RESEARCH ARTICLE

Public Pharmaceutical Spending, Governance Quality and Household Health Borrowing in the European Union

Marius Daniel SISU[1]

[1] Doctoral School of Economic and Humanistic Sciences, Valahia University of Targoviste, Romania

✉ mariussisu82@gmail.com

Received: 29 August 2026
Accepted: 30 September 2026
Published: 30 September 2026

DOI: https://doi.org/10.67276/j9owkxoda4

Abstract

Public spending on medicines is expected to shield households from the financial consequences of illness, yet the link between what governments spend on medical products and whether people borrow to pay for care has rarely been tested. This study examines whether government expenditure on medical products is associated with the share of adults who borrow for health reasons, and whether the association depends on institutional quality. The analysis combines government finance statistics, three waves of a global household survey and composite governance indicators for 22 European countries observed in 2014, 2017 and 2021, giving 66 observations. Four pooled least squares specifications are estimated, and the sample is then split at the median of government effectiveness. Government effectiveness is negatively and significantly associated with health borrowing (coefficient −1.85, p = 0.032), while public pharmaceutical spending has a positive, insignificant coefficient in the pooled models (1.42, p = 0.203). The interaction between spending and governance is not significant (p = 0.773); in the better-governed half of the sample the spending coefficient is positive and significant (3.36, p = 0.003); in the other half it is 0.79 and insignificant; the difference (2.57) is not significant (p ≈ 0.21). On these data, higher public pharmaceutical spending is not associated with less household health borrowing. The pattern is more consistent with wider utilisation and coverage in high-spending systems, where co-payments still fall on patients, than with a protective effect of spending; institutional quality, not budget size, tracks financial protection.

Keywords: financial protection; out-of-pocket payments; medical debt; institutional capacity; Global Findex; COFOG

JEL Classification: I13; I18; H51; C23

© 2026 The Author(s). Published by Athenaeum University of Bucharest under CC BY 4.0 license.

1. INTRODUCTION

The assumption that more public spending on medicines means less financial hardship for patients is so intuitive that it is rarely stated, let alone tested. It underlies the reform agenda in much of Central and Eastern Europe, where ministries argue for larger pharmaceutical budgets because households pay too much from their own pockets, and it underlies the universal health coverage literature, which treats the public share of health financing as the primary lever for financial protection (Kutzin, 2013; World Health Organization & World Bank, 2023). The empirical support for this intuition at the level of total

health spending is reasonably strong (Xu et al., 2007; Wagstaff et al., 2018). Whether it carries over to the narrower category of public expenditure on medical products is a different question, and one the cross-country evidence has left open.

This article asks that question for the European Union. It pairs a specific fiscal input, general government expenditure on medical products, appliances and equipment under COFOG group 07.1 in the IMF Government Finance Statistics, with a specific household outcome, the share of adults who report having borrowed money for health or medical purposes in the World Bank Global Findex survey. The first is a budget line that governments control fairly directly through reimbursement lists, reference pricing and co-payment rules; the second is a behavioural marker of financial stress measured with the same survey instrument in every country.

The second question concerns institutions. Financial protection is produced not by money alone but by the administrative machinery that turns a budget into reimbursed prescriptions in a pharmacy, and that machinery is uneven across the EU. Procurement quality, health technology assessment, the control of informal payments and the reliability of supply chains all condition what a given level of spending delivers (Lewis, 2007; Cylus et al., 2016; Vogler et al., 2021), so the association between spending and borrowing should differ between well-governed and poorly governed systems. We test this with the Worldwide Governance Indicators, through interaction terms and through a split of the sample at the median of government effectiveness.

Our findings are not the ones the protection hypothesis predicts, and the article says so plainly. Across 22 EU countries observed in the Findex waves of 2014, 2017 and 2021, the coefficient on public pharmaceutical spending is positive in every specification: insignificant in the pooled models, significant in the better-governed half of the sample, insignificant in the other half, with a contrast between the halves that does not survive a formal test. What is robust is that government effectiveness is negatively and significantly associated with health borrowing. On these data, higher public spending under COFOG 07.1 is not associated with less health-related borrowing, and in better-governed systems it is associated with more of it. We read this as a utilisation or coverage channel, in which systems that spend more also reach more patients, who then face co-payments and other residual costs, rather than as evidence that spending protects.

Romania anchors the discussion. Its public spending on medical products was 0.86 per cent of GDP in 2021, close to the sample mean of 0.89 per cent, after a rise to 1.29 per cent in 2014 and a contraction documented in the companion convergence analysis (Sisu, 2026), while its health borrowing rate of 12.53 per cent in 2021 is among the highest in the panel. The Romanian case is not one of low spending; it is one of spending that does not appear to buy protection.

Section 2 reviews the literature and states the hypotheses. Section 3 describes the data, the estimation strategy and the diagnostics. Section 4 reports the results, including the test of the difference between subsample coefficients. Section 5 discusses what the results do and do not support. Section 6 concludes, with limitations and directions for further work.

© 2026 Athenaeum University of Bucharest

2. LITERATURE REVIEW

2.1 Financial Protection as a Health System Objective

Financial protection entered the mainstream of health policy through the World Health Organization's framework for health system performance, which placed fairness in financing alongside health outcomes as a core objective. Kutzin (2013) gives the canonical statement: a financing system should ensure that people can use needed services without financial hardship, which depends on the balance between prepaid, pooled revenue and payments at the point of use. Out-of-pocket payments are the mechanism through which illness becomes financial distress, and the public share of financing is the main instrument for reducing them.

Two measures dominate the empirical literature. Catastrophic health expenditure identifies households whose out-of-pocket spending exceeds a threshold share of income or consumption, typically 10 or 25 per cent of total consumption or 40 per cent of capacity to pay (Xu et al., 2003; Wagstaff & van Doorslaer, 2003). Impoverishing health expenditure identifies households pushed below, or further below, a poverty line by such payments. Wagstaff et al. (2018) apply both measures to 133 countries and document rising catastrophic incidence between 2000 and 2010 alongside falling impoverishment, a divergence that reflects income growth more than improvement in health financing.

For Europe, the measurement choices matter more than is often assumed. Cylus et al. (2018) show that the conventional thresholds, applied to European household budget surveys, produce indicators weakly related to poverty, and propose subtracting a standard amount for basic needs from household consumption before comparing out-of-pocket spending with the remainder, an approach that identifies hardship concentrated among poorer households. The WHO Regional Office for Europe has adopted the method, and its latest round of country studies finds catastrophic incidence ranging from around 1 per cent of households in some Western European systems to well above 10 per cent in several Eastern and Southern European ones, with outpatient medicines the single largest driver in most countries (WHO Regional Office for Europe, 2023).

That last point is central here. In Europe, catastrophic spending is not primarily a matter of hospital bills but of medicines bought outside hospital, and of the co-payments, non-reimbursed products and informal charges that attach to them. Yerramilli et al. (2018), reviewing the European evidence, note both the concentration of hardship on outpatient pharmaceuticals and the scarcity of studies linking financial protection outcomes to specific financing policies; the link between public pharmaceutical spending and household hardship has more often been assumed than estimated.

2.2 From Aggregate Spending to Pharmaceutical Spending

The cross-country evidence on public health spending and financial protection is broadly consistent. Xu et al. (2007), using data for 89 countries, find that catastrophic incidence falls as the public share of total health expenditure rises. Wagstaff et al. (2018) and the global monitoring reports of the World

© 2026 Athenaeum University of Bucharest

Health Organization and the World Bank (2021, 2023) confirm the negative relationship between prepayment and hardship, while cautioning that progress on service coverage has outpaced progress on financial protection: more people use services, but a stable or growing share of them pay heavily for doing so. The Lancet Global Health Commission on financing primary health care draws the same distinction (Hanson et al., 2022).

Most of this evidence concerns total health spending, and most of the catastrophic-spending literature concerns low- and middle-income countries, where out-of-pocket shares are far higher than in Europe (Eze et al., 2022). Evidence that isolates pharmaceutical spending is thinner, and for a conceptual reason as much as a data one: public expenditure on medicines is the outcome of prices, volumes and reimbursement rates rather than a policy in itself. A government can raise its pharmaceutical budget because it pays higher prices, because it reimburses more products, because more patients are treated, or because a larger share of each prescription is covered. Only the last of these mechanically lowers what households pay; the first three may leave household payments unchanged or raise them, if wider coverage draws more people into treatment and each treated patient contributes a co-payment.

Vogler et al. (2011) document how European countries responded to the 2008 financial crisis with price cuts, reference pricing, generic substitution and, in several cases, higher patient co-payments, and Palladino et al. (2016) show that cost sharing rose in a number of European systems during the recession, with unmet need for medicines increasing most among lower-income groups. The sign of the spending-to-hardship relationship is therefore not fixed: a country can cut its public pharmaceutical bill and shift the cost to patients, or expand it and expand co-payment revenue in step. Thomson et al. (2022), comparing financing responses to the 2008 crisis and the first year of COVID-19, find that the countries which protected households best were those whose caps and exemptions limited out-of-pocket exposure, not simply those that spent more. Tambor et al. (2021) make the same point for Central and Eastern Europe, where public financing shares have risen since accession while out-of-pocket shares have stayed well above the EU average.

2.3 Governance and Health System Performance

The efficiency literature offers a framework for why spending may fail to protect. Cylus et al. (2016) emphasise that inputs are transformed into outputs by processes that differ in quality across countries, so two systems with the same pharmaceutical budget can deliver very different quantities of reimbursed medicine, at very different prices, to very different populations. Where procurement is competitive and transparent, unit prices are lower and a budget stretches further; the European collaborations on joint procurement described by Vogler et al. (2021) exist because smaller purchasers pay more. Where distribution chains leak through informal payments or diversion, formally allocated resources do not reach patients.

© 2026 Athenaeum University of Bucharest

Informal payments are the governance failure most directly relevant here. Lewis (2007) shows that informal payments for nominally free care are pervasive where public sector accountability is weak, fall disproportionately on the poor and are invisible in expenditure statistics. Rechel et al. (2014), writing on the former Soviet countries, describe how systems that inherited universal entitlements on paper came to depend on unofficial payments in practice. The mechanisms are specific to that region, but the underlying point, that a formal entitlement to reimbursed medicine is only as good as the institutions that honour it, applies wherever government effectiveness is low.

The Worldwide Governance Indicators are the standard cross-country measure of that institutional quality. Kaufmann et al. (2011) describe the construction of the six aggregate indicators and defend their use for cross-country comparison, while cautioning that margins of error are wide enough that small differences between neighbouring countries should not be over-interpreted. Government effectiveness and control of corruption are the two dimensions most obviously connected to whether a pharmaceutical budget reaches patients, and annual updates (Kaufmann & Kraay, 2023) allow them to be matched to the Findex years.

Health policy research has increasingly treated governance as a determinant of financing outcomes rather than as background. The European Observatory's study of resilience during COVID-19 identifies governance capacity as the factor that most consistently distinguished systems that absorbed the shock from those that did not (Sagan et al., 2021), and OECD (2023) reports that out-of-pocket shares and catastrophic spending vary across member countries far more than the public share of financing can explain. What has been missing is a cross-country test of whether governance conditions the relationship between pharmaceutical spending and household hardship.

2.4 Romania and the Central and Eastern European Context

Romania is a useful reference case. Its public spending on medical products rose from 0.42 per cent of GDP in 2001 to a peak of 1.29 per cent in 2014 and then contracted to 0.86 per cent by 2021, a trajectory the companion paper attributes to post-accession catching-up followed by the pharmaceutical clawback introduced in 2009 and by fiscal consolidation (Sisu, 2026). At its peak Romania spent more on this category than the EU average; in 2021 it spent slightly less. On the spending side, it does not look like a laggard.

On the protection side, it does. The 2023 country health profile records an out-of-pocket share of health spending well above the EU average, with outpatient medicines the largest component of household health payments (OECD & European Observatory on Health Systems and Policies, 2023), and unmet need for medical care for reasons of cost, distance or waiting is among the highest in the EU and strongly graded by income (Eurostat, 2024). Vlădescu et al. (2016) describe the mechanisms: a reimbursement list slow to incorporate new products, co-payment rates that vary widely across categories, persistent informal payments in hospitals, and recurrent supply problems for reimbursed

© 2026 Athenaeum University of Bucharest

medicines that the clawback aggravated. Respectable spending alongside poor protection is what a governance reading of the spending-to-protection chain would predict.

Similar tensions are visible across the region: OECD and European Commission (2024) report that catastrophic spending remains concentrated in Eastern and Southern member states, and public health spending is projected to rise as a share of GDP in every member state to 2070, with the countries that have the weakest protection today having the least fiscal room (European Commission, 2024).

2.5 Hypotheses

The literature supports three testable propositions. The first is the protection hypothesis in its simplest form: holding other things constant, higher public spending on medical products should be associated with a lower prevalence of health borrowing (H1). The alternative, made explicit above, is that spending tracks the scale of the system rather than the share of costs it absorbs, in which case the association could be zero or positive. The second concerns institutions directly: better governance should be associated with less health borrowing, independently of spending, because it lowers prices, reduces leakage and improves the reliability of entitlements (H2). The third is the moderation hypothesis: the association between spending and borrowing should be more negative, or negative only, where governance is better (H3). H3 is tested through an interaction term and, as a complement, through a split of the sample at the median of government effectiveness with a formal test of whether the two subsample coefficients differ.

3. METHODOLOGY

3.1 Data Sources and Sample

Our dependent variable is the share of adults aged 15 and over who report having borrowed money for health or medical purposes in the previous 12 months, from the World Bank Global Findex Database (Demirgüç-Kunt et al., 2022). The question has been asked in the same form in the 2014, 2017 and 2021 waves, which fixes the panel's time dimension. Findex is a nationally representative survey of roughly 1,000 adults per country, and the health borrowing item is one of the few internationally comparable measures of illness-related financial stress that does not depend on household budget surveys.

Public spending, the main explanatory variable, is general government expenditure on medical products, appliances and equipment as a share of GDP, group 07.1 of the COFOG classification in the IMF Government Finance Statistics, accessed through the World Bank Data360 platform under indicator code IMF_COFOG_GELM_GF0701. The general government sector includes social security funds, which matters because in most EU countries pharmaceutical reimbursement flows through a health insurance fund. This is the series used in the companion convergence analysis (Sisu, 2026).

© 2026 Athenaeum University of Bucharest

Governance is measured with two of the six Worldwide Governance Indicators, government effectiveness and control of corruption, on the standard scale from about −2.5 to +2.5 (Kaufmann et al., 2011; Kaufmann & Kraay, 2023). The out-of-pocket share of current health expenditure comes from the WHO Global Health Expenditure Database (World Health Organization, 2023) and captures the household cost-sharing burden across all types of care. GDP per capita in purchasing power parity terms, in logarithms, is drawn from the World Development Indicators and used in robustness checks.

The sample consists of the 22 EU member states with complete data in all three waves: Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain and Sweden, a balanced panel of 66 observations. Poland is included in the main estimates. Its COFOG 07.1 values of around 0.06 per cent of GDP, the sample minimum, almost certainly reflect a classification convention under which pharmaceutical reimbursement is recorded elsewhere, an anomaly noted in the companion paper, which excludes Poland from its convergence tests (Sisu, 2026). Rather than drop a country on a suspicion, we retain it and report in Section 4 that its exclusion leaves the signs and the pattern of significance unchanged.

3.2 Variables and Specification

Four pooled least squares specifications are estimated in sequence. The first is bivariate and serves as a baseline. The second adds governance, the out-of-pocket share and wave dummies. The third and fourth add an interaction between spending and each governance indicator in turn. Writing Borrow for the health borrowing rate, COFOG for public spending on medical products, GE for government effectiveness, CC for control of corruption and OOP for the out-of-pocket share, with i indexing countries and t indexing waves, the baseline is given by Equation (1):

$$\text{Borrow_it} = \alpha + \beta_1 \, \text{COFOG_it} + \varepsilon\text{_it} \tag{1}$$

The direct-effects specification, which is the preferred model for the pooled sample, is given by Equation (2):

$$\text{Borrow_it} = \alpha + \beta_1 \, \text{COFOG_it} + \beta_2 \, \text{GE_it} + \beta_3 \, \text{OOP_it} + \delta_{2017} \, \text{D2017_t} + \delta_{2021} \, \text{D2021_t} + \varepsilon\text{_it} \tag{2}$$

Adding the product term gives the interaction specification with government effectiveness in Equation (3), and the fourth model replaces GE with CC throughout:

$$\text{Borrow_it} = \alpha + \beta_1 \, \text{COFOG_it} + \beta_2 \, \text{GE_it} + \beta_3 \, (\text{COFOG_it} \times \text{GE_it}) + \beta_4 \, \text{OOP_it} + \delta_{2017} \, \text{D2017_t} + \delta_{2021} \, \text{D2021_t} + \varepsilon\text{_it} \tag{3}$$

Wave dummies absorb common shocks, of which the most obvious is the pandemic in 2021. GDP per capita is omitted from the main specifications because its correlation with government effectiveness is

© 2026 Athenaeum University of Bucharest

0.84, which would make the two coefficients difficult to separate with 66 observations; it is reintroduced in a robustness check.

3.3 Estimation and Inference

All models are estimated by ordinary least squares with HC3 heteroskedasticity-consistent standard errors (MacKinnon & White, 1985), which perform well in samples of this size. With 22 countries and three waves, observations within a country are unlikely to be independent, and the natural remedy is to cluster by country. Cameron and Miller (2015) caution that cluster-robust inference with fewer than about 40 clusters can over-reject, and 22 clusters fall within that range. We therefore report HC3 standard errors in the tables and computed a country-clustered variant of every model as a robustness note. The clustered version gives the same qualitative picture: the same signs, government effectiveness still significant in the direct-effects model, the pooled spending coefficient still insignificant, the interaction terms still far from significance.

Country fixed effects would be the standard way to remove unobserved time-invariant heterogeneity. With three waves per country they are estimable in principle, but they would absorb almost all of the variation in the governance indicators, which move very slowly, and leave the level effect of governance, the object of H2, unidentified. We rely on pooled estimation and treat the absence of fixed effects as a limitation.

The moderation hypothesis is tested in two ways. The interaction terms in the third and fourth models provide the direct test. As a complement, the sample is split at the median of government effectiveness (1.06) and the direct-effects model, without the governance variable, is estimated separately in each half. The split is made observation by observation on the year-specific value of government effectiveness, so a country whose score crosses the median between waves contributes observations to both halves. Table 1 lists the resulting classification; Estonia, Portugal, Slovenia and Spain appear in both groups for this reason.

Table 1.
Countries by governance classification (median split on Government Effectiveness)

Low governance (N = 35 observations, 14 countries)	High governance (N = 31 observations, 12 countries)
Bulgaria, Croatia, Czechia, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovenia, Spain	Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Netherlands, Portugal, Slovenia, Spain, Sweden

Note: The split is performed observation by observation on the year-specific Government Effectiveness value relative to the sample median (1.06). Estonia, Portugal, Slovenia and Spain cross the median between waves and contribute observations to both groups.

Source: Worldwide Governance Indicators. Author's classification.

A split-sample comparison invites a familiar error: reading a coefficient that is significant in one group and insignificant in the other as proof that the groups differ. Gelman and Stern (2006) show why this inference is invalid, since the difference between a significant and an insignificant estimate need not

© 2026 Athenaeum University of Bucharest

itself be significant. We therefore test the difference between the two spending coefficients directly, with the z statistic for coefficients from independent samples: the difference divided by the square root of the sum of the squared standard errors. We also resist dismissing the interaction term on the grounds of a high variance inflation factor. The variance inflation factor of an uncentred product term is inflated by construction and says nothing about whether the interaction is informative (Brambor et al., 2006); the p-value of the interaction is the evidence.

Diagnostics for the preferred model include the Breusch-Pagan test for heteroskedasticity, the Durbin-Watson statistic computed on the wave-ordered residuals, the Jarque-Bera test for residual normality and variance inflation factors for the constituent regressors.

4. RESULTS

4.1 Descriptive Statistics and Correlations

Table 2 reports descriptive statistics for the six variables. Health borrowing averages 4.90 per cent of adults across the 66 observations, with a standard deviation of 3.32 percentage points and a range from 0.80 per cent (Finland, 2017) to 14.97 per cent (Lithuania, 2017); the distribution is right-skewed, with most Western and Northern European observations below 4 per cent. Public spending on medical products averages 0.89 per cent of GDP and runs from 0.06 per cent (Poland) to 1.77 per cent (Germany, 2021). Government effectiveness ranges from −0.16 (Romania, 2014) to 1.96 (Finland, 2014), with a mean of 1.02. The out-of-pocket share averages 20.45 per cent of current health expenditure, between 9.00 and 37.90 per cent.

Table 2.
Descriptive statistics, 22 European countries, 2014, 2017 and 2021

Variable	N	Mean	SD	Min	Max
Health borrowing (%)	66	4.90	3.32	0.80	14.97
COFOG spending (% GDP)	66	0.89	0.36	0.06	1.77
Gov. Effectiveness (WGI)	66	1.02	0.58	−0.16	1.96
Control of Corruption (WGI)	66	0.89	0.80	−0.32	2.24
OOP share (%)	66	20.45	8.11	9.00	37.90
GDP per capita (PPP, log)	66	10.52	0.29	9.80	10.97

Source: Global Findex, IMF COFOG via World Bank Data360, Worldwide Governance Indicators, WHO Global Health Expenditure Database, World Development Indicators. Author's own calculations.

Public pharmaceutical spending and health borrowing are essentially unrelated, with a Pearson coefficient of 0.10 ($p = 0.417$). Government effectiveness and health borrowing are strongly and negatively related, with a coefficient of −0.49 ($p < 0.001$). Figure 1 plots spending against borrowing for all 66 observations, distinguishing the two governance groups and labelling Romania's three observations. The scatter shows why the pooled correlation is close to zero: within each group the fitted line slopes upward, more steeply in the high-governance group, while the low-governance group

© 2026 Athenaeum University of Bucharest

sits above the high-governance group at every level of spending. Spending does not separate the two clouds of points; governance does.

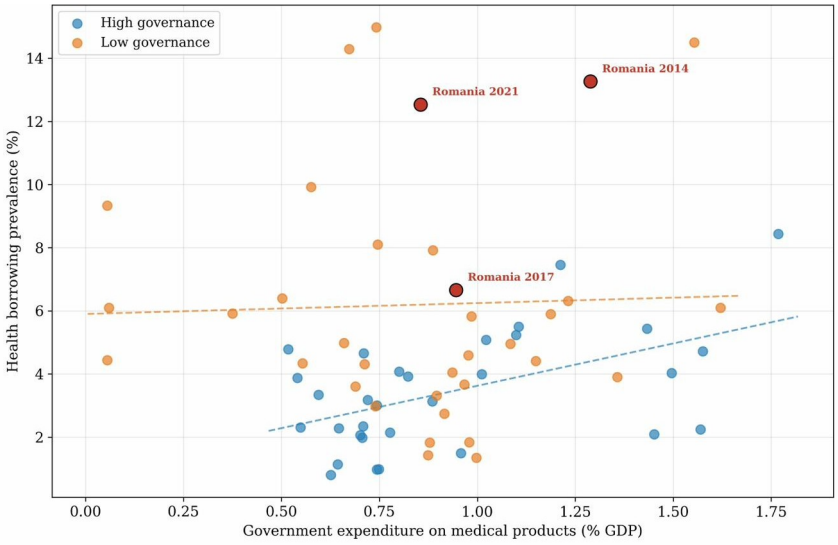


Figure 1. Public spending on medical products versus health borrowing prevalence, 22 EU countries, 2014, 2017 and 2021, by governance group. Observations are classified by median split of Government Effectiveness; dashed lines are within-group linear fits. Romania's three observations are labelled.

Source: Author's own elaboration based on IMF COFOG, Global Findex and Worldwide Governance Indicators data.

4.2 Pooled Regression Results

Table 3 reports the four pooled specifications. In the bivariate model of Equation (1), the spending coefficient is 0.934 with a standard error of 1.261 ($p = 0.459$), and the R^2 is 0.010.

Table 3.
Pooled OLS results, dependent variable: health borrowing prevalence (%)

Variable	M1 (Bivariate)	M2 (Direct effects)	M3 (Interaction, GE)	M4 (Interaction, CC)
COFOG (% GDP)	0.934 (1.261)	1.420 (1.114)	0.796 (2.869)	0.881 (2.365)
Gov. Effectiveness		−1.850** (0.863)	−2.419 (1.927)	
Ctrl. Corruption				−1.666 (1.458)
COFOG × Gov. Eff.			0.653 (2.260)	
COFOG × Ctrl. Corr.				0.652 (1.629)
OOP share (%)		0.113* (0.064)	0.114* (0.067)	0.123* (0.066)
Year 2017		−0.716 (0.832)	−0.718 (0.853)	−0.693 (0.836)
Year 2021		1.547* (0.843)	1.527* (0.869)	1.631* (0.899)
R^2	0.010	0.368	0.369	0.344
Adj. R^2	−0.005	0.315	0.305	0.277
N	66	66	66	66

*Note: *** p < 0.01,** p < 0.05, * p < 0.10. HC3 robust standard errors in parentheses. Blank cells indicate variables not included in the model.*

Source: Author's own calculations.

© 2026 Athenaeum University of Bucharest

The direct-effects model of Equation (2) changes the picture, though not in the direction H1 anticipates. Government effectiveness enters with a coefficient of −1.850 (standard error 0.863, p = 0.032): a one-point improvement on the governance scale, roughly the distance between Romania and the sample mean, is associated with 1.85 percentage points less health borrowing, over half a standard deviation of the dependent variable. The out-of-pocket share is positively associated with borrowing, at 0.113 (p = 0.081), and the 2021 dummy is positive at 1.547 (p = 0.067), consistent with the pandemic having raised borrowing above what the structural variables predict. The spending coefficient, at 1.420 (standard error 1.114, p = 0.203), remains positive and insignificant. The R^2 rises to 0.368 and the adjusted R^2 to 0.315, with almost all of the gain attributable to governance.

Neither interaction model of Equation (3) supports H3. The product of spending and government effectiveness has a coefficient of 0.653 with a standard error of 2.260 (p = 0.773); the product of spending and control of corruption has a coefficient of 0.652 with a standard error of 1.629 (p = 0.689). The R^2 of the third model is 0.369, indistinguishable from the second, and the adjusted R^2 falls. The inflated standard errors on the constituent terms are a mechanical consequence of including an uncentred product and do not alter the conclusion: there is no evidence in the pooled data that governance changes the slope of the spending-to-borrowing relationship.

Two robustness checks are worth recording. Adding log GDP per capita to the direct-effects model leaves the spending coefficient positive and insignificant and reduces the precision of the governance coefficient, as expected given the 0.84 correlation between the two; neither changes sign. Excluding Poland, the classification anomaly discussed in Section 3.1, leaves every sign in Table 3 unchanged and the pattern of significance intact, and the country-clustered standard errors described in Section 3.3 tell the same story.

4.3 Split-Sample Estimates and the Test of Their Difference

Table 4 reports the direct-effects model estimated separately in the two governance groups, and Figure 2 displays the four coefficients side by side for each group.

Table 4.
Split-sample OLS results by governance group

Variable	Low governance (N = 35)	High governance (N = 31)
COFOG (% GDP)	0.791 (1.750)	3.358 (1.103)
OOP share (%)	0.143** (0.067)	0.113 (0.073)
Year 2017	−0.752 (1.502)	−0.257 (0.713)
Year 2021	2.396 (1.558)	1.128 (0.802)
R^2	0.211	0.452
Countries	14	12

*Note: *** p < 0.01,** p < 0.05, * p < 0.10. HC3 robust standard errors in parentheses. Sample split at the median of Government Effectiveness (1.06), observation by observation.*

Source: Author's own calculations.

© 2026 Athenaeum University of Bucharest

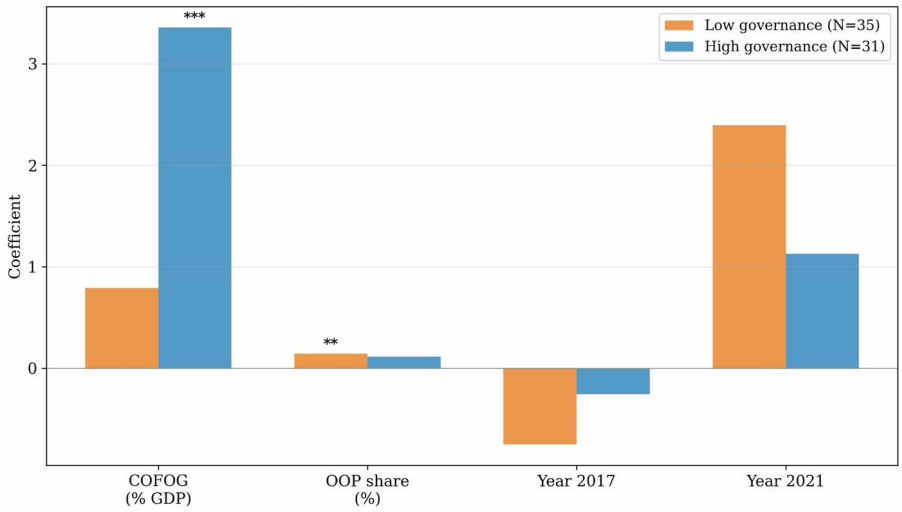


Figure 2. Split-sample coefficient comparison: estimated effects of COFOG spending, the out-of-pocket share and the wave dummies in the low-governance and high-governance groups. Asterisks mark significance at the 1 per cent and 5 per cent levels.

Source: Author's own elaboration.

In the high-governance group the spending coefficient is 3.358 with a standard error of 1.103 ($p = 0.003$), and the model explains 45.2 per cent of the variation in borrowing. In the low-governance group, which contains Romania and the other Central and Eastern European and Southern European members listed in Table 1, the spending coefficient is 0.791 with a standard error of 1.750 ($p = 0.652$), and the model explains 21.1 per cent. The out-of-pocket share is significant only in the low-governance group, at 0.143 ($p = 0.035$), and the 2021 dummy is larger there, at 2.396 against 1.128, though neither wave dummy reaches conventional significance in either group.

The point that must be made before any interpretation is that the coefficient on spending is positive in both groups: nowhere in these data does public pharmaceutical spending carry the negative sign a protective effect would produce. In the better-governed half of the EU, an additional 0.1 percentage point of GDP spent on medical products is associated with about a third of a percentage point more adults borrowing for health.

A second point concerns the contrast between the groups. The spending coefficient is significant in one and not in the other, and it would be tempting to describe this as the finding. Applying the test set out in Section 3.3, the difference between the two coefficients is $3.358 - 0.791 = 2.567$, with a pooled standard error of $\sqrt{(1.103^2 + 1.750^2)} = 2.07$, giving $z \approx 1.24$ and a two-sided $p \approx 0.21$. The two coefficients are not significantly different. This agrees with the insignificant interaction terms in Table 3 and means the split-sample contrast is suggestive at best: the data are compatible with a spending coefficient about 2.6 points higher in well-governed systems and equally compatible with its being the same in both.

© 2026 Athenaeum University of Bucharest

4.4 Diagnostic Tests

Figure 3 presents the actual-versus-predicted plot, the residuals-versus-fitted plot and the normal quantile plot for the direct-effects model. The Breusch-Pagan test gives a Lagrange multiplier statistic of 9.49 ($p = 0.091$), indicating mild heteroskedasticity that the HC3 standard errors address. The Durbin-Watson statistic on the wave-ordered residuals is 1.886, giving no indication of serial correlation, though with three waves per country the test has limited power. The Jarque-Bera statistic is 23.10 ($p < 0.001$), reflecting the right skew of the dependent variable: the high-borrowing observations in Lithuania, Bulgaria, Greece and Romania produce positive residuals that the model under-predicts. Variance inflation factors in the direct-effects model are all below 5, so the collinearity concern is limited to the interaction models and to the excluded GDP per capita variable.

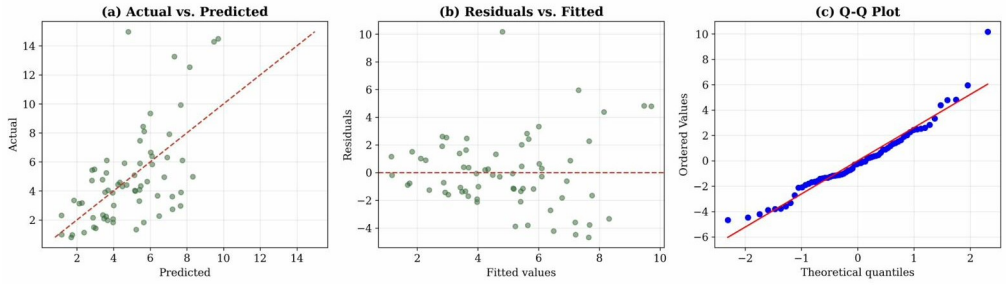


Figure 3. Model diagnostics for the direct-effects model: (a) actual versus predicted values, (b) residuals versus fitted values, (c) normal quantile plot of residuals.

Source: Author's own elaboration.

4.5 Romania in the Panel

Romania's public spending on medical products and its health borrowing rate for the three waves are plotted in Figure 4, with government effectiveness annotated. Spending fell from 1.29 per cent of GDP in 2014, the peak year identified in the companion paper, to 0.95 per cent in 2017 and 0.86 per cent in 2021, close to the sample mean of 0.89 per cent. Health borrowing was 13.26 per cent in 2014, 6.66 per cent in 2017 and 12.53 per cent in 2021. Government effectiveness barely moved, from −0.16 to −0.07 to −0.09, and stayed at or near the bottom of the panel throughout.

© 2026 Athenaeum University of Bucharest

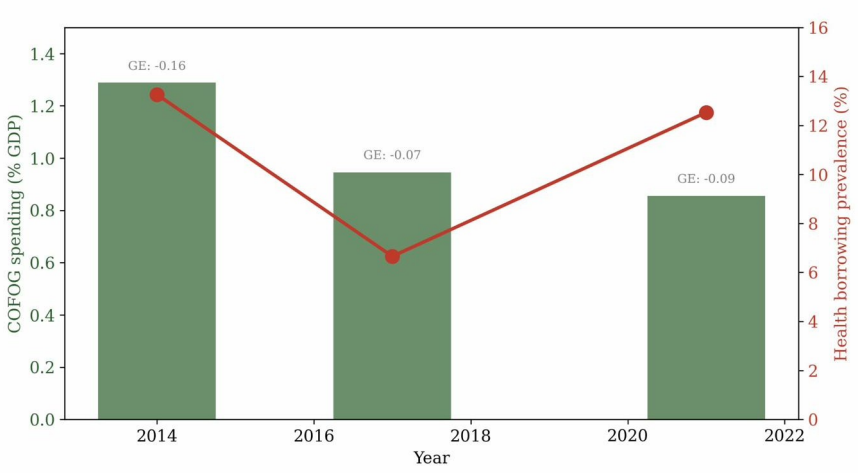


Figure 4. Romania: public spending on medical products (bars, left axis) and health borrowing prevalence (line, right axis), 2014, 2017 and 2021, with Government Effectiveness scores annotated.

Source: Author's own elaboration based on IMF COFOG, Global Findex and Worldwide Governance Indicators data.

At 12.53 per cent, Romania's 2021 borrowing rate is among the highest values in the 66-observation panel. It is exceeded by Lithuania in 2017 (14.97 per cent), by Bulgaria in 2021 (14.29 per cent), by one further low-governance observation visible at the top of Figure 1, and by Romania's own 2014 value of 13.26 per cent, recorded in the year of peak spending. The last comparison is the instructive one. In 2014 Romania spent more on medical products than all but a handful of countries in the sample, and its borrowing rate was the highest in the panel that year; the subsequent contraction in spending was not followed by a sustained rise in borrowing. The 2017 dip to 6.66 per cent is hard to attribute to any change in financing policy and may partly reflect sampling variation in that Findex wave; the 2021 rebound coincides with the pandemic. All three Romanian observations lie well above the fitted line for the low-governance group in Figure 1: Romania borrows more than its spending, its cost-sharing burden and its governance group would predict.

5. DISCUSSION

5.1 What the Data Do and Do Not Support

Governance quality is negatively and significantly associated with household health borrowing (H2 supported). Public pharmaceutical spending is not negatively associated with health borrowing in any specification, and in the better-governed half of the sample it is positively and significantly associated with it (H1 not supported). The moderation hypothesis finds no support in the interaction terms and only suggestive support in the split-sample contrast, which fails a direct test of the difference (H3 not supported).

The temptation with a positive spending coefficient is to explain it away. It should instead be taken seriously as a description of how European pharmaceutical systems work. Public spending under COFOG 07.1 is the product of the number of people treated, the number of products reimbursed, the

© 2026 Athenaeum University of Bucharest

price paid for each and the share of that price the public payer covers. Only the last determines the household's residual payment for a given prescription, and it is the one that varies least across the high-governance systems in the sample, most of which cover the bulk of the cost of reimbursed medicines; what varies is the scale of utilisation and the breadth of the formulary. Germany, at 1.77 per cent of GDP, and France, at 1.50 per cent, spend more because they reimburse more products for more people, not because they cover a larger share of each prescription than Denmark, at 0.52 per cent, or Sweden, at 0.74 per cent. More people in treatment means more people facing co-payments, prescription charges and the cost of non-reimbursed products, and a fraction of those people borrow. This is the coverage-expansion reading, and it is the phenomenon the global monitoring reports describe when they note that service coverage has improved faster than financial protection (World Health Organization & World Bank, 2021, 2023; Hanson et al., 2022).

A protection reading, under which each additional euro of public pharmaceutical spending replaces a euro a household would otherwise have paid, would require the coefficient to be negative. It is not, in any subsample, under any set of controls, with or without Poland, with HC3 or country-clustered standard errors. Public pharmaceutical spending as a share of GDP is a poor proxy for the depth of coverage of any individual patient's costs.

Governance does the explanatory work in these results and deserves the same care. Government effectiveness is a composite of perceptions of public service quality and policy credibility, highly correlated with income and with most other things that distinguish Northern from Eastern Europe, and the coefficient of −1.85 should not be read as the effect of an administrative reform. What it captures, within the limits of a cross-sectional design, is that the countries where households borrow to pay for health are those where the state is least able to deliver on its formal commitments, and that this distinction is far more informative than the size of the pharmaceutical budget. The bivariate correlations make the point without any modelling: −0.49 for governance, 0.10 for spending.

5.2 Engaging with the Literature

The findings sit comfortably with the European financial protection literature and less comfortably with the simpler versions of the universal coverage argument. WHO Regional Office for Europe (2023) finds that catastrophic spending across European countries is explained mainly by the design of coverage policy, whether co-payments are capped, whether exemptions protect poorer households and whether outpatient medicines are covered at all, rather than by the public share of financing, and Thomson et al. (2022) reach a similar conclusion for crisis periods. Our results add that this holds for the pharmaceutical budget specifically.

They also qualify the efficiency argument of Cylus et al. (2016), which predicts that better-governed systems convert a given budget into more protection and hence a more negative spending coefficient in the high-governance group. We observe a more positive one. The two are reconciled

© 2026 Athenaeum University of Bucharest

once the utilisation channel is recognised: a well-governed system converts its budget more efficiently into reimbursed treatment, and precisely because it does so it draws more people into the system and exposes more of them to the residual costs of being treated. In the high-governance group the model explains 45.2 per cent of the variation and spending does most of the work, because there spending measures the reach of the system. In the low-governance group the model explains 21.1 per cent, spending explains almost nothing, and the out-of-pocket share is the variable that matters, which speaks to the informal-payment literature (Lewis, 2007; Rechel et al., 2014): where governance is weak, the burden on households runs through channels that spending statistics do not capture.

None of this establishes a difference between the two groups: the gap between the spending coefficients, 2.57 points, has a p-value of about 0.21, and the interaction terms are nowhere near significance. What the split-sample analysis does establish is the sign of the coefficient in the well-governed group, and that is enough to reject the protection hypothesis for that group with some confidence.

5.3 Implications for Romania and for Policy

The conventional diagnosis of Romania is that it spends too little on medicines and that households borrow because of it. The data do not bear this out. Romania spent 1.29 per cent of GDP on medical products in 2014, above the EU average, and its borrowing rate that year was the highest in the panel; it spent 0.86 per cent in 2021, near the average, and borrowing was again among the highest. The contraction in spending after 2014 did not raise borrowing in any detectable way, because spending was not what was holding borrowing down. Romania borrows more than its spending, its cost-sharing share and its governance group predict, and the residual is institutional: the reimbursement list, the co-payment structure, the informal payments and the supply interruptions that the health system review and the country health profile describe (Vlădescu et al., 2016; OECD & European Observatory on Health Systems and Policies, 2023), none of which a budget line captures.

A policy implication follows. For Romania and the other low-governance countries in the sample, the evidence gives no reason to expect that a larger pharmaceutical budget, delivered through the existing institutional channels, would reduce the share of households borrowing for health, and some reason to expect that measures acting directly on the residual cost faced by patients would. The out-of-pocket share is the only variable significantly associated with borrowing in the low-governance group, and it is the variable that co-payment caps, exemptions for chronic and low-income patients and zero co-payment for essential medicines address; these are the instruments the European financial protection literature identifies as effective (WHO Regional Office for Europe, 2023; Thomson et al., 2022), and they cost less than a general budget increase. Procurement reform and health technology assessment capacity, the institutional complements to spending growth identified in the companion paper (Sisu, 2026), determine how much reimbursed treatment a budget buys, not how the residual cost falls on households.

© 2026 Athenaeum University of Bucharest

For the well-governed countries the implication is less comfortable. Systems that reach more people with reimbursed medicines also expose more people to the residual costs of treatment, and a small but non-trivial share of those people borrow; financial protection there is a matter of cost-sharing design at the margin, for patients with chronic conditions, multiple prescriptions and low incomes. The public health spending growth projected in the 2024 Ageing Report (European Commission, 2024) will not, on these results, reduce health borrowing by itself.

A final implication concerns the convergence documented in the companion paper (Sisu, 2026). Convergence in spending does not imply convergence in financial protection, because the mapping from one to the other runs through institutions that are not converging at the same pace; two countries can spend the same share of GDP on medicines and have health borrowing rates that differ by a factor of ten.

6. CONCLUSIONS

This study set out to test whether public spending on medical products protects households from having to borrow for health care, and whether that protection depends on governance quality, using 22 EU countries observed in the 2014, 2017 and 2021 waves of the Global Findex survey. The answer to the first question, on these data, is no. Public pharmaceutical spending is positively associated with health borrowing in every specification, insignificantly in the pooled models and significantly in the better-governed half of the sample, where the coefficient is 3.36. Government effectiveness is negatively and significantly associated with borrowing, with a coefficient of −1.85 in the preferred model. The interaction between spending and governance is not significant, and the difference between the split-sample spending coefficients, 2.57 points, is not significant either ($p \approx 0.21$); the split-sample contrast is suggestive and should be described as such.

The interpretation most consistent with the evidence is that the level of public pharmaceutical spending measures the reach of a health system rather than the depth of its coverage of any individual patient's costs. Systems that spend more reach more people, and more people in treatment means more people exposed to co-payments and to the cost of non-reimbursed products. Where institutions are weak, the burden on households runs through channels the spending statistics do not see, and the out-of-pocket share, not the budget, tracks borrowing.

Several limitations shape what can be claimed. The panel has three waves, and country fixed effects are not estimable without absorbing the level effect of governance that is the main result; the estimates are cross-sectional in character and describe associations, not causal effects. Twenty-two countries are too few for cluster-robust inference to be fully reliable, although the country-clustered variant of every model gives the same qualitative picture. Government effectiveness is highly correlated with income, and GDP per capita is omitted from the main models for that reason. The dependent variable is self-reported and may be affected by differences in financial culture and in survey sampling across countries and waves. The COFOG 07.1 category aggregates medicines with

© 2026 Athenaeum University of Bucharest

appliances and equipment, and Poland's values in it appear to reflect a classification convention; the results are unchanged when Poland is excluded, but the same concern may apply in milder form elsewhere. The governance indicators have wide margins of error, and a median split on them is a coarse instrument.

Extensions in three directions would strengthen the analysis. The most valuable would replace the spending variable with measures that capture depth of coverage directly: the public share of pharmaceutical expenditure, co-payment caps, and the coverage of outpatient medicines in the benefit package, all of which the WHO financial protection studies now document for most European countries. A second would use catastrophic and impoverishing spending from household budget surveys as dependent variables alongside health borrowing, and a third would add the next Findex wave, allowing fixed-effects estimation with four periods. The most useful addition would be a country-level study of Romania that decomposes household pharmaceutical payments into formal co-payments, non-reimbursed purchases and informal payments, since it is the composition of that residual, not the size of the public budget, that this article identifies as the binding constraint on financial protection.

ACKNOWLEDGMENTS

The author used Claude (Anthropic, 2026 version) for data processing support, checking of computations and language editing. All output was reviewed and verified by the author, who takes full responsibility for the content. The author thanks the anonymous reviewers for comments that led to a substantial revision of the interpretation of the results.

AUTHOR CONTRIBUTIONS

Conceptualisation, M.D.S.; methodology, M.D.S.; software, M.D.S.; formal analysis, M.D.S.; data curation, M.D.S.; writing, original draft, M.D.S.; writing, review and editing, M.D.S. The author has read and agreed to the published version of the manuscript.

DATA AVAILABILITY

The panel is assembled from publicly available sources: IMF Government Finance Statistics, COFOG classification, indicator IMF_COFOG_GELM_GF0701 via World Bank Data360; World Bank Global Findex Database, 2014, 2017 and 2021 waves; Worldwide Governance Indicators; WHO Global Health Expenditure Database; and World Development Indicators for GDP per capita. The assembled dataset and the estimation code are available from the author on reasonable request.

DECLARATION OF INTEREST

The author declares no competing interests.

FUNDING

This research received no external funding.

REFERENCES

Brambor, T., Clark, W. R., & Golder, M. (2006). Understanding interaction models: Improving empirical analyses. *Political Analysis*, *14*(1), 63–82. https://doi.org/10.1093/pan/mpi014

Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, *50*(2), 317–372. https://doi.org/10.3368/jhr.50.2.317

© 2026 Athenaeum University of Bucharest

Cylus, J., Papanicolas, I., & Smith, P. C. (Eds.). (2016). *Health system efficiency: How to make measurement work for policy and management*. European Observatory on Health Systems and Policies.

Cylus, J., Thomson, S., & Evetovits, T. (2018). Catastrophic health spending in Europe: Equity and policy implications of different calculation methods. *Bulletin of the World Health Organization*, *96*(9), 599–609. https://doi.org/10.2471/BLT.18.209031

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank. https://doi.org/10.1596/978-1-4648-1897-4

European Commission. (2024). *2024 Ageing Report: Economic and budgetary projections for the EU Member States (2022–2070)* (Institutional Paper 279). Publications Office of the European Union.

Eurostat. (2024). *Self-reported unmet needs for medical examination by sex, age, main reason declared and income quintile* (hlth_silc_08) [Data set]. https://ec.europa.eu/eurostat/databrowser/view/hlth_silc_08

Eze, P., Lawani, L. O., Agu, U. J., & Acharya, Y. (2022). Catastrophic health expenditure in sub-Saharan Africa: Systematic review and meta-analysis. *Bulletin of the World Health Organization*, *100*(5), 337–351J.

Gelman, A., & Stern, H. (2006). The difference between "significant" and "not significant" is not itself statistically significant. *The American Statistician*, *60*(4), 328–331. https://doi.org/10.1198/000313006X152649

Hanson, K., Brikci, N., Erlangga, D., Alebachew, A., De Allegri, M., Balabanova, D., Blecher, M., Cashin, C., Esperato, A., Hipgrave, D., Kalisa, I., Kurowski, C., Meng, Q., Morgan, D., Mtei, G., Nolte, E., Onoka, C., Powell-Jackson, T., Roland, M., … Wurie, H. (2022). The Lancet Global Health Commission on financing primary health care: Putting people at the centre. *The Lancet Global Health*, *10*(5), e715–e772. https://doi.org/10.1016/S2214-109X(22)00005-5

Kaufmann, D., & Kraay, A. (2023). *Worldwide Governance Indicators, 2023 update* [Data set]. World Bank. https://www.govindicators.org

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The Worldwide Governance Indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law*, *3*(2), 220–246. https://doi.org/10.1017/S1876404511200046

Kutzin, J. (2013). Health financing for universal coverage and health system performance: Concepts and implications for policy. *Bulletin of the World Health Organization*, *91*(8), 602–611. https://doi.org/10.2471/BLT.12.113985

Lewis, M. (2007). Informal payments and the financing of health care in developing and transition countries. *Health Affairs*, *26*(4), 984–997. https://doi.org/10.1377/hlthaff.26.4.984

MacKinnon, J. G., & White, H. (1985). Some heteroskedasticity-consistent covariance matrix estimators with improved finite sample properties. *Journal of Econometrics*, *29*(3), 305–325. https://doi.org/10.1016/0304-4076(85)90158-7

OECD. (2023). *Health at a Glance 2023: OECD indicators*. OECD Publishing. https://doi.org/10.1787/7a7afb35-en

OECD & European Commission. (2024). *Health at a Glance: Europe 2024: State of Health in the EU cycle*. OECD Publishing.

OECD & European Observatory on Health Systems and Policies. (2023). *Romania: Country health profile 2023* (State of Health in the EU). OECD Publishing.

Palladino, R., Lee, J. T., Hone, T., Filippidis, F. T., & Millett, C. (2016). The great recession and increased cost sharing in European health systems. *Health Affairs*, *35*(7), 1204–1213.

Rechel, B., Richardson, E., & McKee, M. (Eds.). (2014). *Trends in health systems in the former Soviet countries*. European Observatory on Health Systems and Policies.

© 2026 Athenaeum University of Bucharest

Sagan, A., Webb, E., Azzopardi-Muscat, N., de la Mata, I., McKee, M., & Figueras, J. (Eds.). (2021). *Health systems resilience during COVID-19: Lessons for building back better*. European Observatory on Health Systems and Policies.

Sisu, M. D. (2026). Convergence of public pharmaceutical spending in the European Union: Evidence from IMF COFOG data (2001–2021). *Internal Auditing & Risk Management*, *21*(73, Suppl.), 20–40. https://doi.org/10.67276/tiy8jazkf9

Tambor, M., Klich, J., & Domagała, A. (2021). Financing healthcare in Central and Eastern European countries: How far are we from universal health coverage? *International Journal of Environmental Research and Public Health*, *18*(4), 1382.

Thomson, S., García-Ramírez, J. A., Akkazieva, B., Habicht, T., Cylus, J., & Evetovits, T. (2022). How resilient is health financing policy in Europe to economic shocks? Evidence from the first year of the COVID-19 pandemic and the 2008 global financial crisis. *Health Policy*, *126*(1), 7–15.

Vlădescu, C., Scîntee, S. G., Olsavszky, V., Hernández-Quevedo, C., & Sagan, A. (2016). Romania: Health system review. *Health Systems in Transition*, *18*(4), 1–170.

Vogler, S., Haasis, M. A., van den Ham, R., Humbert, T., Garner, S., & Wirtz, V. J. (2021). European collaborations on medicine and vaccine procurement. *Bulletin of the World Health Organization*, *99*(10), 715–721.

Vogler, S., Zimmermann, N., Leopold, C., & de Joncheere, K. (2011). Pharmaceutical policies in European countries in response to the global financial crisis. *Southern Med Review*, *4*(2), 69–79.

Wagstaff, A., & van Doorslaer, E. (2003). Catastrophe and impoverishment in paying for health care: With applications to Vietnam 1993–1998. *Health Economics*, *12*(11), 921–933. https://doi.org/10.1002/hec.776

Wagstaff, A., Flores, G., Hsu, J., Smitz, M.-F., Chepynoga, K., Buisman, L. R., van Wilgenburg, K., & Eozenou, P. (2018). Progress on catastrophic health spending in 133 countries: A retrospective observational study. *The Lancet Global Health*, *6*(2), e169–e179. https://doi.org/10.1016/S2214-109X(17)30429-1

World Health Organization. (2023). *Global Health Expenditure Database* [Data set]. https://apps.who.int/nha/database

WHO Regional Office for Europe. (2023). *Can people afford to pay for health care? New evidence on financial protection in Europe* (2023 ed.). WHO Regional Office for Europe.

World Health Organization & World Bank. (2021). *Global monitoring report on financial protection in health 2021*. World Health Organization.

World Health Organization & World Bank. (2023). *Tracking universal health coverage: 2023 global monitoring report*. World Health Organization.

Xu, K., Evans, D. B., Carrin, G., Aguilar-Rivera, A. M., Musgrove, P., & Evans, T. (2007). Protecting households from catastrophic health spending. *Health Affairs*, *26*(4), 972–983. https://doi.org/10.1377/hlthaff.26.4.972

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. L. (2003). Household catastrophic health expenditure: A multicountry analysis. *The Lancet*, *362*(9378), 111–117. https://doi.org/10.1016/S0140-6736(03)13861-5

© 2026 Athenaeum University of Bucharest