

Exploring the Causal Link between Health, Fertility, and Economic Development: New Evidence and a Theoretical Framework

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論 文 内 容 の 要 旨

Thesis Summary

This thesis focuses on the relationship between economic growth, health, and fertility, which has long attracted significant attention from economists. Specifically, in empirical research, the direct effect of health on economic growth has been controversial due to reverse causality. Although Acemoglu and Johnson (2007) suggested a significant negative health effect, their methodology appears to be invalid. Equally critical as the lack of empirical evidence is the fact that the dynamic interaction between health, income, and population remains unclear under existing theoretical mechanisms, making it difficult to explain some historical phenomena. Fogel (1994) emphasized the role of health investments in driving productivity improvements during industrialization and beyond. However, this explanation does not always hold historically. For example, current theories struggle to explain Clark (2007)'s empirical findings, which suggested the early agricultural sector, despite its initial negative impacts on health due to poorer nutrition and higher disease rates, managed to achieve overall economic growth and population expansion. Furthermore, economists have been working on explaining the causes of low-level fertility from various perspectives. A groundbreaking contribution made by Becker and Barro's foundational model (1988) introduced the trade-off between the quantity and quality of children. This framework is crucial to understanding the incentives families have to limit fertility as income rises. Another study by Rindfuss and Brewster (1996) also suggested that fertility would rise in response to any easing of the worker-mother conflict. On the other hand, the gender theory proposed by McDonald (2000) argued that gender inequalities are responsible for countries' low fertility levels, but empirical evidence contradicts this conclusion.

Therefore, this study aims to address the following research questions: (1) Empirically, what is the direct impact of health on economic growth? (2) What role does health play in economic development, and how does this role evolve over time? (3) Why are developed countries experiencing low fertility, and what role does gender equality play in this phenomenon? This thesis comprehensively addresses these questions from three distinct perspectives: firstly, it challenges the validity of previous empirical studies on the effect of health improvements on economic growth by introducing a novel instrumental variable, yielding interpretable and robust results. Next, it develops a set of macroeconomic models to delve into the intricate

relationship between economic growth, health, and fertility. These innovative models conceptualize health as an intermediate good, offering new interpretations of dynamic socio-economic phenomena, particularly the non-monotonic effects of health on economic and population growth. Finally, the study investigates the impact of women's social status on familial fertility choices through a concise microeconomic model. This model provides a compelling explanation for the observed decline in fertility rates in developed countries, linking it to the rising economic status of women.

Chapter 1 provides a comprehensive review of the existing literature. Specifically, as the introduction, this chapter effectively summarizes the findings and limitations of previous research and highlights the objectives that the subsequent chapters aim to address.

Chapter 2 begins by reviewing Acemoglu and Johnson (2007), a widely cited paper in which the authors propose the unprecedented view that health improvements have negative effect on income growth, using a special instrumental variable. However, through this review of their methodology, I identified and prove its invalidity. More importantly, this chapter constructs a new instrumental variable to address this problem, yielding statistically significant results that show a positive effect of health on income growth.

Chapter 3 explores the role of health investment across different periods of human history by developing two macroeconomic models. Specifically, the first model provides an effective mechanism to explain the dynamic relationship between health investment, population, and production during the transition from hunting-gathering to agriculture in early human history. This model offers a compelling explanation for a counterintuitive historical phenomenon: while early agriculture adversely affects health level, the agricultural sector ultimately replaced the hunting-gathering sector. The second model develops a detailed depiction of the role health played in economic development and demographic dynamics during the later period when agricultural technology had become more advanced. These two models show that the mechanisms by which health operates on economic development vary across historical periods.

Chapter 4 develops a more straightforward and concise game-theory model to examine modern families' fertility choices. By incorporating the empirical-evidence-suggesting assumption that women are averse to childbearing, the model concludes that the rise in women's social status is the key driver of low fertility rates in developed countries. This framework also effectively explains why some less developed countries with relatively high gender equality also face low fertility issues.

As Chapter 5 summarized, this study provides new empirical evidence and novel mechanisms to interpret currently controversial or unexplained economic phenomena by revisiting the relationship between health, economic growth, and population. Specifically, I first present empirical evidence demonstrating the positive effects of health on economic growth, utilizing a unique instrumental variable. Next, I construct macroeconomic models to explore the dynamic interactions among economic growth, population, and health during the early stages of human development, highlighting how the roles of health varied across different historical periods. Finally, using a game theory model, I identify the rising economic status of women as the underlying cause of low fertility rates in modern developed countries.