International financial organisations and global child mortality rates

Elias Nosrati*

We assess the causal effect of economic policy reforms mandated by the International Monetary Fund (IMF) on child mortality rates across 176 countries between 1990 and 2017 using instrumental variables. IMF programmes cause 90 excess under-5 deaths per 1,000 live births (95% CI: 50–130). This aggregate effect is driven by large-scale privatisation reforms, which cause up to 132 excess child deaths per 1,000 live births (95% CI: 72–191).

Main

The International Monetary Fund (IMF) is an influential financial organisation that seeks to foster global macroeconomic stability and growth. It influences the institutional determinants of population health through its conditional lending schemes, known as 'structural adjustment programmes'.[1] Countries across the world that are experiencing economic turmoil may turn to the IMF to secure financial support. However, fresh credit is typically issued on the condition that national governments agree to a wide variety of domestic policy reforms. The goal of these reforms is to ensure macroeconomic stability through reduced public spending, the privatisation of state-owned enterprises, and other related policy interventions. Consequently, structural adjustment programmes can exert profound effects on national health systems, state capacities, and attendant health outcomes.[2] Previous research has identified negative associations between IMF programmes and health,[3] but to the author's knowledge, the causal impact of such programmes on child mortality rates has not been assessed.

To fill this gap in the extant literature, a novel data set is used covering 176 countries between 1990 and 2017. The outcome variable is the under-5 mortality rate from all causes per 1,000 population. Two treatment variables are used to assess the effects of structural adjustment policies. First, a dichotomous indicator of whether a country is under an IMF programme is employed to estimate an overall average treatment effect of IMF intervention. Second, to probe specific policy interventions, we assess the role of IMF-mandated privatisations of state-owned enterprises, as motivated by earlier scholarship linking rapid privatisation reforms to poor health.[4,5]

To distinguish causal from merely correlational relationships, we adopt a compound instrument derived from the interaction between the country-specific average exposure to structural adjustment programmes over the sample period and the Fund's annual budget constraint. Liquidity concerns lead the IMF to impose harsher loan conditions but are unrelated to any individual country's child mortality profile, thus providing a source of exogenous variation.[6,7] To allow for delayed effects, we lag the treatment variable(s) by one year. Any time-invariant confounders are accounted for by isolating changes in child

*Merton College, University of Oxford. Contact: elias.nosrati@merton.ox.ac.uk.

mortality rates within countries over the sample time period, whilst aggregate time trends, such as secular improvements in life expectancy, that affect all countries simultaneously are controlled for through the use of year dummies. Further methodological details are provided in the online METHODS section.

FIGURE 1 visualises the output of a two-way fixed effects instrumental variable regression model. The model tracks within-country changes in child mortality rates across units with and without IMF programmes. Estimation uncertainty is accounted for by simulating from the model sampling distribution. First differences in the outcome variable between the treatment and control groups are then visualised. FIGURE 1 shows that, on average, IMF programmes cause 90 excess under-5 deaths per 1,000 live births (95% CI: 50–130). In percentage terms, this amounts to a 51% increase in such deaths.

FIGURE 2 visualises a similar model, except that the instrumented treatment variable is now centred on IMF-mandated privatisation reforms. The model suggests that the aggregate effect of IMF programmes identified above is most likely driven by the Fund's privatisation policies, which lead to 132 excess child deaths per 1,000 live births (95% CI: 72–191). This is equivalent to a 77% increase in under-5 mortality rates.

Two sensitivity analyses are conducted to assess the robustness of these findings to confounding bias. First, we control for two economic variables that are potentially associated with child mortality rates and with participation in IMF programmes, namely per capita GDP and a financial crisis indicator. We also control for the political determinants of health in the form of a democracy index and a coup d'état indicator (a measure of political instability). Finally, we also control for average number of years of formal education in the female population, an important predictor of child mortality. The substantive findings presented in FIGURES 1 AND 2 are fully robust to each of these control variables.

Second, we quantify the net effect size that an unmeasured confounder would need to have in order to fully eliminate the estimated causal effect of IMF programmes on the outcome variable, above and beyond the aforementioned variables.[8,9] We find that in the case of the first model, the unmeasured confounder would have to increase child mortality rates by around 5 standard deviations — equivalent to 385 excess deaths per 1,000 live births — in order to nullify the estimated treatment effect. In the case of the second model, the corresponding number would be 9 standard deviations, or nearly 700 excess deaths per 1,000 live births.

In conclusion, these findings provide remarkably robust empirical evidence of a substantively large deleterious impact of structural adjustment programmes on under-5 mortality rates across the world. The implications for future policy-making are substantial. IMF-mandated privatisation reforms are especially harmful and must be revised in order to prevent avoidable child deaths. The role of international financial organisations in shaping global health outcomes must be taken seriously by clinicians, researchers, and policy-makers alike.

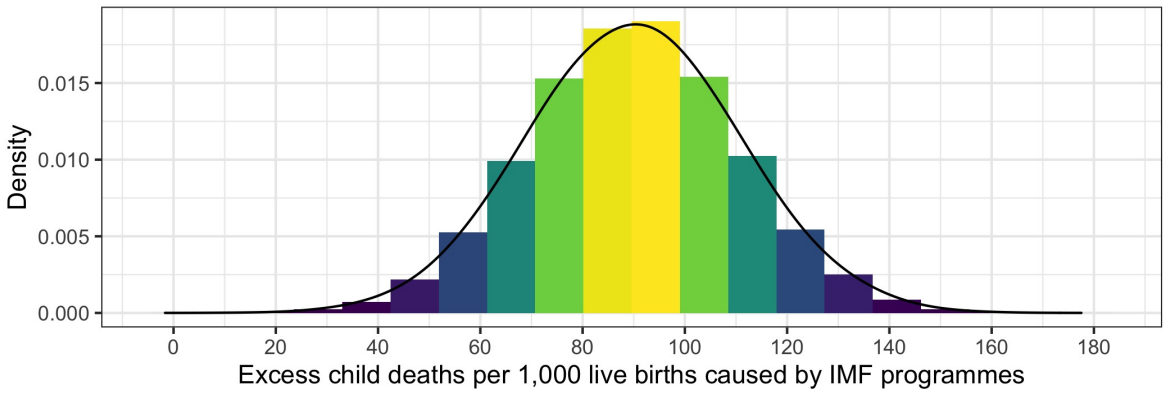

Figure 1: The figure visualises the estimated excess under-5 mortality burden per 1,000 live births caused by IMF programmes. The estimates are derived from two-way fixed effects instrumental variable regression models in which within-country changes in child mortality rates across units with and without IMF programmes are calculated. First differences in the outcome variable are then used to estimate excess death rates.

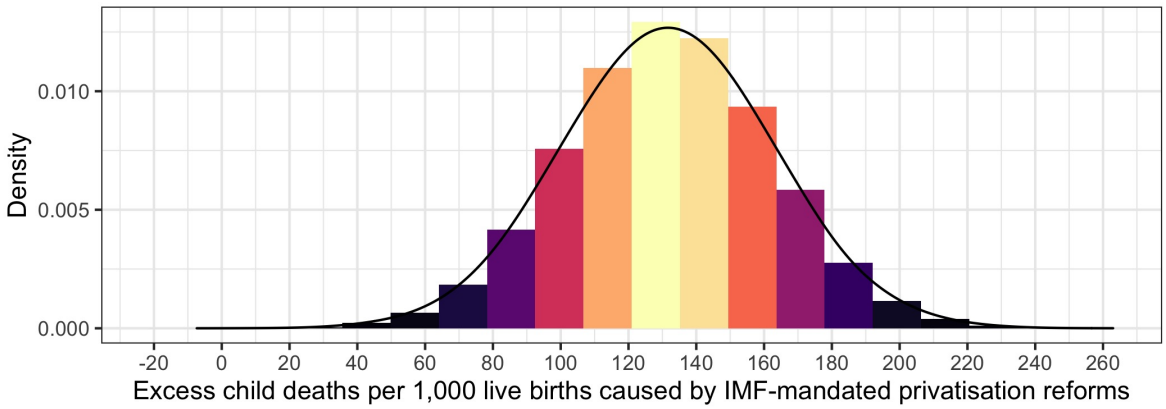

Figure 2: The figure visualises the estimated excess under-5 mortality burden per 1,000 live births caused by IMF-mandated privatisation reforms. The estimates are derived from two-way fixed effects instrumental variable regression models in which within-country changes in child mortality rates across units with and without privatisation reforms are calculated. First differences in the outcome variable are then used to estimate excess death rates.

Methods

We posit the following data-generating process:

$$Y_{it} = T_{i[t-1]}\beta + X_{it}\theta + \mu_i + \varphi_t + \varepsilon_{it}, \tag{1}$$

where Y_{it} denotes one of the two alternative outcome variables as measured in country i at time t; $T_{i[t-1]}$ is a dichotomous indicator of IMF programme participation, lagged by one year to allow for delayed effects to manifest; X is a vector of control variables; μ captures time-invariant country-specific effects; φ measures time-fixed effects; and ε is a stochastic error term. Descriptive statistics of all variables used in the model specifications are presented in Table A1. Our principal quantity of interest is β, which is a causal effect parameter to be estimated. However, to tease causation and correlation apart, we construct an instrumental variable, Z, that is suited to isolating exogenous variation in T. To do this, we follow recent methodological advances in the study of structural adjustment[5,6] by adopting a compound instrument derived from the interaction between the country-specific average exposure to IMF programmes over the sample period and the Fund's annual budget constraint. This instrument is (a) relevant insofar as the IMF is likely to impose more stringent loan conditions when facing liquidity concerns,[5] and (b) exogenous insofar as the Fund's aggregate annual budget constraints are independent of any given client country, such that unit-specific shocks that deviate from a country's long-run average exposure to structural adjustment result from a treatment assignment mechanism that is random with respect to any given country's counterfactual outcomes. In other words, child mortality rates in countries with varying propensities to participate in IMF programmes will not be affected by changes in the Fund's budgetary constraint other than through the impact of structural adjustment. We thus obtain a two-stage regression model with the following selection equation:

$$T_{it} = Z_{it}\tau + X_{it}\eta + \alpha_i + \kappa_t + \upsilon_{it}. \tag{2}$$

We then re-specify the model in equation (1) as follows, with $\widehat{T}$ being a vector of fitted values from equation (2):

$$Y_{it} = \widehat{T}_{i[t-1]}\beta + X_{it}\theta + \mu_i + \varphi_t + \varepsilon_{it}. \tag{3}$$

To empirically assess the strength of the chosen instrument, we compare the model in equation (2) to a restricted first-stage regression in which the effect τ of Z on T is set to be null, obtaining a χ^2 test statistic of 55 on 1 degree of freedom ($p < 0.001$). Our alternative instrument targeting privatisation reforms also passes the required significance threshold, with a χ^2 test statistic of 63 on 1 degree of freedom ($p < 0.001$). Hence, in both cases, Z comfortably satisfies the benchmark for identifying strong instruments. We control for the endogenous relation between T and Y potentially induced by any time-invariant propensity of countries with a prior health disadvantage to select into IMF programmes by adjusting for country-fixed effects, whereas year-fixed effects help account for broader aggregate changes that affect all countries simultaneously. All variance estimators are consistent with serial autocorrelation, heteroskedasticity, and country-level clustering effects. All analyses are conducted in R, version 4.0.2.

Table A1: Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
Under-5 mortality rate	5,068	50.9	54.3	2.1	327
IMF programme	4,874	0.3	0.5	0.0	1.0
IMF-mandated privatisation reform	4,827	0.04	0.2	0.0	1.0
GDP per capita	4,610	11,589	17,245	164	111,968
Democracy index	4,786	3.5	6.5	−10	10
Coup d'état	4,286	0.02	0.1	0.0	1.0
Financial crisis	4,928	0.1	0.3	0.0	1.0
Mean years of formal female education	5,068	8.8	4.0	0.5	15.5

Notes: The under-5 mortality rate is per 1,000 live births. The second column lists the number of observed country-years. The two IMF variables are binary variables indicated the presence or absence of IMF programmes or IMF-mandated privatisation reforms. The democracy index ranges from −10 to 10. Sources: World Bank World Development Indicators, IMF monitor, The Polity Project, Coups in The World database, and Systemic Banking Crises database.

References

1. Babb, S.L. & Carruthers, B.G. Conditionality: forms, function, and history. *Ann. Rev. Law Soc. Sci.* **4**, 13–29 (2008).

2. Kentikelenis, A.E. Structural adjustment and health: a conceptual framework and evidence on pathways. *Soc. Sci. Med.* **187**, 296–305 (2017).

3. Forster, T., Kentikelenis, A.E., Stubbs, T.H. & King, L.P. Globalization and health equity: The impact of structural adjustment programs on developing countries. *Soc. Sci. Med.* **267**, 112496 (2020).

4. Azarova A. et al. The effect of rapid privatisation on mortality in mono-industrial towns in post-Soviet Russia: a retrospective cohort study. *Lancet Public Health.* **2**, e231–e238 (2017).

5. Stuckler, D., King, L., McKee, M. Mass privatisation and the post-communist mortality crisis: a cross-national analysis. *Lancet.* **373**, 399–407 (2009).

6. Lang, V. The Democratic Deficit and Its Consequences: The Causal Effect of IMF Programs on Income Inequality. *Rev. Int. Organ.* Online first (2020).

7. Stubbs, T.H., Reinsberg, B., Kentikelenis, A.E. & King L.P. How to evaluate the effects of IMF conditionality: An extension of quantitative approaches and an empirical application to public education spending. *Rev. Int. Organ.* **15**, 29–73 (2018).

8. Vanderweele, T.J., Arah, O.A. Bias formulas for sensitivity analysis of unmeasured confounding for general outcomes, treatments, and confounders. *Epidemiol.* **22**, 42–52 (2011).

9. VanderWeele, T.J. & Ding, P. Sensitivity analysis in observational research: introducing the E-value. *Ann. Intern. Med.* **167**, 268–274 (2017).