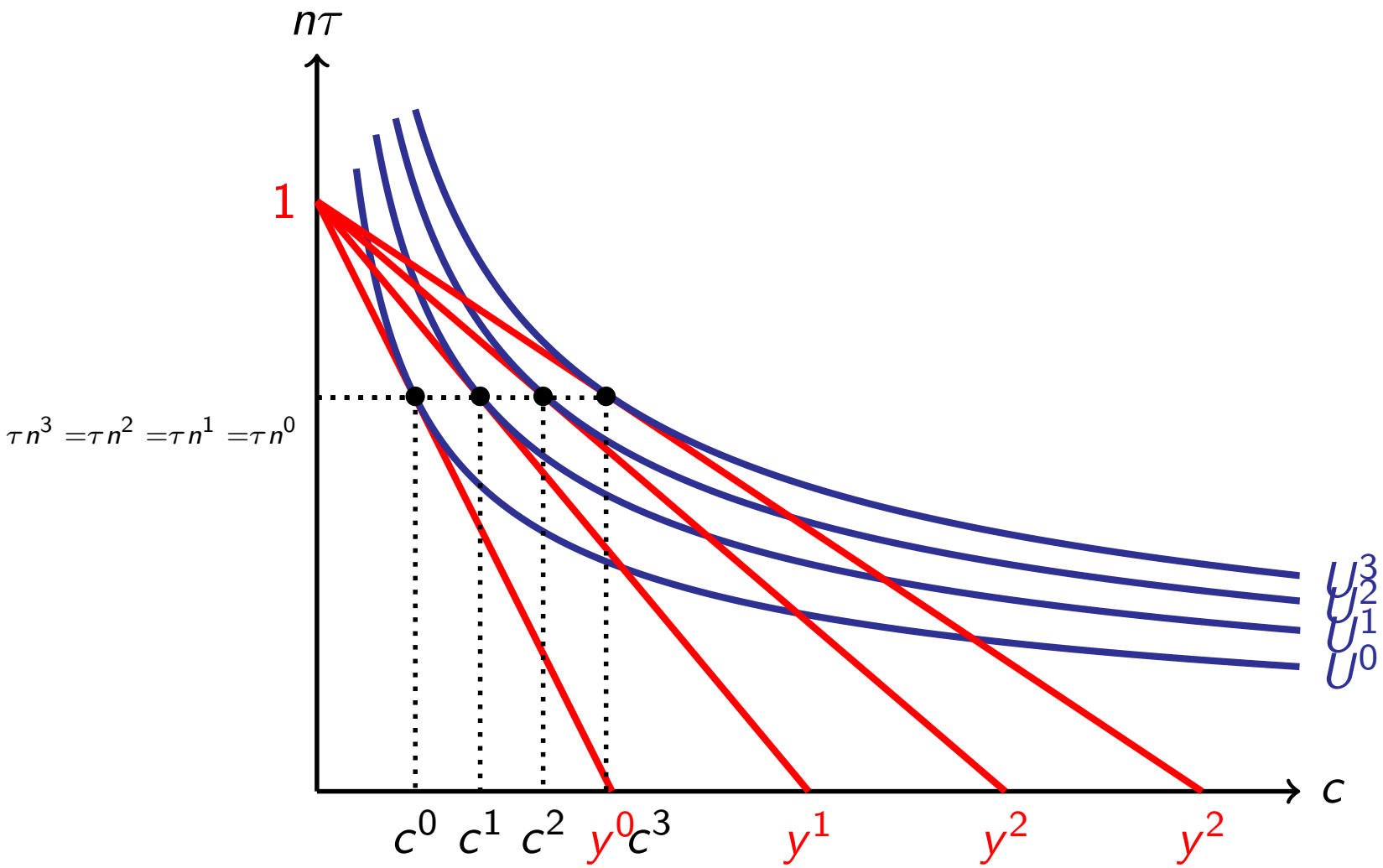

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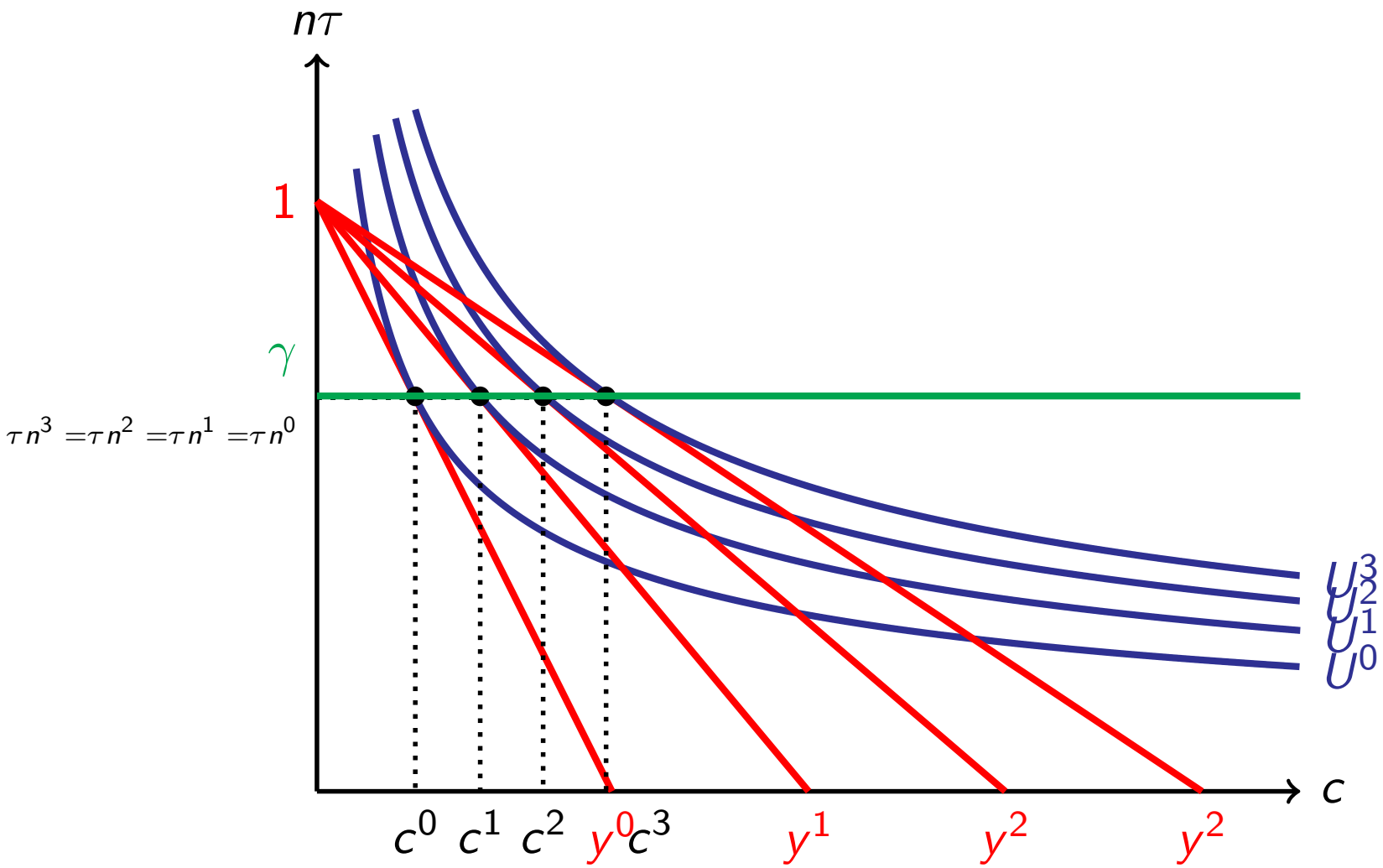

The Rise in Income: Testable predictions

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- Within an economy, the number of (surviving) children across households is inversely related to their levels of income.

The Rise in Income: Refuting Cross Country Evidence

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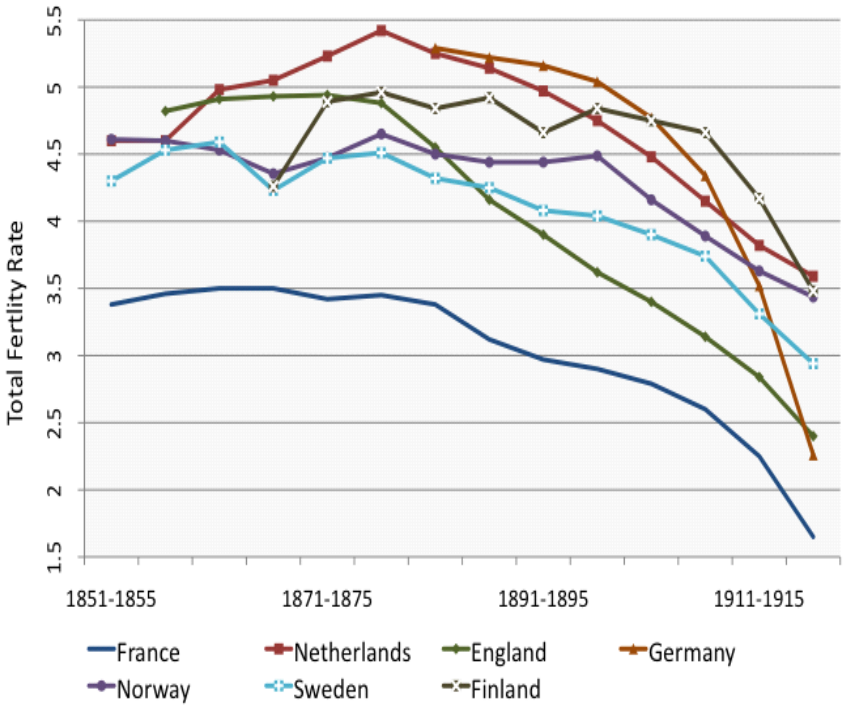
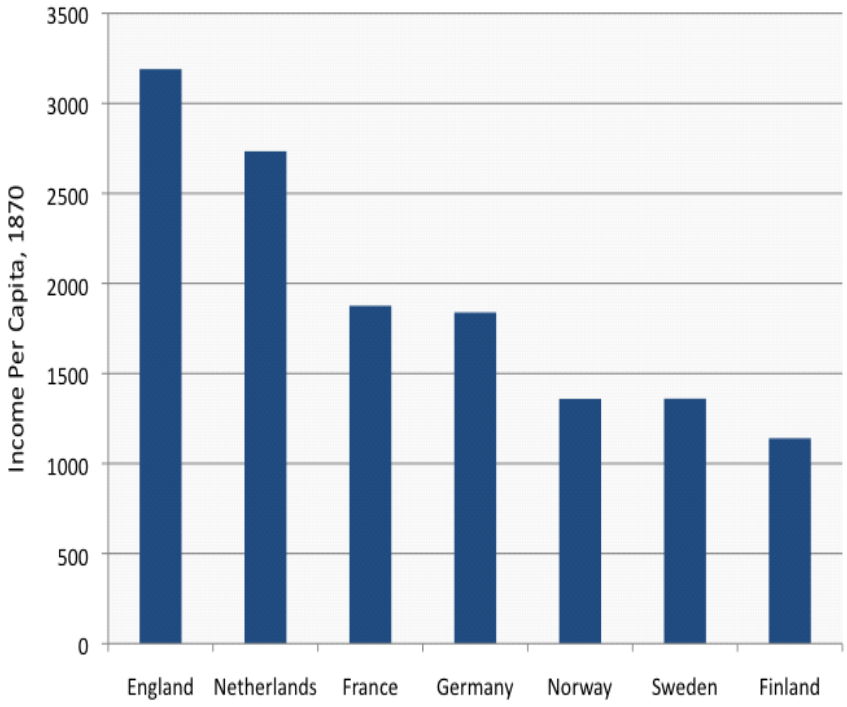
Simultaneous DT across European Countries that Differ in Income per Capita





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- England (1630s) Reproductive success increases with income (Clark and Hamilton JEH 2006)

The Decline in Child Mortality - Main Hypothesis

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$$n^b = n/\theta = \gamma/(\tau\theta)$$

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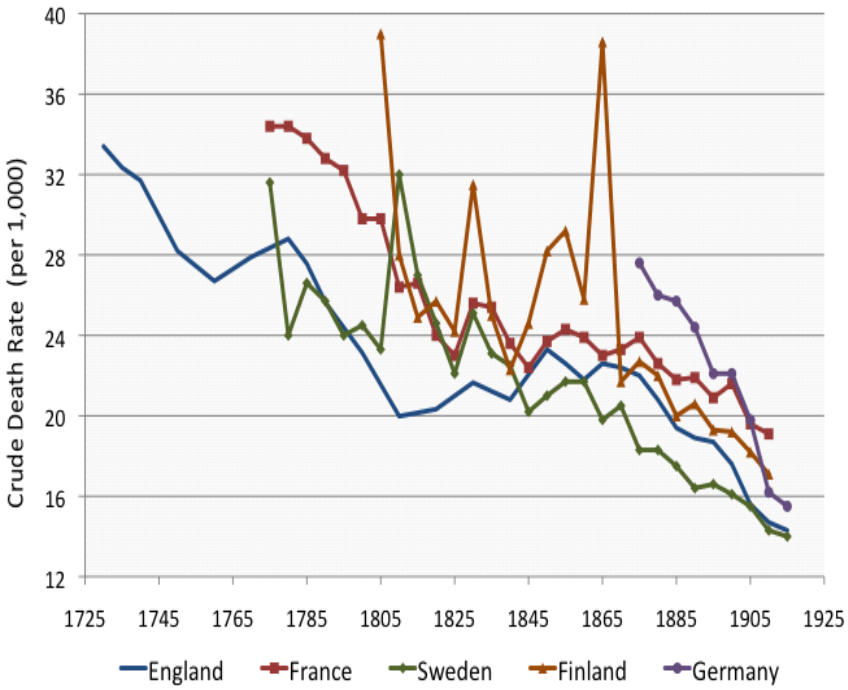
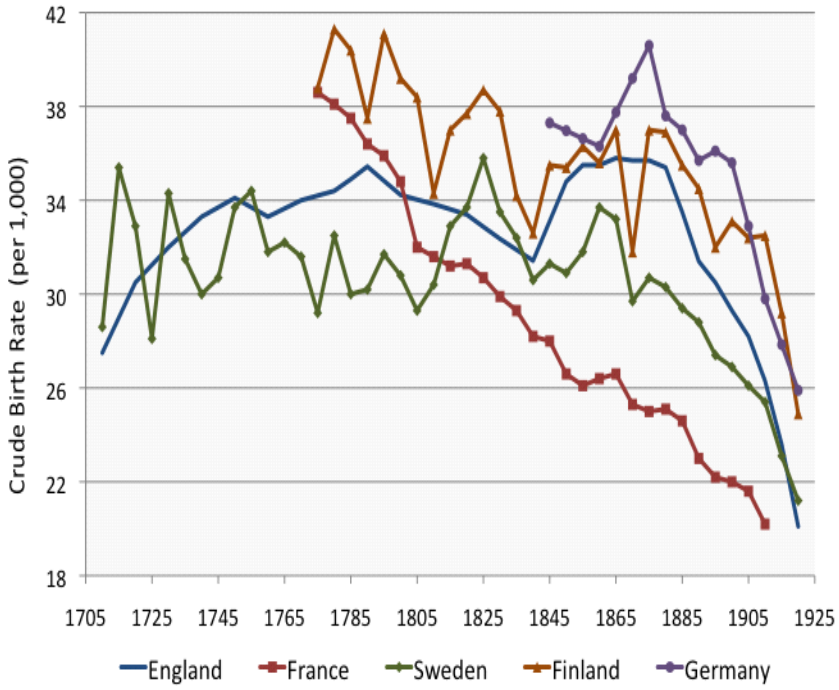
  - Resources saved from investment in non-surviving children are not channeled towards higher fertility

The Decline in Mortality and Fertility - Evidence





The Decline in Child Mortality – Challenges to the Theory

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The Old-Age Security Hypothesis

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- The development of financial markets reduced the demand for children for investment purposes and triggered a decline in fertility

The Old-Age Security Hypothesis - Challenges to the Theory

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  - England (16th century) Parents did not rely on support from children in their old age (Pelling and Smith 1991)
- Prior to the demographic transition, richer individuals who presumably had better access to financial markets, had larger number of surviving children

The Decline in the Gender Wage Gap

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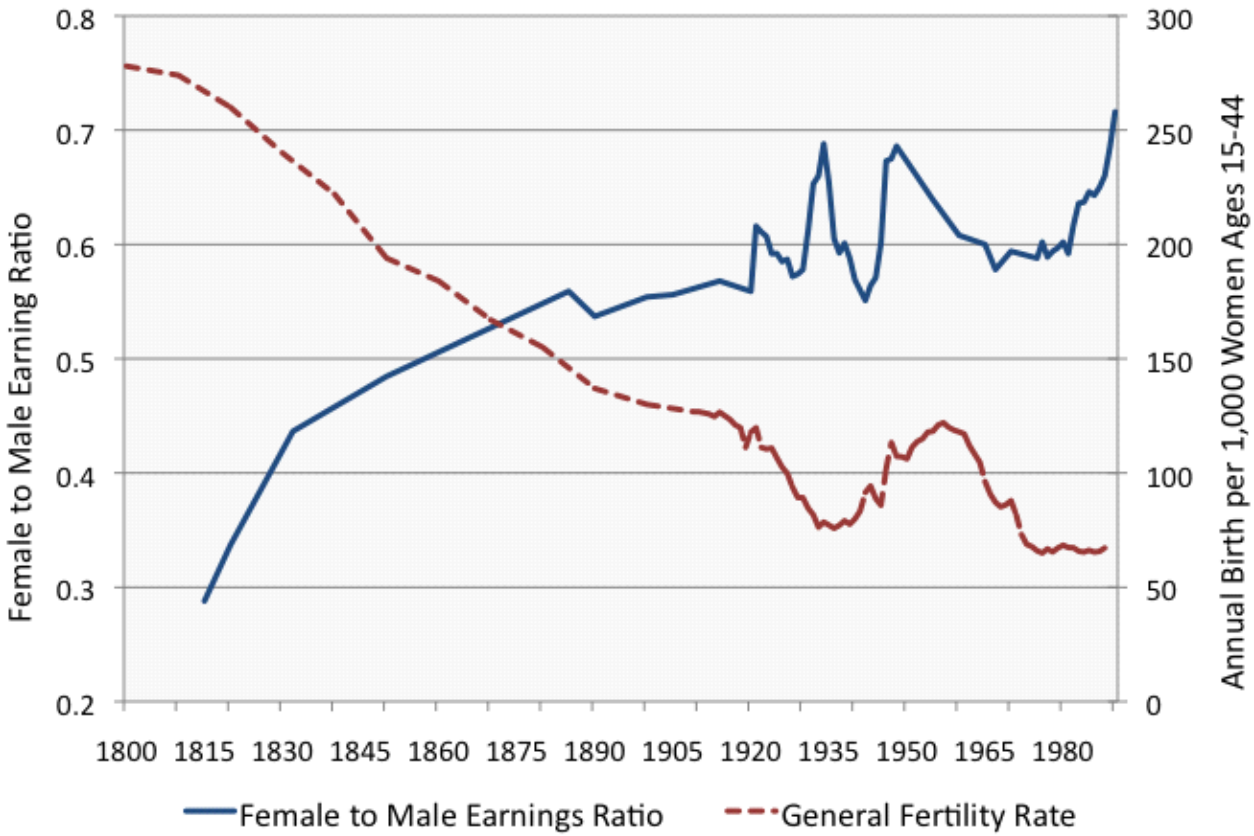
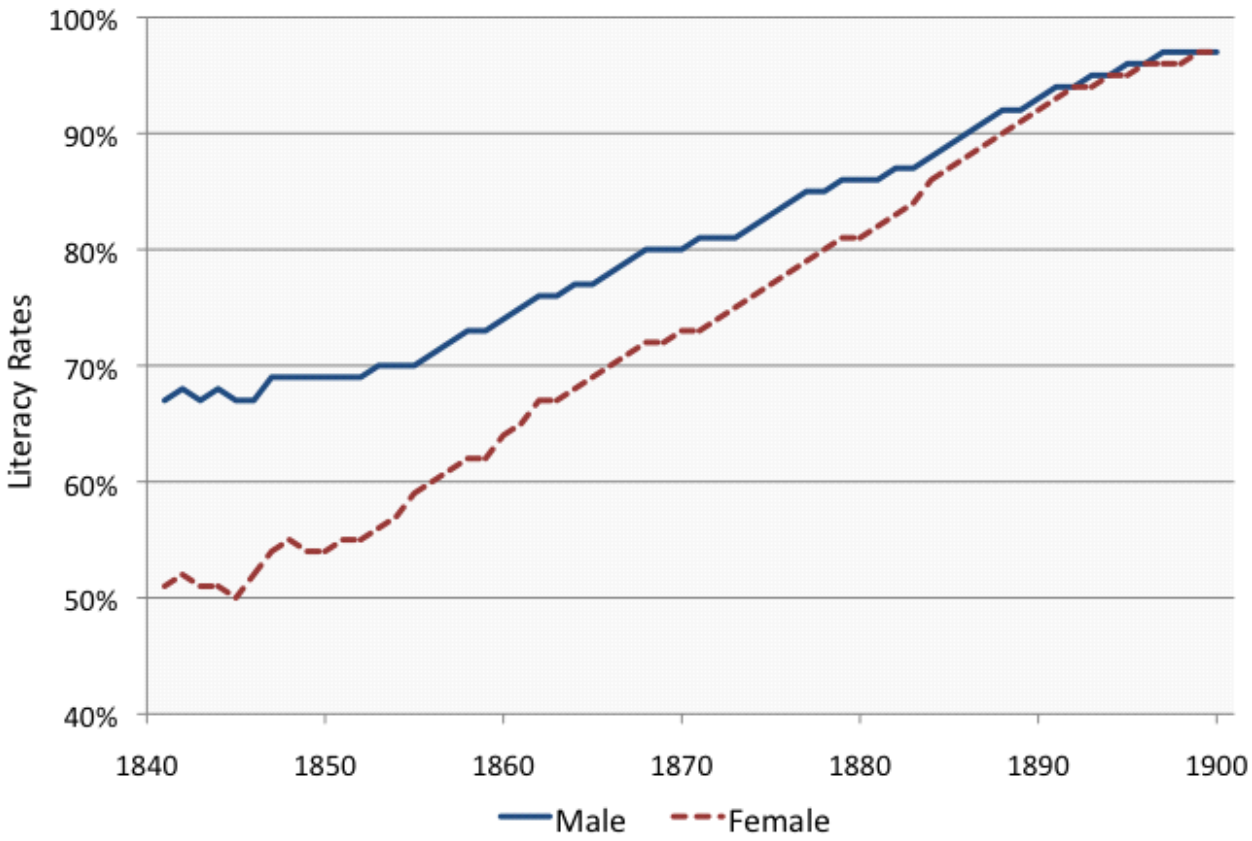


Evolution of the Gender Literacy Gap - England



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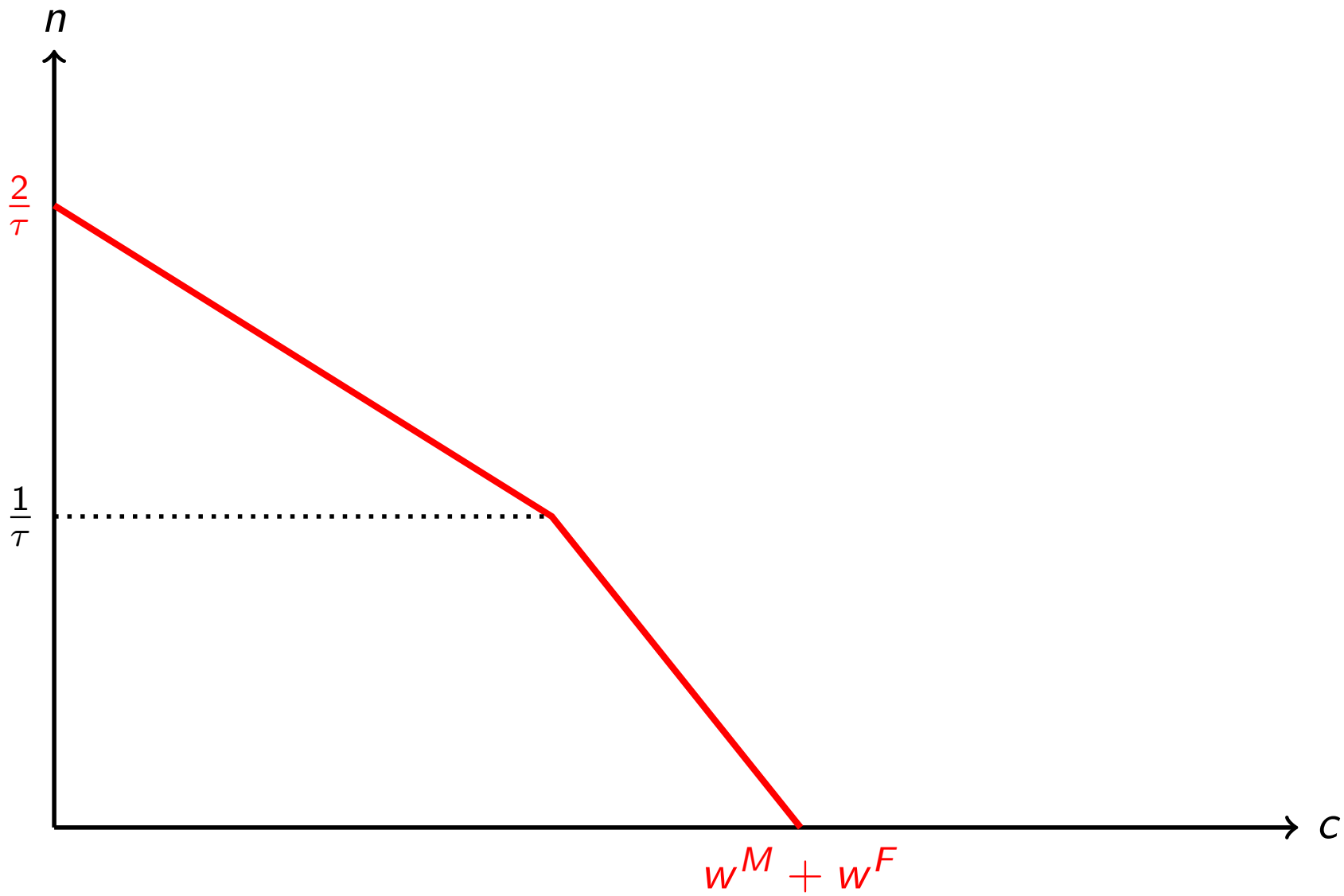

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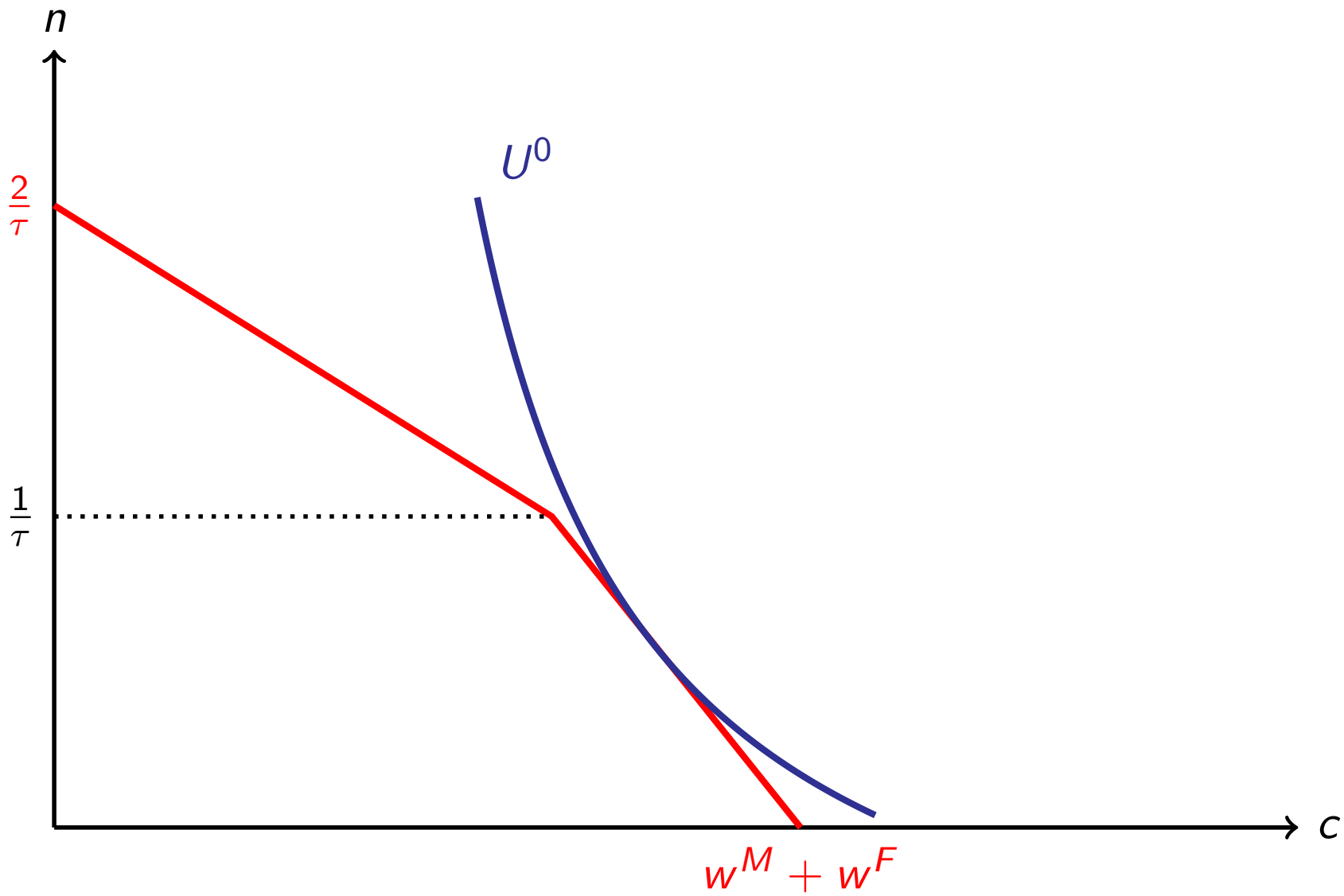

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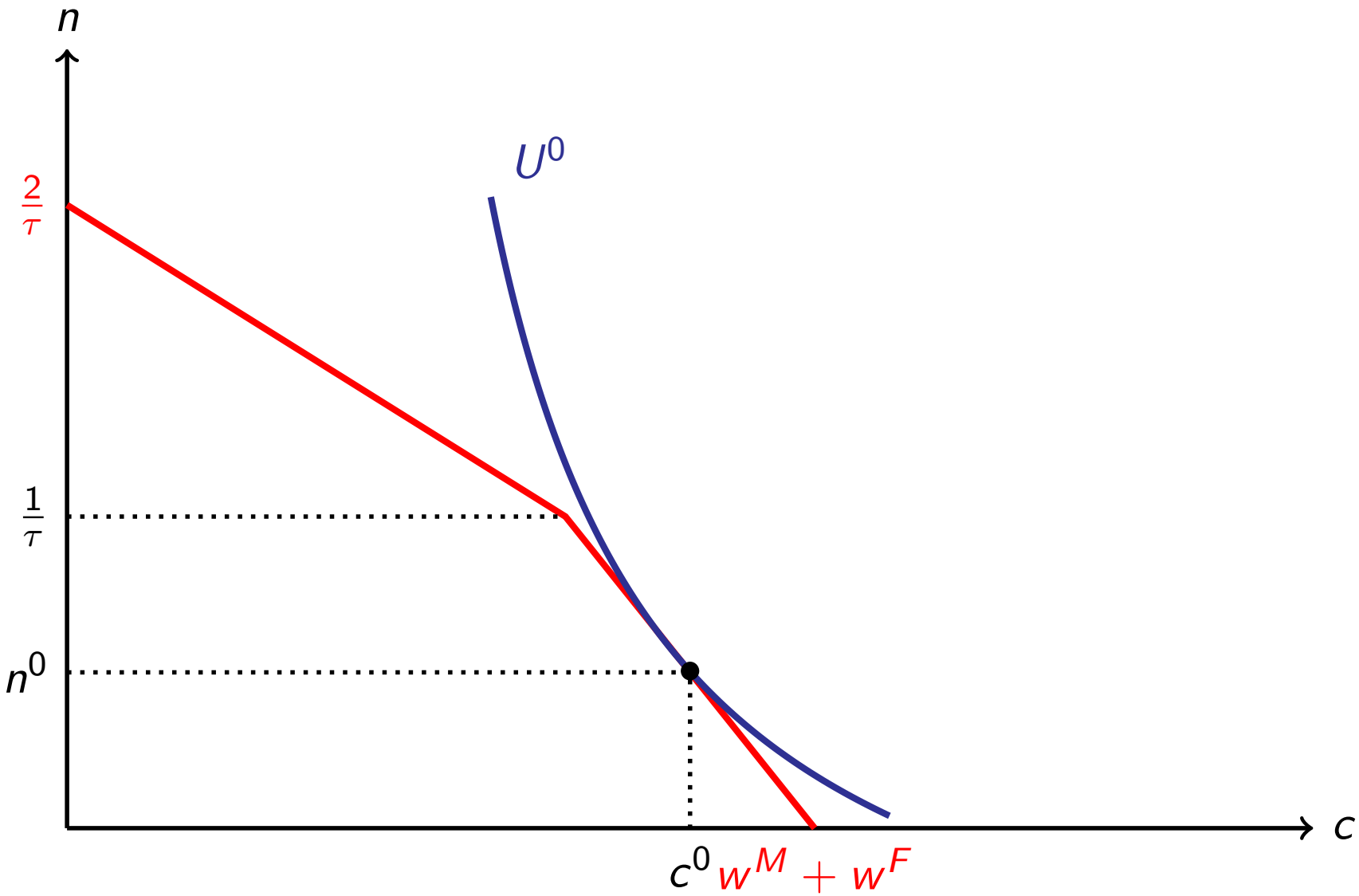

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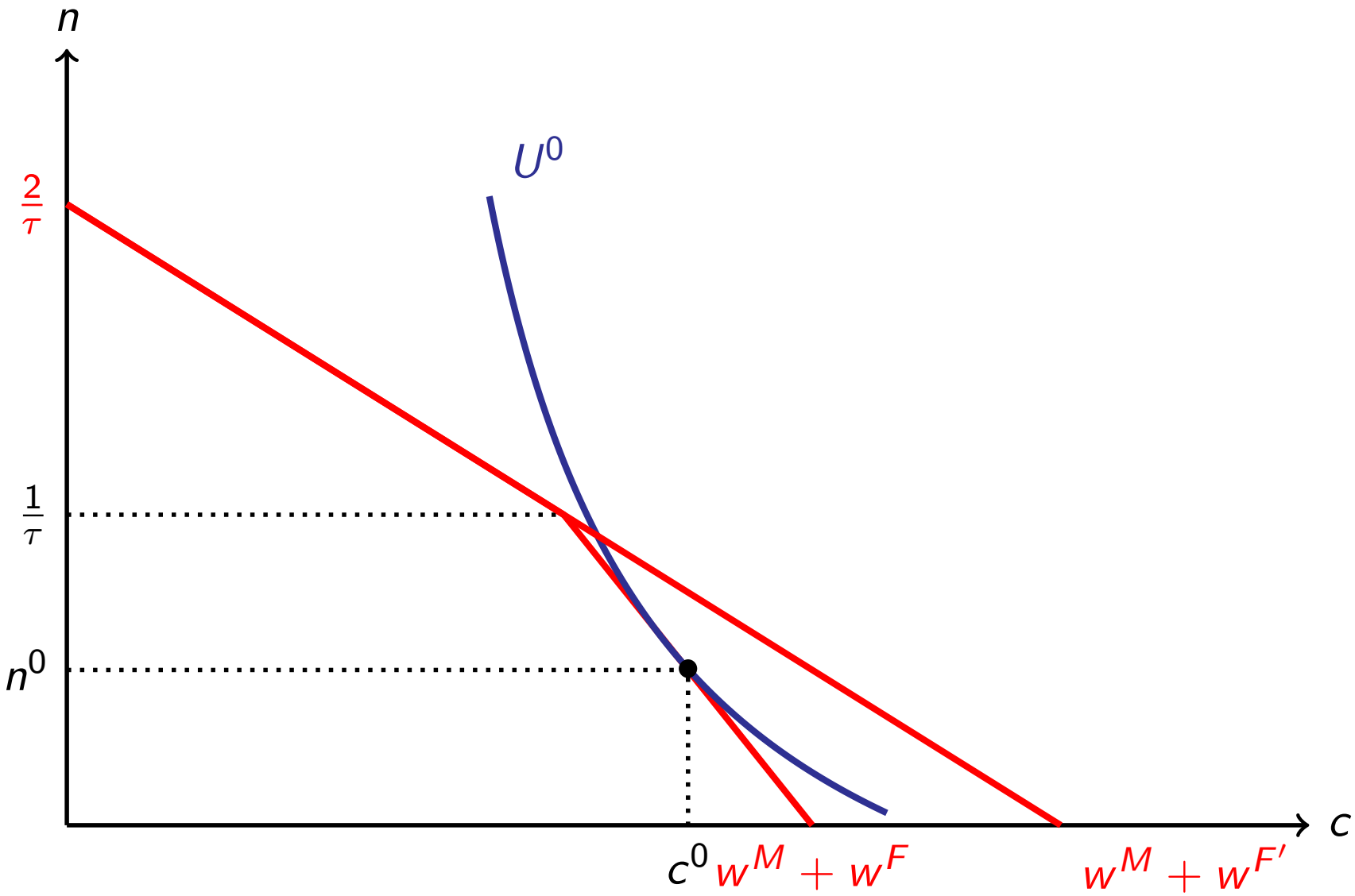

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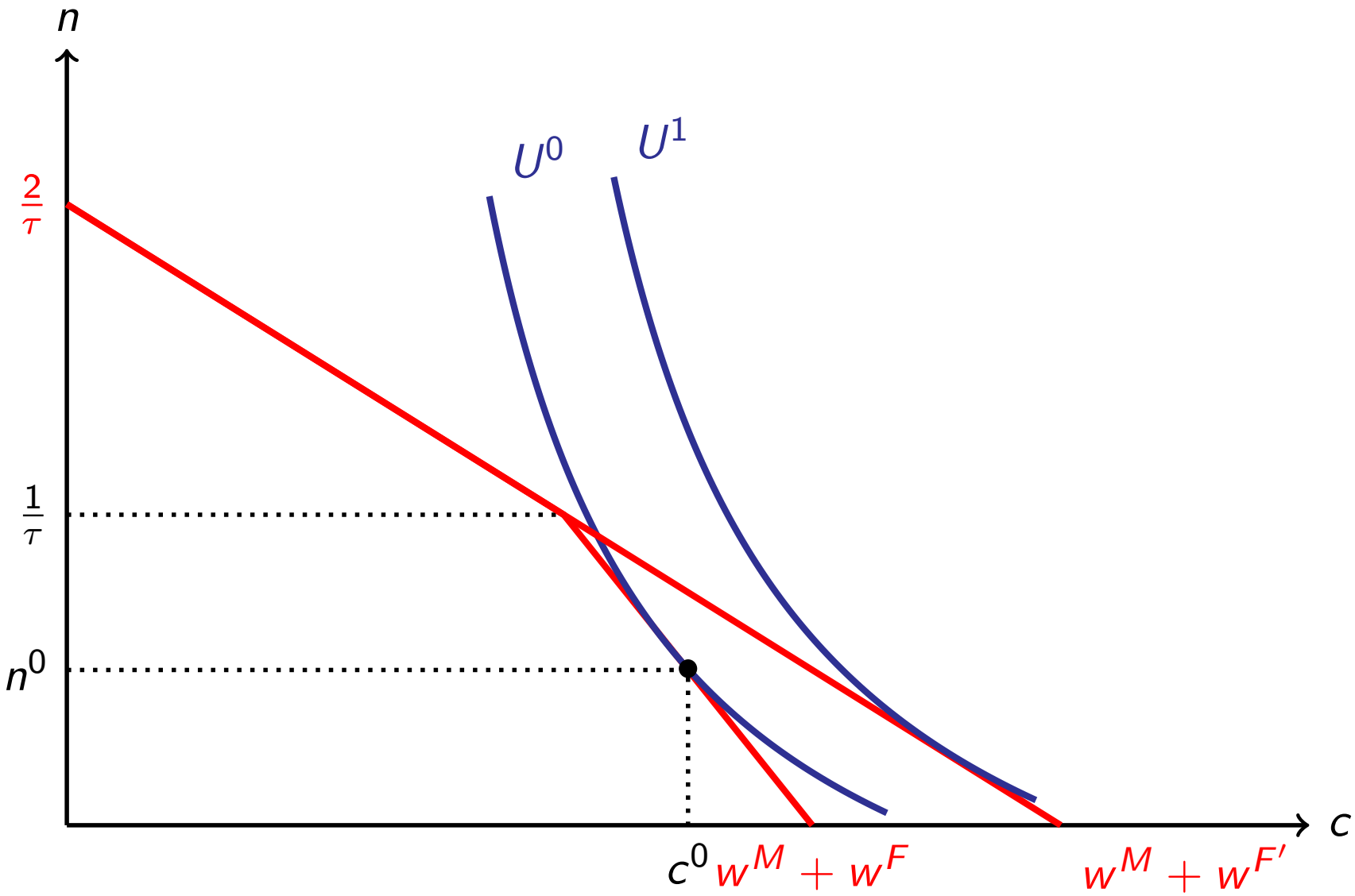

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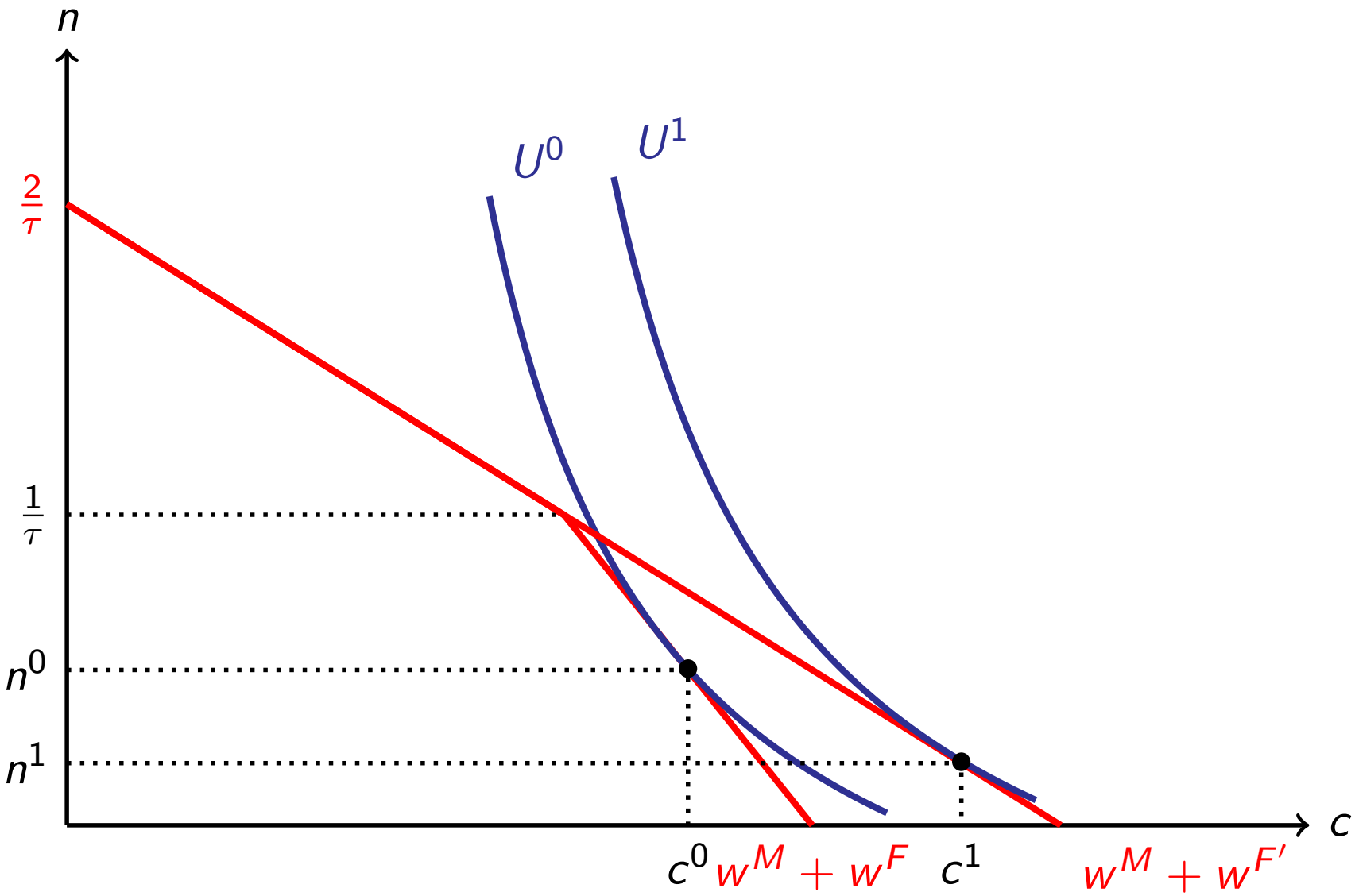

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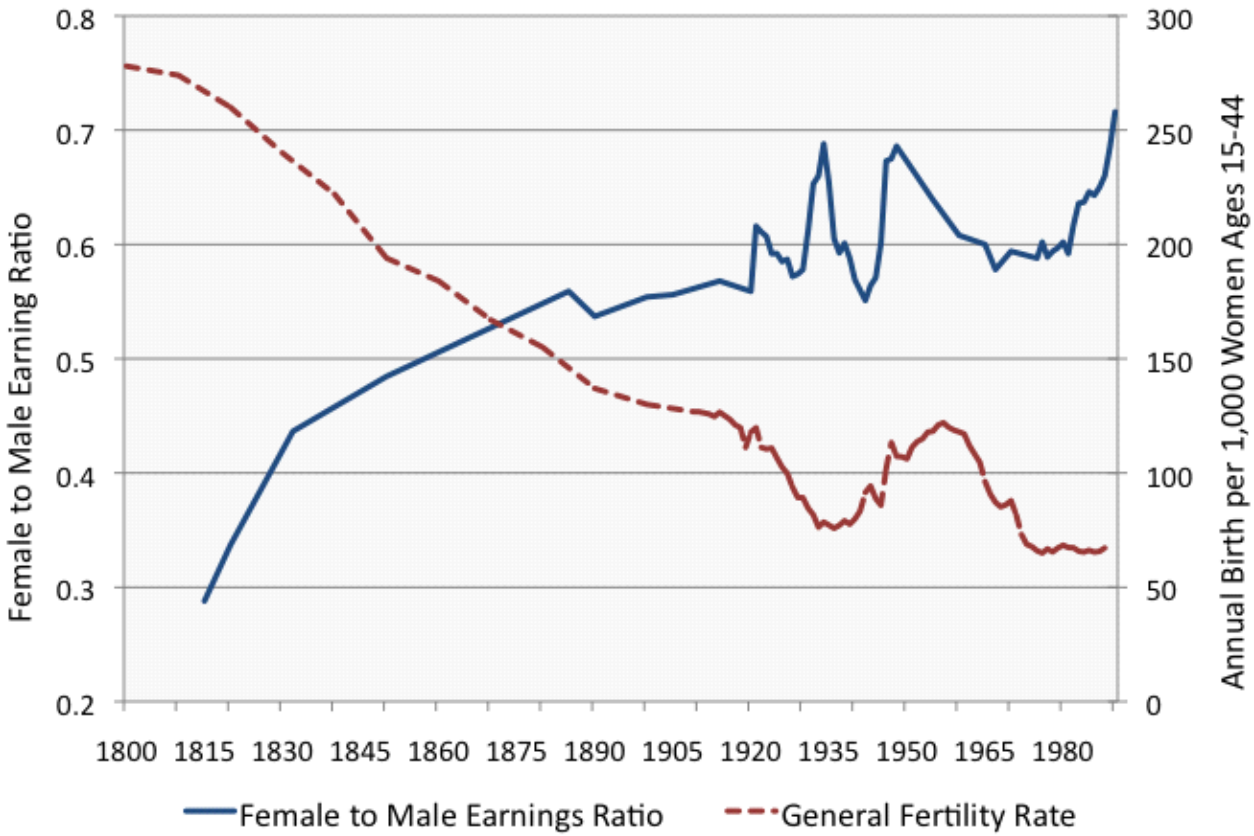

Women's Relative Wages and Fertility - Evidence

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- France (1876–1896): reduction in the gender literacy gap had an adverse effect on fertility, accounting for income per capita, educational attainment, and mortality rates (Murphy 2015)

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$$\Longrightarrow \quad \text{reduction in fertility}$$

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  - Basic level of human capital & interior solution

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$$\frac{\gamma\beta h_e(e, g)}{h(e, g)} = n\tau^e \quad \Longrightarrow \quad \frac{\beta h_e(e, g)}{h(e, g)} = \frac{\tau^e}{(\tau^q + \tau^e e)}$$

Optimization

$$\{n, e\} = \arg\max \gamma[\ln n + \beta \ln h(e, g)] + (1 - \gamma) \ln y[1 - n(\tau^q + \tau^e e)]$$

- with respect to e :

$$\frac{\gamma\beta h_e(e, g)}{h(e, g)} = \frac{(1 - \gamma) y n \tau^e}{y[1 - n(\tau^q + \tau^e e)]}$$

- since $n(\tau^q + \tau^e e) = \gamma$

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$$\Longrightarrow \varepsilon_{h,e} \equiv \frac{h_e(e, g) e}{h(e, g)} = \frac{1}{\beta} \frac{\tau^e e}{(\tau^q + \tau^e e)} \equiv \sigma(e; \beta, \tau^q, \tau^e)$$

Optimal education choice

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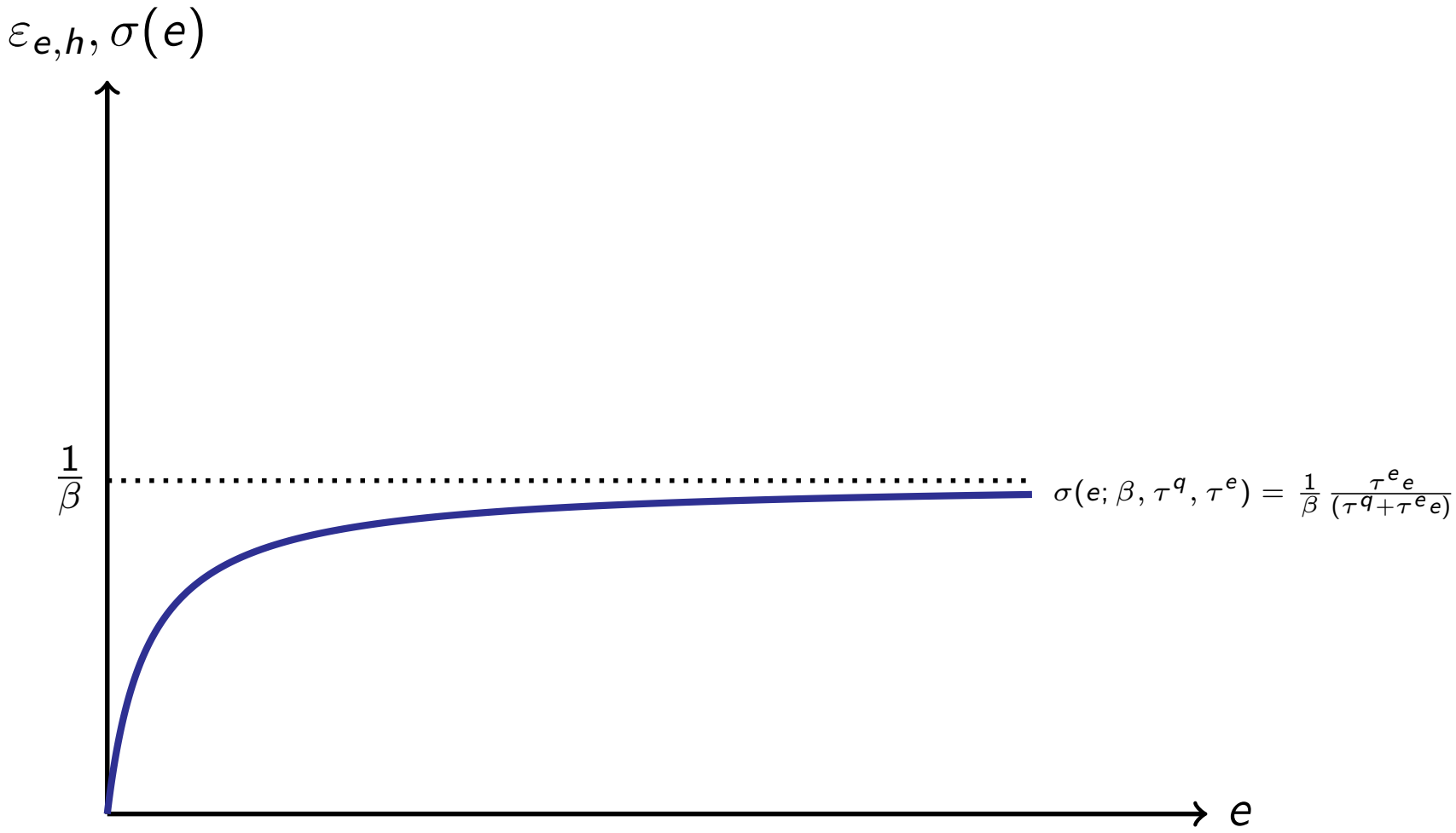
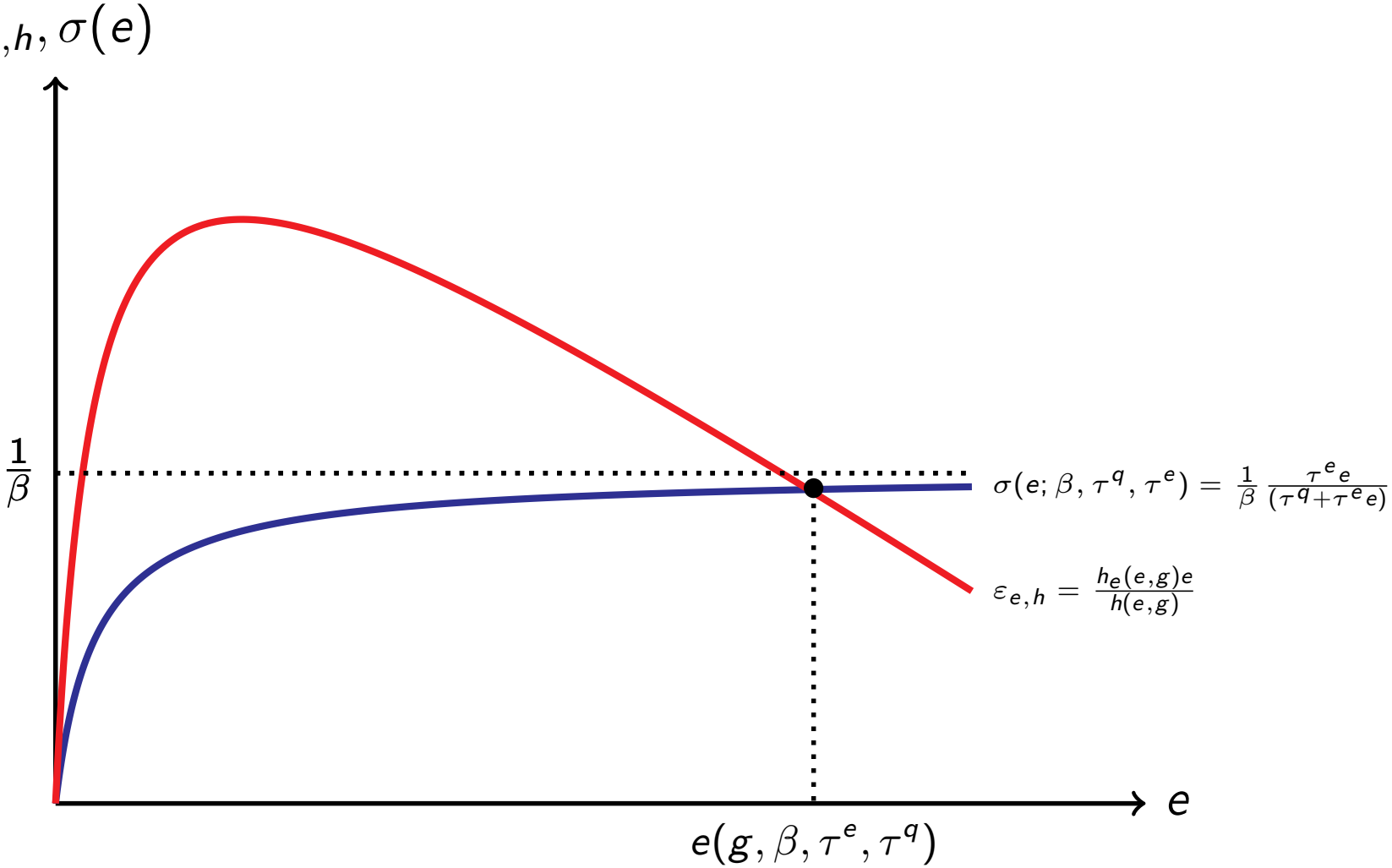


Optimal education choice



Optimization

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$$\Longrightarrow$$

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Testable Predictions - Investment in Quality

The optimal level of investment in child quality increases if:

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$$\partial e(g, \beta, \tau^e, \tau^q)/\partial g > 0$$

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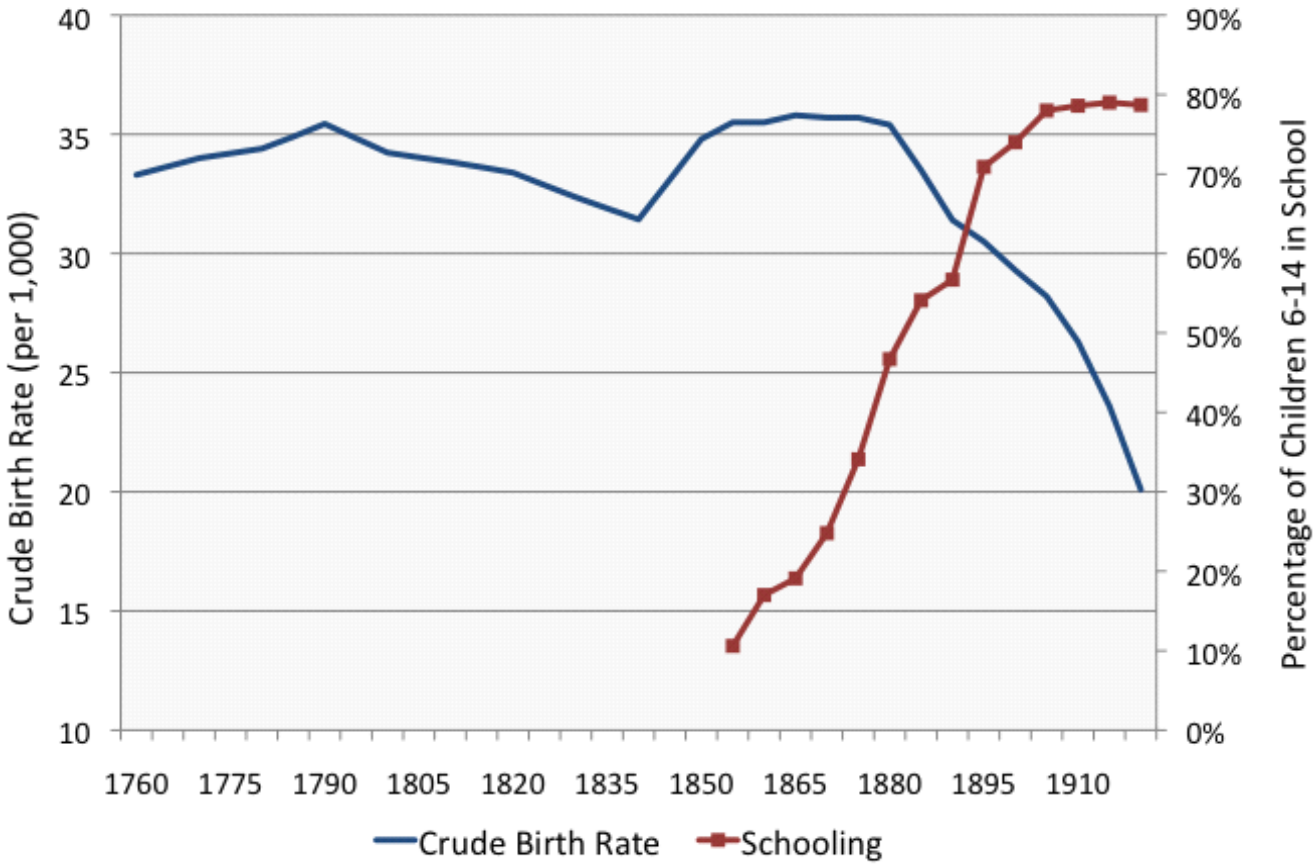
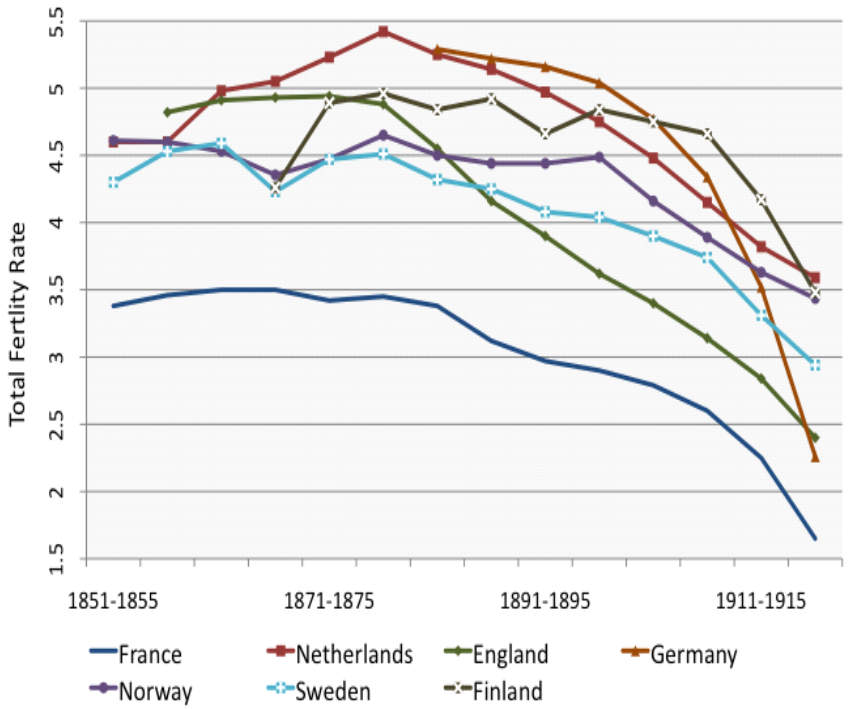
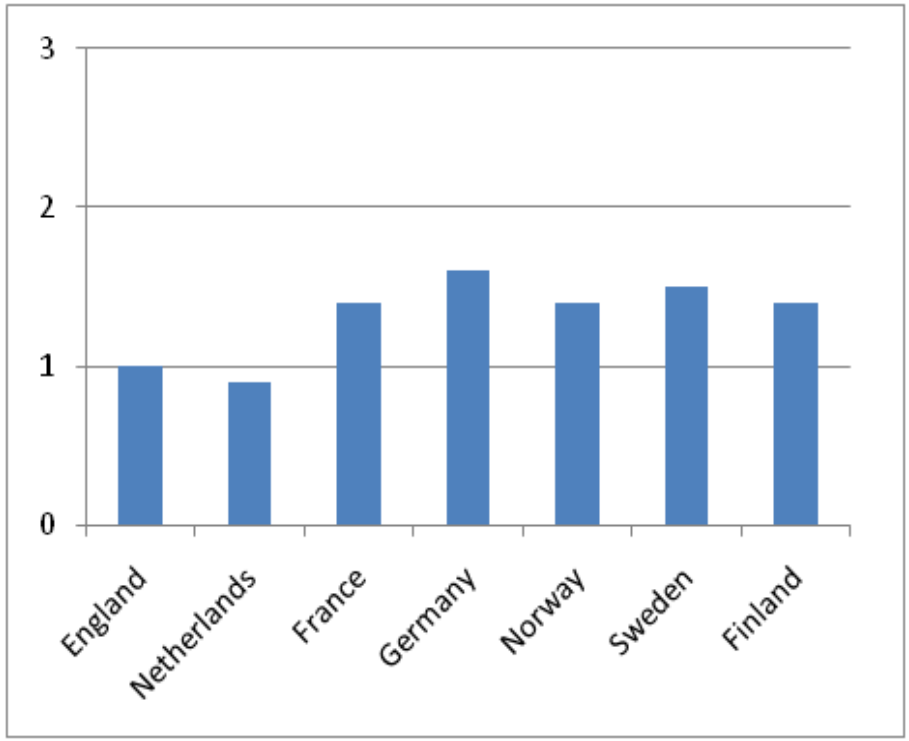
- The cost of educating a child increases and the elasticity of child quality with respect to the cost of child quality is smaller than one in absolute value
$$\partial n/\partial \tau^e < 0 \text{ if } [\partial e/\partial \tau^e][\tau^e/e] > -1$$

Human Capital Formation and the DT - England



Growth Rates 1870-1913 and DT





Supporting Evidence: Cross-Country Evidence

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- Cross Section of Countries (1960-1999): adverse effect on net fertility of an increase in productivity in advanced stages of development, when education demand dominates (Lehr 2009)

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- England (1580-1871) Adverse effect of family size on children's literacy. (Klemp-Weisdorf 2016)