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Structural adjustment, state capacity, and child health: Evidence from IMF programs

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Summary

Background

Consensus is growing that policy reform programs by the International Monetary Fund (IMF)—an international organization mandated with upholding global financial stability and assisting countries in economic turmoil—produce adverse effects on public health. However, this consensus is unclear about which policies of these programs underlie these effects. This article fills parts of this gap by examining the impact of four kinds of IMF policies (fiscal policy, public sector employment, privatization of state-owned enterprises, and price liberalization) on public health expenditure, child vaccination, and child mortality.

Methods

We conduct time-series cross-section analysis for up to 128 developing countries over the 1980-2014 period using observational data on health outcomes and IMF conditionality for different policy areas. IMF effectiveness research faces two types of potential biases: self-selection into IMF programs and IMF policy conditions. We deploy instrumental variables in a seemingly-

unrelated regression framework to address both types of endogeneity, besides traditional remedies such as the use of fixed effects on countries and years.

Results

IMF policy conditions on public-sector employment are negatively related to child health. A change from the minimum to the maximum number of such policy conditions decreases vaccination (which ranges from 0 to 100) by 10.97 percent (95% CI: 1.16 to 20.79). This effect is robust against different sets of control variables. In addition, IMF programs increase the share of government expenditure devoted to public health in developing countries by 0.91 percentage points (95% CI: 0.15 to 1.68).

Conclusions

These findings suggest that IMF policies—particularly those that require public sector reforms—undermine health by weakening the capacity of states to deliver vaccination. Therefore, international financial institutions need to increase their awareness of the public health impact of their policy prescriptions. Strengthening state capacity in times of economic crisis would ensure that increased health spending also delivers quality healthcare.

Key messages

We evaluate the effect of four types of policy conditions on public health.

Our study deploys an innovative methodology to address non-random selection into IMF programs and policy conditions.

Our analysis finds that IMF programs—particularly policy conditionality on the public sector that also affects doctors and health workers—adversely affect child vaccination.

Keywords:

International Monetary Fund; conditionality; child mortality; health systems capacity; health expenditure;

1. Introduction

In 2010, the Greek government agreed with the 'troika' on a bailout program over EUR 110 billion—in exchange for committing to a number of policy conditions mandating fiscal austerity and structural reforms. The program adversely affected public health.[1] In particular, child mortality increased by 43% between 2008 and 2010.[2] These alarming figures prompted the Greek government to turn to the World Health Organization for emergency support. The Greek case represents one out of 131 countries that were under International Monetary Fund (IMF) assistance over the past thirty years.[3]

While many scholars have established adverse effects of IMF programs on public health,[4–7] our primary goal is to investigate the effects of IMF-mandated policy reforms—so-called 'conditionality'—on health outcomes. A recent study using micro-data established that IMF programs erode the protective effect of parental education on child health, especially in rural areas.[8] Yet, that study did not identify the specific IMF policies that underlie this effect. Most studies assume—often due to data limitations—that all IMF programs are created equal, thus imposing homogeneous treatment effects. In reality, this assumption rarely holds since the IMF designs policies to fit the macroeconomic conditions of the recipient country. Hence, the social determinants of health literature lacks an empirical understanding of the policy mechanisms linking the impact of IMF programs on health.

Our article starts filling this gap by scrutinizing the policy design of IMF programs. We focus on four types of policy conditions in IMF programs, targeting fiscal policy, privatization of state-owned enterprises, price liberalization, and public-sector employment. Based on previous literature and qualitative evidence, we propose that these policy conditions harbor the most relevant causal effect on health outcomes.[9]

First, fiscal policy conditions stipulate a reduction of government spending. The IMF imposes these policies to reduce budget deficits—the difference between how much governments spend on public affairs and how much they collect in taxes and other revenues. Such measures,

especially when imposed abruptly, can adversely affect public health by causing under-investment into health facilities, medical equipment, and medicines.[10]

Second, the IMF promotes privatization of state-owned enterprises to increase efficiency in the health sector. The assumption is that private ownership incentivizes investments, which will lead to higher healthcare quality.[11] However, the pressure for investors to make profit increases healthcare prices, making healthcare unaffordable to less well-off citizens and more remote populations outside capitals for which public services are often subsidized.[12,13]

Third, IMF policies also require price liberalization, based on the rationale that doing so promises to increase market efficiency and the quality of service delivery.[14] Although liberalizing prices can alleviate scarce supply of goods[15–17], it also tends to imply rising prices for essential products such as food[18], healthcare, and medicines. For example, the government of Sudan, in 1983, agreed with the IMF to "[…] terminate the subsidy on […] pharmaceuticals."[19] The removal of subsidies rises prices and tends to harm poor households disproportionately.[9,20]

Fourth, public-sector conditions often require wage freezes, cutbacks in minimum wages[21], social security, and unemployment benefits for public-sector workers.[22] This class of workers include doctors, nurses, and midwifes.[7] The IMF's motivation to impose public-sectors conditions is to reduce the governments' fiscal deficits by reducing wages and scaling back the state's capacity in sectors where it assumes private actors offer better quality operations.

The primary goal of our study is to assess the effect of these four policy conditions on public health. The study analyzes both the main and heterogeneous treatment effects of these policies. To test how these IMF conditions affect health outcomes, we use a newly-released dataset on IMF conditionality covering all IMF programs between 1980 and 2014.[3] Our analysis focuses on two parts of the health system: health spending as an input to public health, and child vaccination and child mortality as health outcomes. Analyzing the input and output side yields a more complete picture of how IMF policies affect health systems. Our study also goes beyond previous work by deploying instrumental variables to address endogeneity. While all estimations account

for non-random selection into IMF programs, we also account for potentially endogenous IMF conditionality in further analyses.

2. Data and methods

We collect time-series cross-section data at the country level to conduct our analyses. Health-related outcome variables and control variables are available from the World Development Indicators and other standard macro-level datasets further detailed below. Our key policy predictors are drawn from a new dataset on IMF conditionality that extracts individual policy conditions from all loan agreements between the Fund and its borrowers in the 1980-2014 period (covering over 960 agreements in 131 countries and including over 54,000 conditions). Due to missing observations in the control variables, our (unbalanced) sample includes up to 128 countries for up to 35 years, or up to 4,480 country-year observations in total.

Outcome variables

We examine three outcome variables: UNDER-FIVE CHILD MORTALITY (number of children not surviving until their fifth birthday per 1,000 live births) and CHILD VACCINATION, (average percentage of population vaccinated against measles, polio, and diphtheria); both proxy health outputs. As a measure for health system inputs, we employ health expenditure as a percentage of government expenditure. We derive the data from the World Development Indicators.

Policy treatments

To elicit the impact of specific policy conditions on health outcomes, we include (separately) the total number of binding IMF conditions on FISCAL POLICY, PUBLIC SECTOR, PRIVATIZATION, and PRICE LIBERALIZATION applicable to a country in a given year. To capture effects spawning from IMF programs over and above these specific policy conditions, we include a binary indicator indicating the presence of an IMF program. For example, adjustment programs may include policy measures on other economic matters that can affect governments' public health priorities.

The binary indicator captures this additional effect. All IMF variables are drawn from the IMF conditionality database.[3]

Control variables

Studies suggest a number of control variables to block the effect of confounders.[23–26] Our models include country and year fixed effects and hence focus only on time-varying associations. We include the natural logarithm of GDP PER CAPITA to capture the level of development, expecting a beneficial effect on health outcomes. Albeit an admittedly imperfect proxy for development, GDP per capita is widely used in previous studies and using alternatives such as life expectancy and the Human Development Index does not alter our substantive conclusions. Furthermore, we control for (logged) FOREIGN AID PER CAPITA. Albeit an admittedly broad proxy for external resources for health, this variable excludes military aid and hence should relate positively to health outcomes. Furthermore, as demography also affects health outcomes, we include the DEPENDENCY RATIO (health systems may be more strained when dependency ratios are high) and the share of URBAN POPULATION (health service provision may be more difficult in rural areas). We draw all the above controls from the World Development Indicators. Finally, we include a binary indicator of CIVIL WAR, drawn from the UCDP/PRIO dataset, as war may undermine the capacity of governments to deliver health services. Table 1 presents descriptive statistics and data sources of all variables.

[Table 1 here]

Methods

We initially proceed with bivariate analysis to assess how IMF conditions affect health outcomes. To that end, we only consider country-year observations under IMF programs and compare the average health outcomes of two groups of countries—the ones with a specified IMF condition over the 1980-2014 period, and the ones without. We use t-tests with unequal variance to assess whether the differences between groups are random.

To isolate the effect of potential confounding factors, we proceed with multivariate analysis. Figure 1 presents the causal graph[27] underlying our analysis. Our relationship of interest goes from IMF policy conditionality to health outcomes. We allow other aspects of IMF programs unrelated to conditionality to have an independent effect on health outcomes. As we use observational data, we control for potential observable confounders that could affect both IMF interventions and health outcomes, as discussed above. However, this approach does not account for unobserved confounders or reverse causality, both of which may introduce bias.

For instance, estimates may be biased because countries with certain characteristics affecting health outcomes (e.g., child mortality) select themselves into IMF programs. Self-selection into IMF programs is a form of confounding as such drivers of program participation are unobservable. In addition, IMF conditionality may be endogenous with respect to health outcomes, for example due to reverse causality (e.g., poor public health outcomes may make the Fund more likely to impose certain policy conditions). In principle, both biases can be addressed by deploying instrumental variables. A valid instrument is 'relevant' (i.e., correlates with the endogenous variable) and 'excludable' (i.e., affects health outcomes only through its impact on the endogenous variable).

In our case, the more relevant source of bias is due to non-random selection into IMF programs. We therefore explicitly model this selection process through an IMF program equation in which we use a geopolitical instrument—the voting alignment of developing countries in the UN General Assembly with G7 countries. It is relevant because it predicts IMF program selection well and also excludable because it is arguably unrelated to health outcomes.[28,29] To further improve model fit, we also include standard predictors of IMF programs such as the institutional history of countries with the Fund, macroeconomic fundamentals, political characteristics, regional dummies, and year dummies.

Policy conditionality is less likely endogenous with respect to health outcomes. This is because the Fund is unlikely to assign conditions based on health outcomes after controlling for economic conditions (which could jointly affect public health and the need for IMF assistance). Any remaining bias would underestimate our findings because the Fund arguably would reduce the amount of policy reforms a country must implement if the country had poor public health.

[Figure 1 here]

Nonetheless, we also seek to address potential endogeneity of IMF conditionality in the robustness tests. For each type of condition, we construct a 'compound instrument' based on the interaction of a time-invariant variable (i.e., the within-country average number of conditions) and a time-varying variable (i.e., number of countries under programs). As further detailed in the appendix, this instrument is relevant because when the IMF assists more countries in any year, its funds are in higher demand and so it must raise the 'price' of its loans by requiring more policy conditions from borrowing countries.[29,30] The instrument is also plausibly excludable because deviations from the country-specific average number of conditions occur as a result of an IMF decision that is unrelated to a country's health outcomes.

Hence, we estimate seemingly-unrelated regression of up to three equations, for which we allow standard errors to be correlated across equations and clustered on countries to account for serial correlation. While we initially treat all health outcomes as mutually unrelated, we also allow them to be mutually dependent in the robustness checks, which increases the number of equations jointly estimated. We estimate all these models via maximum-likelihood using the package *cmp* in Stata 14.[31]

A key concern is that IMF conditionality might undermine health outcomes in the most vulnerable countries that already have low capacity to deliver public services. Therefore, we conduct sub-sample analyses examining which kinds of countries are most affected by IMF conditionality. In particular, we test for effect differences with respect to democratic governance, Sub-Saharan Africa, low income, and weak state capacity, respectively.

3. Results

IMF programs have opposing effects on the three health outcomes. While IMF policies increase health spending, they tend to undermine health system capacity, with potentially negative impacts on child health.

Bivariate analysis

Table 2 suggests a generally weaker health performance of IMF countries. With regard to child mortality, for example, countries with privatization conditions on average have 34.49 additional child deaths compared to program countries without such conditions (95% CI: 13.20─55.78). Countries with price liberalization conditions even have 43.55 child deaths more than their respective control group (95% CI: 19.06─68.05). We do not find differences in health outcomes related to fiscal policy conditions. These raw differences do not account for potential confounding factors such as IMF program selection and other observable confounders.

[Table 2 here]

Multivariate analysis

Table 3 presents results from multivariate analysis accounting for non-random selection into IMF programs. All models include fixed effects on both countries and years. While we expect the impact of IMF policies to be immediate (t), we allow for delayed impacts up to three years (t-3). Our models capture delayed impacts by lagging the policy variables.

Our models identify that privatization tends to have an adverse impact throughout the entire period under scrutiny on child mortality. However, the magnitude is strongest in the year in which a country is under an IMF program (t), while gradually declining over subsequent years. In the first year of an IMF program (a coefficient of 1.114), the differential effect from no conditions to eight conditions on privatization—equivalent to a move from the minimum to the

maximum—is weakly related to an increase in child mortality by 8.91 deaths per 1,000 births (p=0.073).

Public-sector policy conditions have a negative effect on child vaccination. This effect is most robust in the immediate aftermath of their occurrence (t), while disappearing three years afterwards (t-3). In the first year (a coefficient of -0.844), the effect of thirteen conditions (the maximum number in the sample) is an almost 10.97 percent decrease in vaccination (95% CI: 1.16─20.79). Figure 2 shows the predicted marginal effects for the above IMF policy conditions.

[Figure 2 here]

Finally, our analysis of health expenditure shows that IMF programs help governments prioritize health in the budget up to a two-year period. This effect is unrelated to any of the four policy conditions studied here. In the first year, an IMF program is related to a 0.91 percent higher health expenditure (95% CI: 0.14─1.68).

[Table 3 here]

We briefly discuss the coefficients of the control variables (shown in Table B3 in the appendix due to space constraints). While effect size and statistical evidence vary across different outcome equations, we focus attention on the best-fitting model for each covariate. Due to our use of country-fixed effects, slow-moving covariates such as GDP per capita tend to be weakly associated with the outcome, except in the health expenditure equation. Foreign aid has no association with the outcomes, reflecting potential effect heterogeneity across different recipient countries. Consistent with theoretical expectations, correlates of modernization such as urbanization (p=0.07) and the dependency ratio (p=0.001) are negatively related to child mortality. An intuitive interpretation of these results is that if populations concentrate in cities, the delivery of public health services becomes easier. A higher dependency ratio reflects both old-age longevity and higher survival rates of children. Finally, civil war is adversely related to child mortality (p=0.017). In terms of model fit, the control variables perform well in our models

of child mortality (R^2=0.63) and vaccination (R^2=0.64), but rather poorly for health expenditure (R^2=0.07).

For completeness, we also discuss the results of our selection model (shown in Table B3 in the appendix due to space constraints). Consistent with previous literature, we find evidence of recidivism in IMF programs ($p<0.001$)—countries with a history of IMF programs tend to return for IMF treatment. Macroeconomic fundamentals—such as GDP per capita, GDP growth, and foreign reserves—are also strongly related to IMF programs in the expected direction ($p<0.001$). Most importantly, our geopolitical instrument—how well a given country aligns with the G7 in its UNGA voting behavior—is positively correlated with IMF program participation ($p=0.003$), hence revealing favoritism in development politics. Last, we do not find evidence for domestic politics—democratic governance and executive elections—in relation to IMF program participation.

Finally, Table 4 presents results across different sub-samples. Our analysis indicates that especially the less resilient countries are more adversely affected by IMF conditionality. Coefficient estimates are substantively bigger in countries with lower capacity—as measured by income group, state capacity, and a Sub-Sahara Africa dummy. Using World Bank low-income country status as a proxy for low capacity, we strongly reject the null hypotheses that negative associations between public-sector conditions and vaccination are random ($p=0.005$). We also examine the role of democracy, which holds key to better health outcomes by increasing the accountability of governments to their citizens.[33] Unsurprisingly, public-sector conditions adversely affect child mortality only within democracies ($p=0.021$), while we cannot reject the null hypothesis within autocracies.

[Table 4 here]

Robustness checks

As further detailed in the supplemental appendix, we probe the robustness of our findings in several ways. First, we probe the sensitivity of our findings to alternative sets of controls (for

which descriptive statistics and data sources are shown in Table B1). Further controls suggested by previous literature include democracy, state capacity, population, population density, trade openness, debt service as of GNI, and GDP growth.[23,24,32] In choosing these variables, we follow previous studies as closely as possible while avoiding variables with excessive missing data and focusing on the most plausible confounders. We do not consider variables affected by IMF programs to mitigate post-treatment bias. Using three alternative sets of controls, we find consistently negative effects of public-sector conditions with respect to vaccination, while IMF programs increase public health expenditure. However, the relationship between privatization and child mortality is not robust.

Second, we also check if estimating models for all three outcomes simultaneously—child mortality, vaccination, and health expenditure—alters the results. The results remain stable. This approach would be adequate if there was an unobserved variable jointly affecting these outcomes, or, if these outcomes were mutually dependent. While health expenditure is not consistently associated with the two health outcomes, child vaccination and child mortality are negatively correlated, but the latter relationship is not due to unobserved variables because our estimates are similar. Yet, an additional benefit of simultaneous estimation is that we can test all implications of our argument in a joint *F*-test. In the case of public-sector conditions, for instance, the combined null hypothesis that these conditions do not affect child mortality and child vaccination, and IMF programs do not affect health expenditure can be rejected (p=0.014).

Third, when using an instrumental-variable design to also account for potentially endogenous IMF policy conditionality, our statistical evidence becomes weaker. While the negative association between privatization and child mortality vanishes, we continue to find strong evidence for an adverse effect of public-sector conditions on vaccination. As is common in instrumental-variable designs, effect magnitudes increase (in our case ten-fold). For example, one public-sector condition increases vaccination by up to 10.29 percent (95% CI: 2.85─17.73). The positive effect of IMF programs on public health expenditure, unrelated to any IMF policy conditions, remains.

We further probe the robustness of the IV approach by using a different compound instrument, defined as the interaction between the country-specific average number of conditions and their global average in a given year. This instrument is based on the rationale that policy conditions are popular during specific times and diffuse rapidly at the global level. As the Fund prescribes policy conditions without consideration of the local country circumstances, a change in a country's number of conditions is unrelated to a country's specific circumstances. Our main result is robust to the use of this alternative instrument.

4. Discussion

Scholars have devoted significant attention to upstream factors affecting public health.[34] A cross-disciplinary literature on the political economy of health—drawing on sociology, political science, and epidemiology—reveals adverse effects of IMF interventions.[7,35,36] To identify the mechanisms underlying these effects, we studied the impact of four policy areas (fiscal issues, privatization of state-owned enterprises, public sector employment, and price liberalization) on three aspects of the health system: child mortality, child vaccination, and public health spending.

We obtain most robust statistical evidence for public-sector conditions adversely affecting child vaccination. In addition, privatization increases child mortality, but this effect decreases in our instrumental-variable analysis. If one believes that endogeneity is unlikely to be a problem, then the results from OLS regressions are consistent and efficient. In contrast, an instrumental-variable design is necessary if one suspects that the number of IMF conditions is driven by health outcomes, or that some other (unobserved) variable affects both these variables. To the extent that our chosen instrument is excludable with respect to health outcomes—an empirically untestable assumption—our result on public-sector conditions has a causal interpretation.

Further exploring effect heterogeneity, we find that the adverse effects of IMF conditionality are concentrated among low-income countries (where state capacities are low to begin with) and

democracies (where health provision by the government is generally better due to its accountability to citizens).

Taken together, these findings suggest that IMF policies undermine public health, notably by deteriorating the employment conditions of public-sector workers (including health personnel) and thus weakening state capacity. Public-sector conditions adversely affect vaccination, which we consider a direct proxy for the capacity of the state to reach its population and to deliver public services effectively. Some public-sector conditions explicitly exempt health personnel. For example, in its agreement with the Central African Republic, the IMF required a suspension of "all new civil service recruitment, with the exception of recruitment in the education and health sectors […]"[37] as a precondition for program approval.[38,39] However, these exemptions may not be sufficient, and they also neglect that health workers can only be effective in the presence of a well-functioning public administration that coordinates the various health efforts.

Consistent with previous studies, we find governments to increase health expenditure in the realm of IMF programs—not due to explicit conditionality, but other aspects of IMF programs such as technical assistance on public financial management.[9] While it is true that IMF programs often mandate floors on health spending,[23,40,41] we find that the positive effect on health spending is limited to a two-year window following a program. Caution in interpreting this result is necessary because an increase in the budget share devoted to public health may simply reflect that non-health spending declines even faster than health spending.

Our study has four noteworthy limitations. First, the statistical evidence of effect estimates is generally low particularly for fiscal and price liberalization policies. This may be due to small sample sizes, or a long causal chain from IMF interventions to child mortality. Indeed, results are less robust for child mortality than for child vaccination, which causally precedes mortality. In addition, our choice of estimator seeks to minimize bias arising from endogenous policy conditions, which necessarily increases variance due to the bias-variance tradeoff. Second, our models capture the most probable timing of IMF impact on public health, up to three years from program initiation. However, longer time spans would be necessary to capture slow-moving

aspects of public health, for example, cardiovascular morbidity, obesity, and mental health.[4] Third, we examine four IMF policy conditions that theoretically most strongly relate to health outcomes.[32] Yet, other types of conditions could be relevant for health. For example trade liberalization conditions which might expose countries to both global and environmental fluctuations (e.g. natural disasters) in food prices.[18,20,42] Fourth, for reasons of data availability, we focus on three aspects of the health system, but public health entails a myriad of other aspects for which systematic data needs to be collected over longer time periods.[4] Future studies could resolve the former two limitations; the last one would require a more substantial effort.

In terms of policy implications, our findings suggest a need for both the IMF and governments to tailor policies that maintain adequate levels of health spending (input side) *and* to ensure that this spending increases the quality of the health services delivered (output side).[7] In a similar way as the IMF has already installed health-spending floors in its programs, it could devise minimum requirements for the quality of public administrations and health systems more specifically. A renewed focus on state capacity is necessary, given the adverse unintended consequences of structural reform programs on state capacity.[29] Furthermore, designing policies with public health in mind would ensure that macroeconomic recovery does not compromise people's health. After all, both are closely related.

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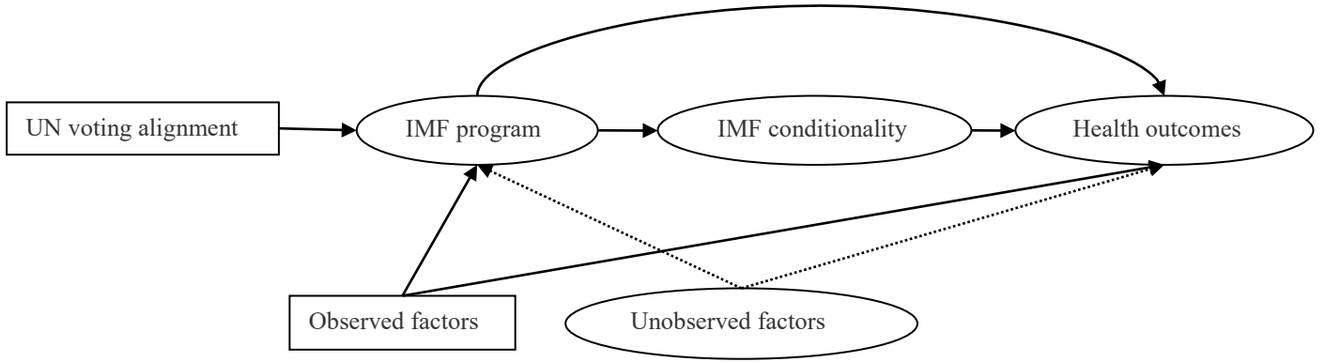
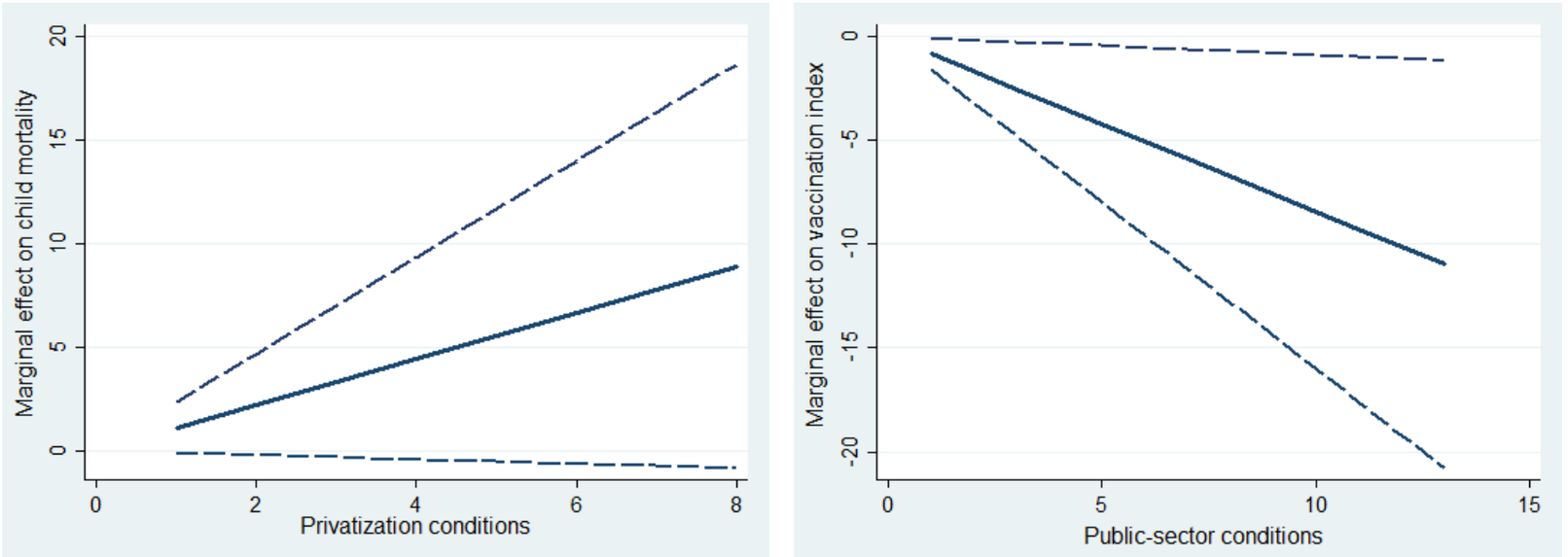
Figures

Figure 1: Causal graph representing our theoretical framework.



Notes: Unobserved factors are prevented from confounding the relationship between IMF programs and health outcomes due to instrumentation with UN voting alignment.

Figure 2: Marginal effect plots for two types of IMF conditions.



Notes: Corresponding coefficient estimates are from Table 3. Thick lines show average marginal effects. Thin lines show 95% confidence interval.

Tables

Table 1: Descriptive statistics and data sources.

	Observations	Mean	Sd	Min	Max	Definition and sources
Outcome variables						
Child mortality	4744	81.09	64.32	4.70	336.90	Under-five child mortality (World Bank 2015)[43]
Vaccination index	4465	70.35	27.32	0.00	99.00	Index of vaccination, computed as the average vaccination (as percentage of the population) against measles, polio, and diphtheria (World Bank 2015)
Health expenditure	2637	10.51	4.44	0.10	34.41	Public health expenditure as a percentage of total government expenditure (World Bank 2015)
IMF variables						
IMF program	4612	0.40	0.49	0.00	1.00	IMF program being active in a given year (as all IMF variables below drawn from Kentikelenis, Stubbs, and King 2016)
Fiscal policy	4577	1.13	2.68	0.00	21.00	Number of (binding) conditions on fiscal policy; includes conditions on expenditure policy and administration, public debt, budget deficits
Public sector	4577	0.15	0.77	0.00	13.00	Number of (binding) conditions on the public sector; includes conditions on: wage and employment limits, pensions, social security institutions; excludes conditions beneficial to labor and social sector workers
Privatization	4577	0.08	0.48	0.00	8.00	Number of (binding) conditions on privatization of state-owned enterprises; includes conditions on all activities related to the privatization of non-financial SOEs, liquidation of SOEs (under the rationale that government is relinquishing ownership), and bankruptcy proceedings of SOEs
Price liberalization	4577	0.21	1.00	0.00	28.00	Number of (binding) conditions on price liberalization; includes restructuring of public enterprises, pricing policies and subsidies; regulatory reforms in utilities, price controls, and marketing restrictions; audits of SOEs; clearance of arrears to the public sector, other SOEs, or elsewhere
Control variables						
GDP per capita	4221	7.15	1.05	4.24	9.66	GDP per capita in constant 2005 USD (World Bank 2015)
ODA per capita	4935	3.13	1.82	-4.88	9.39	ODA per capita in constant 2011 USD (World Bank 2015)
Dependency ratio	4636	42.58	6.33	25.65	54.29	Dependency ratio, computed as the combined share of the population under age of 14 and above age of 65 in the total population (World Bank 2015)
Urbanization	4810	43.15	19.93	4.34	91.60	Urban population as a percentage of total population (World Bank 2015)
Civil war	4925	0.06	0.24	0.00	1.00	Incidence of civil war according to UCDP/PRIO definition (Teorell et al. 2016)[44]

Past programs	4935	2.08	2.36	0.00	6.00	Number of past programs over the past six years
UNGA vote alignment	4317	0.61	0.09	0.00	1.00	Vote alignment of a country with the G7 in the UN General Assembly (Bailey, Strezhnev, and Voeten 2015)[45]
GDP growth	4230	3.61	6.88	-64.05	106.28	GDP growth in percent (World Bank 2015)
Reserves	3288	4.05	4.18	0.01	79.24	Reserves in months of imports (World Bank 2015)
Freedom House index	4310	5.59	3.63	0.00	12.00	Combined civil liberties and political rights from Freedom House and inverted in scale (higher values are better) (Teorell et al. 2016)
Executive elections	3814	0.11	0.32	0.00	1.00	Incidence of executive elections—Database of Political Institutions (Teorell et al. 2016)

Table 2: Bivariate analysis: The difference (Δ) of health outcomes between countries treated with specified IMF policy conditions and untreated countries.

	Child mortality Δ	Vaccination Δ	Health expenditure Δ
With Fiscal policy	-9.919	6.524	-0.117
	[-31.281; 11.443]	[-1.516; 14.564]	[-1.534; 1.300]
With Public sector	17.284	8.504*	0.142
	[-5.722; 40.29]	[-0.038; 17.038]	[-1.469; 1.753]
With Privatization	34.487***	2.174	-0.916
	[13.427; 55.547]	[-6.093; 10.441]	[-2.386; 0.554]
With Price liberalization	43.554***	0.235	-2.134*
	[19.322; 67.778]	[-9.279; 9.749]	[-3.887; -0.381]

Notes: Cell entries give the group mean difference in the outcome (with 95% CIs) shown in the column header for countries with at least one condition shown in the row header compared to countries without such conditions over the sample period. Because all programs have fiscal policy conditions, we compare countries with above-median number of conditions to countries with below-median number of conditions here.

Significance levels: * p<.1 ** p<.05 *** p<.01

Table 3: IMF conditionality and health outcomes accounting for non-random selection into IMF programs.

	Child mortality				Vaccination index				Health expenditure			
	t	t-1	t-2	t-3	t	t-1	t-2	t-3	t	t-1	t-2	t-3
Fiscal policy	0.037	-0.119	-0.156	-0.218	0.137	0.129	0.130	0.133	0.032	0.001	0.005	0.027
	(0.191)	(0.201)	(0.208)	(0.233)	(0.106)	(0.109)	(0.105)	(0.104)	(0.024)	(0.024)	(0.026)	(0.024)
IMF program	0.831	1.141	0.825	0.876	-2.026	-1.493	-1.225	-1.526	0.507	0.913**	0.938**	0.540
	(2.809)	(2.686)	(2.691)	(2.856)	(2.039)	(2.153)	(2.048)	(1.923)	(0.419)	(0.392)	(0.404)	(0.431)
Public sector	0.733	0.736	0.751	0.790	-0.949**	-0.844**	-0.557*	-0.309	0.044	0.051	0.082	0.178**
	(0.53)	(0.517)	(0.523)	(0.535)	(0.431)	(0.385)	(0.338)	(0.339)	(0.077)	(0.075)	(0.064)	(0.064)
IMF program	0.674	0.583	0.164	0.035	-1.373	-0.902	-0.714	-1.086	0.596	0.888**	0.91**	0.532
	(2.815)	(2.686)	(2.694)	(2.86)	(1.982)	(2.077)	(1.969)	(1.853)	(0.426)	(0.396)	(0.398)	(0.411)
Privatization	1.200*	1.114*	0.991*	0.915*	-0.100	-0.226	-0.082	0.001	0.005	-0.102	-0.021	0.053
	(0.66)	(0.621)	(0.572)	(0.529)	(0.485)	(0.496)	(0.468)	(0.467)	(0.084)	(0.074)	(0.06)	(0.06)
IMF program	0.660	0.603	0.219	0.127	-1.653	-1.132	-0.891	-1.202	0.617	0.94**	0.959**	0.614
	(2.823)	(2.69)	(2.695)	(2.863)	(1.987)	(2.078)	(1.975)	(1.857)	(0.425)	(0.395)	(0.399)	(0.421)
Price liberalization	0.471	0.356	0.309	0.323	0.171	0.178	0.344	0.333	0.022	0.011	0.021	0.036
	(0.297)	(0.27)	(0.28)	(0.338)	(0.266)	(0.31)	(0.333)	(0.321)	(0.046)	(0.043)	(0.033)	(0.029)
IMF program	0.737	0.707	0.317	0.206	-1.740	-1.248	-1.036	-1.332	0.607	0.91**	0.941**	0.607
	(2.816)	(2.684)	(2.693)	(2.87)	(1.985)	(2.081)	(1.985)	(1.867)	(0.423)	(0.395)	(0.4)	(0.422)
Country-fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year-fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Compound instruments	no	no	no	no	no	no	no	no	no	no	no	no
Selection correction	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3987	3868	3746	3623	3954	3835	3711	3587	2471	2468	2461	2451
Within-R2	0.64	0.63	0.62	0.62	0.68	0.64	0.60	0.56	0.07	0.07	0.06	0.06

Notes: Two-way fixed effects and control variables included but not shown. All explanatory predictors lagged by one period. Outcome variables shown in the column headers. System-of-equation maximum-likelihood estimation with an additional selection equation for IMF programs. Cross-equation correlated errors clustered by country. Significance levels: * p<.1 ** p<.05 *** p<.01.

Table 4: Heterogeneous effects and sub-group analysis

	Democracy		Sub-Sahara Africa		Low-income country		Low-capacity country	
	no	yes	no	yes	no	yes	no	yes
Public sector	-0.806	-0.744**	-0.506	-0.753	-0.358	-1.342**	-0.536	-1.047
	(0.633)	(0.334)	(0.543)	(0.519)	(0.509)	(0.607)	(0.395)	(0.653)
IMF program	-0.857	-1.990	-6.146*	0.288	-4.55*	0.143	-4.424	2.804
	(3.176)	(2.815)	(3.38)	(2.995)	(2.653)	(2.725)	(2.894)	(3.207)
Observations	2385	1233	2266	1352	2718	900	3022	596
Within-R2	0.55	0.61	0.59	0.61	0.56	0.65	0.57	0.62

Notes: Two-way fixed effects and control variables included but not shown. All explanatory predictors lagged by one period. Samples are split by the variable shown in the column header. For each split-sample, a system-of-equation maximum-likelihood estimation is conducted with an additional selection equation for IMF programs. Cross-equation correlated errors clustered by country. Significance levels: * p<.1 ** p<.05 *** p<.01.

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