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The Journal of Business, Management and Economics
Volume 34, Issue 5 | pp. 987–1043 DOI: 10.1002/hec.4783

Healthcare Expenditure, Universal Health Coverage, and Economic Productivity: Panel Evidence from Emerging Market Economies

Saoirse Ó'Briain[1], Mehmet Yıldırım-Karataş[2], and Ananya Bhattacharya[3]

[1]Department of Health Economics, University College Dublin, Dublin, Ireland [2]Department of Health Economics and Policy, Hacettepe University, Ankara, Turkey [3]Department of Economics, Calcutta University, Kolkata, India

Corresponding Author: Saoirse Ó'Briain, Department of Health Economics, University College Dublin, Belfield, Dublin 4, Ireland. Email: saoirse.obriain@ucd.ie

Abstract

Healthcare expenditure, long viewed primarily as a consumption item in national accounts, has been increasingly reconceptualized as a productive investment that enhances human capital — the health dimension of which is a fundamental determinant of labor productivity, economic participation, and long-run growth. This study investigates the relationship between public healthcare expenditure, Universal Health Coverage (UHC) index attainment, and economic productivity across a panel of 48 emerging market economies (EMEs) over 2000–2022. A sequential empirical strategy employs system GMM to estimate the healthcare expenditure-UHC relationship, two-stage least squares (2SLS) to estimate the UHC-productivity relationship (instrumenting UHC with pre-sample healthcare infrastructure availability), and panel mediation analysis to decompose direct and indirect healthcare-productivity pathways. Results indicate that public healthcare expenditure significantly improves UHC index scores (0.143 per percentage point of GDP, $p < 0.001$), that UHC attainment significantly improves total factor productivity (TFP) growth (0.234 per 10-point UHC improvement, $p < 0.001$), and that the health channel accounts for 67.4% of the healthcare expenditure-productivity relationship. The productivity returns to healthcare expenditure exhibit significant heterogeneity: countries below 60 UHC index points show returns approximately 2.4 times larger than those above 75 points, consistent with the declining marginal returns to baseline health status improvements. Women's health outcomes and reproductive health service coverage show the strongest productivity linkages, suggesting that gender-equitable healthcare is particularly productivity-enhancing.

Keywords: healthcare expenditure, universal health coverage, productivity, human capital, panel GMM, 2SLS, emerging markets

1. Introduction

The economic returns to investment in population health have been recognized since at least the foundational contributions

of Schultz (1961) and Becker (1964) on human capital theory — which identified health, alongside education, as a primary dimension of the human capital that underlies individual and aggregate economic productivity. Grossman's (1972) model of the demand for health formalized the production function perspective: individuals invest in health as a capital good that determines the time available for market work and leisure, with health deterioration representing depreciation of a productive capital stock.

At the macroeconomic level, the linkages between population health and economic development are multidimensional. Healthier populations exhibit higher labor force participation, fewer sick days and disability-related absences, higher cognitive function and educational attainment, and longer productive working lives — all of which translate into higher aggregate labor productivity (Bloom et al., 2001, 2004). The demographic dividend — the growth acceleration associated with the transition from high to low fertility rates that characterizes successful development — operates partly through health: improved maternal and child health reduces infant and child mortality, reducing desired fertility and expanding the working-age share of the population. Universal health coverage (UHC) — ensuring that all people receive quality health services they need without financial hardship — represents a synthesis of health equity and economic development objectives, recognized in SDG3.8 as a target of global significance.

Emerging market economies are the primary empirical focus of this study for two reasons. First, these economies exhibit the most dramatic variation in healthcare expenditure levels, UHC attainment, and health outcomes, creating the statistical variance necessary for identifying healthcare-productivity linkages. Second, the healthcare-productivity relationship is theoretically strongest where baseline health deficits are largest: in economies where a significant share of the working-age population is limited by preventable or treatable health conditions, the marginal productivity gain from reducing those conditions is substantially larger than in advanced economies where health standards are already high. Understanding the productivity returns to healthcare investment in EMEs is therefore critical for establishing the economic case for UHC expansion and for prioritizing healthcare within EME development strategies.

The endogeneity challenge in healthcare-productivity research is substantial: wealthier, more productive economies can afford more healthcare spending, creating reverse causality that biases cross-sectional and simple panel estimates. The instrumental variables approach — using pre-sample healthcare infrastructure availability (hospital bed density in 1990, physician density in 1990) as instruments for current UHC attainment — exploits the plausible exogeneity of inherited infrastructure while acknowledging that current UHC reflects current investment choices. System GMM addresses endogeneity in the healthcare expenditure-UHC relationship using lagged values as instruments.

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2. Literature Review

2.1 Health and Economic Growth: Macro Evidence

Bloom et al. (2001) provided influential panel evidence that adult survival rates (a proxy for population health) significantly increased economic growth, with the implied return to a 10% improvement in life expectancy generating a 0.35% increase in economic growth. Weil (2007) used microeconomic estimates of the return to worker health to calibrate a macroeconomic model, finding that eliminating health differences between countries could account for approximately 23% of cross-country income variance — a substantial share attributable purely to the health capital dimension of human capital differences.

Acemoglu and Johnson (2007) challenged this evidence, arguing that life expectancy improvements driven by the diffusion of disease interventions in the post-WWII period did not generate proportional economic growth, potentially because population increases (reducing per capita output) offset the labor productivity gains from better health. Subsequent debates have focused on identifying the specific health-economic growth mechanisms and addressing the endogeneity inherent in cross-country health-income relationships.

2.2 Universal Health Coverage and Development

The UHC concept, formalized in the 2010 World Health Report and adopted as SDG3.8, encompasses three dimensions: coverage of essential health services, protection from financial catastrophe due to healthcare costs, and quality of services received. The UHC Service Coverage Index (WHO, 2023) provides a summary measure aggregating 14 indicators spanning reproductive and maternal health, child health, infectious diseases, and non-communicable diseases — providing a standardized, cross-nationally comparable measure of UHC attainment.

Economist perspectives on UHC have emphasized both the health equity and economic efficiency dimensions. From an equity perspective, universal access ensures that health — as a fundamental determinant of human capital — does not remain a privilege of the wealthy. From an efficiency perspective, catastrophic health expenditure forces many households into poverty and deprives them of productive capacity; UHC prevents this poverty trap by insuring against health-related financial shocks (Xu et al., 2007; Wagstaff et al., 2018).

2.3 Healthcare Expenditure and Economic Outcomes

The relationship between healthcare spending and economic outcomes operates through multiple channels. The human capital channel is most direct: healthcare that reduces preventable morbidity and premature mortality expands the healthy working-age population and increases the productive hours available per worker. The catastrophic expenditure prevention channel reduces household vulnerability: preventing out-of-pocket health costs from depleting productive assets (savings, productive equipment) preserves household productive capacity. The intergenerational channel operates through maternal and child health: improving maternal health outcomes reduces infant mortality and improves child nutrition, cognitive development, and educational attainment, generating productivity dividends that extend across generations.

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3. Research Gap and Methodology

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Three gaps motivate this study: absence of IV-identified causal evidence for the UHC-productivity relationship in EMEs; absence of gender-disaggregated analysis of health-productivity linkages; and absence of UHC threshold analysis identifying diminishing returns to coverage expansion. The empirical strategy employs system GMM (healthcare expenditure → UHC) and 2SLS (UHC → TFP, using 1990 infrastructure density instruments) in a mediation framework. Threshold regression tests for heterogeneity in UHC-productivity returns by baseline UHC level.

4. Objectives and Hypotheses

H1: Public healthcare expenditure significantly improves UHC index scores.

H2: UHC attainment is positively associated with TFP growth in EMEs.

H3: The productivity returns to UHC improvement are larger in economies with lower baseline UHC scores.

H4: Women's and reproductive health coverage exhibits the strongest productivity linkage of any UHC sub-dimension.

5. Data Analysis and Findings

Table 1: Descriptive Statistics (N = 48, T = 23, Observations = 1,046)

Variable	Mean	SD	Min	Max
Public Health Expenditure (% GDP)	3.87	2.14	0.87	11.43
UHC Service Coverage Index (0–100)	62.34	14.87	28.43	91.34
TFP Growth (annual %)	1.43	2.87	-8.34	9.87
Female Labor Force Participation (%)	52.34	14.87	18.43	78.34
Out-of-Pocket Health Expenditure (% GDP)	2.43	1.87	0.34	8.74

Table 2: GMM Results — Healthcare Expenditure → UHC

Variable	System GMM
Public Health Expenditure	0.143***
	(0.038)
GDP per capita (log)	4.321***
	(0.987)
UHC (t-1)	0.743***
	(0.054)
AR(2) p-value	0.387
Hansen J p-value	0.312
Observations	998

Table 3: 2SLS Results — UHC → TFP Growth

Variable	OLS	2SLS
UHC Index	0.0281***	0.0234***

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Variable	OLS	2SLS
	(0.0054)	(0.0071)
Investment (% GDP)	0.187***	0.178***
	(0.041)	(0.049)
Education (mean years schooling)	0.312***	0.298***
	(0.067)	(0.081)
First-stage F	—	14.87
Observations	1,046	998

Note: H1 and H2 confirmed. 2SLS estimate (0.0234) slightly smaller than OLS (0.0281), consistent with mild upward endogeneity bias in OLS.

Table 4: Threshold Analysis — UHC-TFP Returns by Baseline UHC Level

UHC Category	TFP Return per 10-point UHC	p-value	Relative Return
Low UHC (< 60 points, N = 18)	0.341***	< 0.001	2.44×
Medium UHC (60–75 points, N = 21)	0.187**	0.003	1.34×
High UHC (> 75 points, N = 9)	0.140*	0.048	1.00×

Note: H3 confirmed — diminishing returns to UHC improvement, with low-UHC economies showing 2.44× the productivity return of high-UHC economies per 10-point improvement.

Table 5: Gender Health Dimension (H4) — Reproductive/Maternal Health Sub-Index vs. Other UHC Dimensions

UHC Sub-dimension	TFP Coefficient	p-value
Reproductive and Maternal Health	0.043***	< 0.001
Infectious Disease Control	0.031**	0.004
Non-communicable Disease Management	0.018*	0.047
Child Health	0.037***	< 0.001

Note: H4 confirmed — reproductive and maternal health sub-index shows the strongest productivity linkage.

6–11. Discussion Through Conclusion

The IV-identified evidence that UHC attainment significantly drives TFP growth (0.0234 per 10-point UHC improvement) confirms the macroeconomic productivity case for healthcare investment, complementing the established microeconomic and individual-level health-productivity literature. The threshold finding — that low-UHC economies realize 2.44 times the productivity return per UHC point as high-UHC economies — has critical implications for global health investment prioritization: it suggests that the global economic returns to UHC expansion are

concentrated in the most underserved economies, creating a strong efficiency argument (alongside the equity argument) for directing international health financing toward low-coverage countries. The women's health productivity finding — that reproductive and maternal health coverage has the strongest UHC-productivity linkage — aligns with economic theory on the multiplier effects of women's health: maternal health improvements reduce child mortality and improve child cognitive development; improved reproductive health increases female labor force participation; healthier women make larger investments in children's health and education. These findings support health investment strategies that prioritize gender equity as simultaneously good health policy and good economic policy.

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