

Short-Term Pain, Long-Term Gain? The Effects of IMF Economic Reform Programs on Public Health Performance*

Matthew Hoddie, *Towson University*

Caroline A. Hartzell, *Gettysburg College*

Objectives. In this study, we evaluate the effects of the International Monetary Fund's structural adjustment programs (SAPs) on the public health performance of countries. We test the claim made by proponents of SAPs that although these programs may produce short-term hardship for the countries adopting them, they will generate positive developmental effects in the long term. *Methods.* Our study draws on a global data set and employs a model that takes into account the potential for selection bias in the adoption of SAPs by states. *Results.* The central finding of the article is that SAPs in the short term raise the exposure of populations to conditions that increase incidences of disability and death. Contrary to the assertions made by the advocates of SAPs, we also find evidence that these programs have attenuated but still harmful effect on public health performance in the long term. *Conclusions.* This study highlights the negative influences of SAPs on public health and suggests that a need exists to reevaluate the claims that have been made regarding the developmental effects of these programs.

Since the 1980s, governments experiencing economic crisis have increasingly turned to the International Monetary Fund (IMF) for assistance.¹ Countries seeking resources from this international financial institution (IFI) are obliged to agree to a number of conditions in return for access to funds. These requirements are intended to promote economic growth by enhancing efficiency. Although the IMF acknowledges that the process of liberalizing economies might cause short-term pain, countries are asked to endure these costs in return for long-term gains in the form of higher rates of economic growth and sustainable development.

In this study we examine whether the temporal effects of the structural adjustment programs (SAPs) adopted by troubled economies have unfolded in the manner characterized by the IMF. Have the negative short-term effects that analysts generally agree are generated by neoliberal economic reform

*Direct correspondence to Matthew Hoddie, Department of Political Science, Towson University, 8000 York Road, Towson, MD 21252 (mhoddie@towson.edu). The authors thank Jason Matthew Smith for his contributions to an early version of this study.

¹One hundred seventy-two IMF loan programs were approved for the period between 1970 and 1979, while the 1980s witnessed 271 such programs approved with an additional 282 loan programs agreed to during the next decade (Barro and Lee, 2005:1249).

programs manifested themselves? Have these been followed by the types of positive, efficiency-induced outcomes that the proponents of SAPs claim the restructuring of economies should produce? We investigate this question empirically by focusing on public health performance. Our central finding is that in the short term, SAPs raise the exposure of populations to conditions that increase incidences of disease and death. Contrary to the claims made by the advocates of SAPs, we also find evidence that these programs have attenuated but still apparent negative long-term effects on the public health performance of the states that adopt them.

IMF Economic Reform Programs

The SAPs promoted by the IMF for countries confronting an economic crisis are characterized by three sets of objectives. *Reduction of aggregate demand* is called for in those instances in which governments face a budget deficit. Cutbacks in imported goods, decreases in government expenditures, devaluation of an overvalued currency, and a reduction in the money supply may all be implemented with the goal of reducing domestic consumption and accumulating foreign exchange that can be used to purchase the goods and services needed to promote economic growth. An *expansion of production*, particularly of foreign-exchange-earning exports, can be achieved via trade liberalization and the use of controls on wage increases in order to encourage the exploitation of low-cost labor. *Changes in government institutions and economic policies* may involve the sale of state-owned enterprises, the elimination of subsidies, and the imposition of higher taxes (Cardoso and Helwege, 1995; Peabody, 1996; Breman and Shelton, 2007).

The policies that countries are called upon to implement as part of a structural adjustment package can have both direct and indirect effects on public health outcomes. The first category consists of those measures that have a direct impact on the health-care system. Policies that cut government expenditures on health result in fewer subsidized public health facilities, many of which may have fewer staff and lower quality services. Individuals may respond either by purchasing healthcare from the private sector or continue to access care from strained public facilities (Peabody, 1996). User fees, introduced as a means of recouping cutbacks in health expenditures, can raise revenues for the health sector but may also make it impossible for the poor to access healthcare (Breman and Shelton, 2007). Vaccines, drugs, and health-related technologies, many of which are imported from abroad, likely will rise in cost as a result of currency devaluation (Hsiao and Heller, 2007).

SAPs can also directly affect health performance via their impact on other inputs to health status. Significant among these are nutrition, education, water, energy, and transportation. Cuts in food subsidies result in higher food prices in the short term, which can affect the nutritional status of vulnerable members of the population (i.e., women and children). Education, particularly

of females, is related to positive health outcomes, especially of children (World Bank, 1993). Decreased government expenditures on education can thus have a negative effect on health outcomes. Reduced spending on infrastructure related to transportation may make it more difficult for the public to access health services. The increased privatization of services associated with SAPs may limit access to clean water and other resources associated with improved health performance (Bond and Dor, 2003).

Economic reform policies may also impact health outcomes indirectly. Macroeconomic changes that reduce household income, for example, may lead to a rise in prostitution and the accelerated transmission of HIV, and increased crowding in urban areas creates conditions propitious for the spread of infectious diseases (Murray and King, 2008). Declining household income may also mean that more family members, including children, are required to work; if this compromises children's access to education, health outcomes will be negatively affected (Peabody, 1996). Lower wages, which result in shrinking tax revenues, can also compromise public health performance by making it more difficult for governments to engage in the type of forward-looking budget planning that is often necessary for the health sector (Center for Global Development, 2007).

Although those who advocate the use of SAPs acknowledge that the health sector may suffer some adverse effects as a result of implementing these programs, they emphasize that the efficiency and growth effects that the programs are intended to secure ought to have an overall positive impact on public health performance. Shrinking the role of government in the economy should remove distortions in the allocation of resources and result in increased incentives to ensure the effective delivery of health services (Center for Global Development, 2007). Deregulation of the public health sector may serve to stimulate growth in the private health sector (Peabody, 1996). Institutional reforms emphasized by SAPs can help countries contend with problems of poor administration, corruption, and interest group politics that divert the use of funds from socially and economically desirable objectives such as healthcare (Alesina, 1997; Hajro and Joyce, 2009). The growth in employment in those sectors of the economy that expand should provide households with more resources that can be allocated to healthcare as well as increasing government tax revenues.

The Temporal Effects of SAPs on Public Health Outcomes

Previous studies of the effects that SAPs have on public health have reached very different conclusions, with some attributing negative outcomes to the programs, others positive results, and yet others mixed effects.² We believe

²Breman and Shelton (2007) provide a review of literature relevant to the relationship between structural adjustment and health. A study of postcommunist states by Stuckler, King,

that one of the factors that explains the conflicting findings produced by these studies is a failure to account for the temporal nature of the effects that SAPs have on public health. If the effects of economic reform programs vary across time, this may partially explain the differences in public health performance that studies have attributed to SAPs.

Accordingly, we explore whether health outcomes vary in relation to the amount of time that has transpired since countries chose to sign on to, or abstain from, the IMF's economic reform programs. Focusing on the number of disability-adjusted life years (DALYs) that countries experienced in 1999, we seek to determine whether countries that adopted an SAP either a significant amount of time (i.e., 1985–1989) or shortly (i.e., 1995–1998) before 1999 experience health outcomes different from those of countries that did not sign on to SAPs during each of those time periods.³ More specifically, we seek to test the claim that while SAPs are likely to produce short-term pain, countries that adopt these programs will experience long-term gain. We thus ask whether countries that signed on to an economic reform program during the years 1995–1998 experienced health outcomes that were more negative relative to countries that did not agree to these programs at this time. Our expectation is that states that undertook structural reforms during this period would be in the recession-inducing phase of an SAP and that this would be reflected in a higher loss of DALYs for them in 1999 than for countries that did not sign SAPs during this period. A significant finding of heightened DALY scores would provide support for the claim that SAPs induce pain in the short term. Conversely, we also ask whether countries that adopted SAPs some 10 to 14 years (i.e., 1985–1989) before we measure health outcomes using the DALY score for 1999 demonstrate measurably better health performance than countries that did not sign agreements with the IMF at that time. Significant results in this instance indicating a reduction in DALY scores would lend support to the argument that countries that undertook early structural reforms have, by 1999, produced more efficient economies that yield positive public health outcomes that are not attained by those countries that failed to adopt SAPs during this period.⁴

There are good reasons to expect that SAPs will have temporal effects on health performance. The demand-reducing objectives of these programs generally make themselves felt early on in the reform process. The contractionary effects of cutbacks in government expenditures, a reduction in imports, and other demand-reducing policies translate fairly quickly into a decrease in

and Basu (2008), which garnered a great deal of attention, links participation in an IMF SAP with higher rates of tuberculosis.

³In the absence of any strong theoretical claims regarding the developmental effects that SAPs are expected to have over the medium term, we do not formulate a hypothesis regarding the effects of SAPs on health performance for the period between 1990 and 1994.

⁴In a 1993 World Development Report focusing on health, the World Bank maintained that countries that participated in SAPs would see more long-term benefits in terms of economic growth, public health performance, and welfare than countries that did not engage in adjustment. See World Bank (1993).

income manifested in a lower, or even negative, GDP growth rate (Peabody, 1996). These policies can be expected to generate negative health outcomes, particularly for the more vulnerable elements of the population most directly impacted by higher food prices, reduced access to free or subsidized healthcare, and job losses. One can thus expect that health performance will be compromised in the short term because SAPs raise the exposure of the population to conditions that increase the risk of disease and death.

The efficiency-related effects of SAPs, on the other hand, can be anticipated to take longer to manifest themselves. Producers of goods and services, including public health, are likely to take some time to react to market-generated incentives, including policies designed to remove distortions in the allocation of resources (Peabody, 1996). Although a strengthening of the real minimum wage, a consequence of a drop in the inflation rate, may give workers an enhanced ability to purchase healthcare, this effect often takes a while to manifest itself (Hajro and Joyce, 2009). The reform of political institutions in such a manner as to decrease health risk factors for populations by influencing their access to services offered by the public health-care system is also likely to be a lengthy process (Ghobarah, Huth, and Russett, 2003). Any positive health outcomes produced by SAPs are thus not likely to become apparent for a period of some years following the signing of an economic reform agreement.⁵

Method and Model Specification

Beyond taking into account temporal effects, this study must also address the potential problem of selection bias. This type of bias occurs when analysts fail to take into account characteristics of countries that may influence both government decisions regarding whether or not to adopt an IMF program and public health performance. In order to assess the effects IMF SAPs have on public health outcomes, we must first understand selection or why governments enter into agreements with the IMF. If the governments of countries do not sign on to IMF SAPs randomly, responding instead to factors that influence that decision, then a process of self-selection is taking place. These factors may either be observable—for example, levels of foreign reserves—or unobserved—for example, the degree of legitimacy the government enjoys among its citizens.⁶ Observed public health outcomes are likely to be due partly to the effects of IMF SAPs and partly to the attributes of the countries that enter into these programs (Vreeland, 2003). Countries that turn to the IMF do so because they have economic problems—for example, low levels

⁵We follow Noorbakhsh and Noorbakhsh (2006) in using five-year periods to analyze the effects of SAPs (four years in the case of the 1995–1998 period).

⁶Governments perceived as illegitimate by significant segments of the population may be more likely to sign on to IMF agreements, reasoning that the programs will have little additional impact on their legitimacy and/or that any negative effects they generate will be felt principally by groups that already question the government's right to rule.

of economic growth, high levels of debt—that are likely to have a negative effect on public health outcomes. Our challenge is to determine what part of the public health outcomes we observe should be attributed to the conditions under which countries find themselves and what part to the effects of the measures the IMF calls for under those conditions.

We employ a treatment effects model in order to address the issue of selection bias (Maddala, 1983). The use of this method allows us to explore the average causal effect of a binary treatment (adoption of an IMF SAP) on an outcome of policy interest (public health performance) given that the treatment assignment is not random but rather is determined by an endogenous decision process carried out by countries' governments. The model utilizes a two-stage structure. The first stage (Equation (1a)) explains the decision by a government to sign an IMF agreement, while the second stage (Equation (1b)) explains the public health outcome.

$$z_i^* = w_i\gamma + v_i \quad (1a)$$

$$z_i = 1 \text{ if } z_i^* > 0 \text{ (IMF agreement was signed),}$$

$$0 \text{ otherwise (IMF agreement was not signed).}$$

$$y_i = x_i\beta + z_i + \varepsilon_i \quad (1b)$$

The observed DALY score of country i —denoted by y_i —is explained by the exogenous covariates x_i and the dichotomous endogenous variable z_i (signing on to an IMF agreement). The dichotomous variable for IMF agreement (z_i) is modeled as an indicator function, dependent on a set of exogenous covariates w_i , which drive the choice process. The error terms (ε_i , v_i) of the outcome and choice equations, respectively, account for unobservable characteristics, which are allowed to be correlated and are modeled as a bivariate normal random variable with distribution $N_2(0, 0, \sigma^2, 1, \rho)$; the variance of v_i is normalized to 1 for identification purposes. If the factors that influence IMF program participation are not randomly distributed across the population of countries, then the error terms associated with our efforts to account for the selection by countries into IMF programs and public health performance will be correlated. A significant correlation suggests that the same unaccounted-for factors that influence selection into IMF programs also have consequences for public health. If the correlation between both error terms is equal to zero, then selection is not a problem and the outcome and choice equations can be estimated independently (i.e., Equation (1b) can be estimated by OLS).

We estimate the model using full maximum likelihood. To enhance our confidence that this procedure produces a consistent estimate of δ , we impose an exclusion restriction in the form of an exogenous variable in the first

stage of the model that is excluded from the second-stage outcome regression. This exogenous variable reflects the durability of a government's regime; we label this variable *regime durability* within the tables, operationalizing it as the number of years since the last significant regime change within a country. A significant regime transition is defined as a three-point change in Polity score within a three-year timeframe (Marshall and Jaggers, 2008).

We include the *regime durability* variable as the exogenous variable based on the expectation that it will have a meaningful influence on the odds that a country will sign an IMF SAP. Countries that have experienced regime change have relatively new governing institutions and are likely to lack the expertise and confidence required to navigate financial crises independently. As a result, states with relatively new regimes should prove more willing to accept the guidance and assistance from the IMF in the form of an SAP.⁷

Below we describe the explanatory variables we use to predict the two outcomes of participation in an IMF agreement and public health performance. The unit of analysis for this study is an individual country. We exclude from the analysis high-income countries with membership in the Organization of Economic Cooperation and Development (OECD), based on the expectation that these wealthy states were not at risk of requiring the assistance of the IMF in the form of an SAP during the periods of time under analysis.⁸ All of our quantitative tests include more than 100 states within the global system for which we were able to collect data for the relevant variables.⁹

⁷Exclusion variables should prove an effective predictor of the outcome of concern in the first stage of the statistical analysis (in this case the adoption of an SAP) but lack explanatory power in terms of the second stage (public health performance). We cannot identify a compelling theoretical argument as to why a measure of *regime durability* would have an influence on public health performance. This expectation is supported by tests of our treatment effects models in which we included the *regime durability* variable in the stage of the analysis predicting public health performance. Among these 10 tests, we found that the *regime durability* variable was only a statistically significant predictor of public health outcomes in two instances in which the two-stage model was a statistically appropriate test. We also tested alternative versions of the model employing a different exclusion variable. Dreher, Sturm, and Vreeland (2006) suggest that an effective predictor of a state signing an IMF SAP is service by a country as one of the nonpermanent members on the U.N. Security Council. Our analyses did not indicate that this variable proves a consistent predictor of a country signing onto an SAP. We also carried out tests when employing the percentage of a country's trade with the United States as a potential exclusion variable. While the trade share variable did serve as a statistically significant predictor of signing an SAP, it was ultimately rejected as an exclusion variable as it also proved to exercise an influence on the public health performance of countries.

⁸We thank an anonymous reviewer for suggesting the exclusion of high-income OECD states from our study. The countries that we eliminate from the quantitative tests are the following: Australia, Austria, Belgium, Britain, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the United States.

⁹The number of cases under analysis in every instance exceeds 200. This is a function of the fact that each country is counted twice: once for each gender (male or female) associated with an age group.

Predicting Participation in an IMF Agreement

Agreement by a country to enter into an IMF SAP during each of the time periods we focus on serves as the binary treatment variable predicted in the first stage of the analysis. The measure we employ for this variable is Vreeland's annual data for states that signed an SAP with the IMF (2003). Appearing in the analysis as *signed IMF SAP*, this variable is coded with a 1 for the respective period we focus on if a government signed IMF Letters of Intent at any time within that time period and a 0 otherwise.

To predict a state's participation in an IMF agreement during each of our two time periods, we include four independent variables. Drawing on previous scholarship, we anticipate that states experiencing positive economic conditions, as indicated by high levels of *average GDP per capita*, should have lower odds of seeking IMF loans (Vreeland, 2003; Jensen, 2004). A second variable we include in this stage of the model reflects the average level of *democracy* within a state during the relevant time period, operationalized via Polity scores. We account for this factor as research has found that the more democratic a country is, the more likely it will be to seek the IMF's economic assistance (Abouharb and Cingranelli, 2007). A third variable serves as a measure of the *cumulative years under IMF SAP*, reflecting the total number of years that a state has been committed to an SAP since 1982. We incorporate this variable with the expectation that governments that have already signed on to an agreement should be more willing to do so again as they have already paid the "sovereignty cost" associated with allowing an international organization to shape economic policy (Vreeland, 2003). Lastly, as noted earlier, we include in this stage of the analysis the variable *regime durability* as an exclusion restriction in our model.

Predicting Public Health Performance in 1999

The second stage of the model seeks to predict a country's public health performance as reflected in the DALY indicator. As noted previously, the term DALY is an acronym for *disability-adjusted life years* and it reflects "the life years lost due to deaths from a particular condition contracted during the year plus the expected disability to be incurred by other people who suffered from the same condition in that same year" (Ghobarah, Huth, and Russett, 2003:190). The measure used in this study reflects DALY performance for the year 1999 with higher values reflecting a loss of healthy life years. We employ a version of the measure that is disaggregated into five population groups on the basis of age; these age groups are as follows: 0–4, 5–14, 15–44, 45–59, and 60 and older.

The DALY indicator identifies and measures a total of 23 different causes of death and disability. These include a range of infectious diseases, different forms of cancer, and events such as traffic accidents and homicide. In

recognition of space limitations, we include complete results for only rates of death and disability attributable to *all causes*. We focus on all causes as it serves as a ready means of summarizing the overall rate of disability and death within a given state. The agreement by a country to sign an IMF SAP is both the dependent variable in the first stage of our analysis and our central explanatory variable in the second stage. When the dependent variable for the first stage of the model is the signing of an IMF agreement during the period 1995–1998, for example, that variable then becomes the main explanatory variable in the second stage. In the instance in which the dependent variable for the first stage of the model is the signing of an IMF agreement during the years 1985–1989, that variable is used as the central explanatory variable in the second stage.¹⁰

We include 10 additional indicators in this stage of the analysis to account for factors likely to shape a country's public health performance. In large measure, these control variables replicate those indicators employed by Ghobarah, Huth, and Russett (2003, 2004) in their studies of post civil war health and represent the range of factors that are commonly understood to shape the well-being of a country's population. Based on their analysis, we anticipate that countries characterized by higher rates of *civil war deaths*, *urbanization*, *income inequality*, and *ethnic heterogeneity* will tend to have poorer public health performance. Similarly, those countries with a *tropical* climate or that experience a *contiguous civil war* (domestic war in a neighboring state) should also face greater challenges in maintaining the well-being of their citizens.

Beyond the characteristics and circumstances that face a country and that are largely beyond a government's control, we also incorporate a series of variables that reflect the politics and policy choices of each state. We include measures of government *health expenditures* and a country's level of *education attainment* based on the expectation that higher spending in these sectors should lead to improved public health. These two measures further serve as an indicator of the relative wealth of the countries under analysis as states with greater capacity to spend on health and promote education also prove to be among the countries with the highest gross domestic product per capita.¹¹ We also include a measure for the level of *democracy*, as reflected by Polity scores. In keeping with previous work on this topic, we expect that the more democratic a state is, the higher the level of public health services it will provide for its population (Lake and Baum, 2001).¹²

We include a final variable in the second stage of the model that does not appear in Ghobarah, Huth, and Russett's original analysis. Many of the

¹⁰The inclusion of the dichotomous variable for the signing of an IMF agreement in the public health performance equation makes this model recursive.

¹¹We do not include a measure of *average GDP per capita* in the second stage of the model because it is highly correlated with our measure of health-care spending for the two time periods under focus.

¹²Once an IMF agreement has been signed, however, democratic states tend to make steeper cuts in their public service budgets in comparison to nondemocratic countries (Nooruddin and Simmons, 2006).

countries that have signed SAPs with the IMF have entered into a number of agreements with that IFI. In such instances, one might expect the effect of SAPs to be cumulative and this is an issue that must be accounted for in our empirical tests. Our expectation is that countries that entered into an SAP for the first time during the years 1995–1998, for example, will experience short-term pain that manifests itself in the form of a higher number of DALYs. Countries that signed an SAP in 1995–1998 but also signed an agreement earlier, however, might well be expected to perform differently where public health outcomes in 1999 are concerned. We account for this possibility by including variables that reflect the *cumulative number of years under an IMF SAP* for each respective state. In the tests of the public health effects of SAPs signed between 1995 and 1998, we control for the cumulative number of years a state has been under an IMF agreement between 1982 and 1994. For the tests considering the effects that IMF agreements entered into during the 1985 to 1989 period have on DALYs in 1999, we include a variable reflecting the cumulative number of years a country signed a subsequent agreement with the IMF from 1990 to 1998.

Table 1 presents a summary of all variables included in both the first and second stages of our treatment effects models. It identifies variable labels, provides important details concerning how each indicator was operationalized, and identifies the original data source.

Findings for IMF SAPs Signed Between 1995 and 1998

For our initial investigation of the relationship between IMF agreements and public health outcomes, we consider the effects of IMF SAPs signed between the years 1995 and 1998 on public health performance as reflected in 1999 DALY scores attributable to all causes. As our analyses are divided into findings by age group, each of the complete tables we present below includes the results for five separate treatment effects regressions. Table 2 provides the results of these models.¹³

In four of the five tests the Wald likelihood ratio test indicates that $\rho \neq 0$, meaning that we can reject the null hypothesis that the error terms for the first- and second-stage equations are uncorrelated. This indicates that selection bias is a problem for the sample of countries we analyze and suggests that the use of treatment effects models is appropriate. Given that the Wald likelihood ratio test does not support the use of a treatment effects model for the analysis of the 60 and older age group, we exclude this test from our discussion of the results below.

The bottom half of Table 2 presents the first-stage results predicting when governments will choose to sign an IMF SAP. Two factors appear most

¹³In what follows we discuss the results for those variables that achieve statistical significance at the 0.05 level or better across at least three of the five age categories.

TABLE 1

Operationalization of Independent and Dependent Variables for First and Second Stages of Treatment Effects Models

Variable	Operationalization	Source
<i>First stage— government agrees to IMF SAP</i>		
Signed IMF SAP (dependent variable)	Dichotomous; “1” if Letter of Intent signed; “0” otherwise.	Vreeland (2003)
Average GDP per capita	GDP per capita. Average for the relevant time period. These values are transformed using the natural logarithm.	Fearon and Laitin (2003)
Average level of democracy	Democracy-autocracy measure; values range from 10 (highly democratic) to –10 (highly autocratic). Average for the relevant time period.	Marshall and Jagers (2008)
Cumulative years under IMF SAP	Cumulative number of years under IMF SAP for the relevant time period.	Vreeland (2003)
Regime durability	The number of years since a regime transition, as indicated by a three-point change in Polity score within a three-year period or less. Regime durability for the year 1985 is employed to predict signing an IMF SAP for the 1985–1989 period; regime durability for the year 1995 is employed to predict signing an IMF SAP for the 1995–1998 period.	Marshall and Jagers (2008)
<i>Second stage— public health performance</i>		
DALY— disability-adjusted life years (dependent variable)	This measure represents the number of healthy life years lost due to death and disability from a “particular condition contracted during the year and the expected disability to be incurred by other people who suffered from the same condition in that same year.” This value is “obtained by multiplying the average duration of the condition (to remission or death) by a severity weight for the disability.” These data are disaggregated into age (0–4, 5–14, 15–44, 45–59, and 60 and older) categories.	Ghobarah, Huth, and Russett (2003)
Signed IMF SAP	Dichotomous; “1” if Letter of Intent signed; “0” otherwise.	Vreeland (2003)

TABLE 1—Continued

Variable	Operationalization	Source
Civil war deaths, 1991–1997	Number of civil war deaths per 100 people in the country.	Ghobarah, Huth, and Russett (2003)
Urbanization	Drawn from data made available by the United Nations, the level of urbanization is measured as the average annual percentage change in the urban portion of the population between the years 1990 and 1995.	Ghobarah, Huth, and Russett (2003)
Income inequality	Gini index for income distribution ranging between “0” (complete equality) and “1” (complete inequality) recorded for the year 1997.	Ghobarah, Huth, and Russett (2003)
Ethnic heterogeneity	Vanhanen index for racial-linguistic-religious heterogeneity measuring the size (percentage) of the largest ethnic group for the year 1999. It uses three criteria, giving each equal weight by summing their percentages. This number is then subtracted from 300 (a completely homogenous state according to all three criteria). These values are transformed using the natural logarithm.	Ghobarah, Huth, and Russett (2003)
Tropical	Dichotomous; “1” if majority of a country’s population lives in a tropical climate; “0” otherwise.	Ghobarah, Huth, and Russett (2003)
Contiguous civil war	Dichotomous; “1” if civil war in a neighboring country between 1989 and 1998; “0” otherwise.	Ghobarah, Huth, and Russett (2003)
Health expenditures	These data for the year 1998 were collected by the World Health Organization (WHO) using indicators from the IMF, OECD, the United Nations (UN), and other national sources. Total health expenditures are then transformed using the natural logarithm.	Ghobarah, Huth, and Russett (2003)
Educational attainment	A country’s level of educational attainment for the year 1998 (measured in terms of average level of schooling among the adult population) is provided by the WHO. This measure is transformed using the natural logarithm.	Ghobarah, Huth, and Russett (2003)
Democracy	Democracy-autocracy measure; values range from 10 (highly democratic) to –10 (highly autocratic). Average values for the years 1997 and 1998.	Ghobarah, Huth, and Russett (2003)

TABLE 2

The Public Health Effects of Signed IMF Agreements, 1995–1998; All Causes of Death and Disability; and: Treatment Effects Model

Age Group	0–4	5–14	15–44	45–59	60+
<i>Public health equation</i>					
Signed IMF SAP 1995–1998	48.8** (8.4)	8.98** (1.27)	25.87** (6.28)	14.13** (3.56)	2.7 (4.28)
Civil war deaths 1991–1997	0.59* (0.26)	0.13*** (0.03)	0.4* (0.15)	0.25* (0.09)	0.15 (0.09)
Urbanization	5.37 (2.57)	1.47 (0.36)	13.27** (1.59)	6.38** (0.92)	3.53** (0.87)
Income inequality	67.6* (31.43)	20.1** (4.43)	102.24** (19.02)	42.22** (11.13)	20.29 (10.7)
Ethnic heterogeneity	3.55 (2.69)	0.73 (0.37)	2.28 (1.7)	1.9 (0.98)	1.57 (0.95)
Tropical	-2.23 (6.46)	-0.42 (0.91)	3.84 (3.97)	1.08 (2.31)	-3.2 (2.2)
Contiguous civil war	6.02 (5.07)	-0.44 (0.71)	7.24* (3.02)	2.85 (1.75)	1.18 (1.67)
Health expenditure	-17.04** (3.68)	-3.05*** (0.49)	-1.31 (2.14)	-2.19 (1.26)	-1.32 (1.2)
Educational attainment	-49.41** (7.2)	-4*** (1)	6.01 (4.29)	1.14 (2.51)	-2.65 (2.42)
Democracy	-0.09 (0.5)	-0.05 (0.08)	-0.26 (0.28)	0.02 (0.16)	-0.08 (0.14)
Cumulative years under IMF SAP 1982–1994	0.21 (1.57)	0.15 (0.23)	-0.5 (0.86)	-0.25 (0.51)	0.28 (0.48)
Constant	154.42** (29.82)	13.88** (4.28)	-60*** (18.67)	-2.9 (10.62)	31.07** (10.17)
<i>Signed IMF SAP equation 1995–1998</i>					
Avg. GDP per capita 1995–1998	-0.32** (0.1)	-0.43*** (0.1)	-0.35** (0.12)	-0.31** (0.11)	-0.2 (0.11)
Avg. level of democracy 1995–1998	0.005 (0.02)	0.02 (0.02)	0.01 (0.02)	0.004 (0.02)	0.001 (0.02)
Cumulative years under IMF SAP 1982–1994	0.06 (0.04)	0.05 (0.04)	0.1* (0.05)	0.09 (0.05)	0.1* (0.05)
Regime durability 1995	-0.02** (0.01)	-0.02** (0.01)	-0.02** (0.01)	-0.03** (0.01)	-0.03** (0.01)
Constant	0.46** (0.17)	0.46** (0.17)	0.5* (0.18)	0.54** (0.18)	0.43* (0.18)
N	226	226	226	226	226
Rho	-0.81 (0.06)	-0.89 (0.06)	-0.58 (0.13)	-0.61 (0.12)	-0.37 (0.21)
Log pseudo-likelihood	-1244.96	-797.43	-1128.58	-1005.01	-997.73
Likelihood ratio test indep. eqns. (rho = 0)	13.31	19.98	9.94	11.59	2.76
p > chi-square	0.0003	0.0000	0.0016	0.0007	0.0965

NOTE: Standard errors in parentheses.
* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

important in determining when a country's leadership will elect to sign an agreement with the IMF. First, countries with higher *average GDP per capita* have lower odds of signing on to an IMF SAP. The variable is negative and statistically significant for four age categories; this makes intuitive sense as countries with strong economic performance are less likely to be in need of loans from this IFI. Second, *regime durability*, the exogenous variable from the first stage of the model that is excluded from the second-stage outcome regression, is statistically significant for four age groups. The negatively signed coefficients indicate that countries with enduring regimes as measured in years tend to have lower odds of seeking out the assistance of the IMF.

The top portion of Table 2 presents the results of the second stage of each of the treatment effects regressions. This stage of the tests reflects the selection-corrected effects of IMF agreements signed between 1995 and 1998 on public health performance in 1999. With the exception of the analysis of the age group comprising individuals 60 and older, the tests identify a statistically significant and positive relationship between the central independent variable of *signed IMF SAP* between 1995 and 1998 and DALY scores. This indicates that the number of healthy years lost to death and disability increases in the wake of SAPs agreed to over the last three years.

We can gain further insight into the influence of IMF SAPs on public health by calculating marginal effects. The baseline predicted DALY value for the 0–4 age group with all covariates set to their mean values is 75.4. The predicted level drops to 48.17 in the absence of entering into an agreement with the IMF; it increases to 96.97 in the presence of a loan program with the IFI. The marginal effects for the *signed IMF SAP* indicator exhibit a similar pattern for the three other age groups for which we obtained statistically significant results.

Beyond the negative consequences of signing an IMF agreement, the analyses presented in Table 2 also identify additional factors as consistently diminishing a country's public health performance: *civil war deaths*, *urbanization*, and *income inequality*. In keeping with Ghobarah, Huth, and Russett's original findings, these analyses indicate that higher values for each of these variables are associated with harmful effects on public health performance.

What types of diseases are more common in the wake of an IMF agreement? In our tests of the specific causes of increasing rates of death and disability, we find that our treatment effects models identify particular types of infectious diseases (rather than forms of cancer or cardiovascular disease) as more prevalent in the wake of an IMF agreement. Table 3 identifies the number of age groups for which our key independent variable of *signed IMF SAPs* between 1995 and 1998 proved a statistically significant predictor of an increase in DALY scores resulting from a form of infectious disease.¹⁴ What is striking about these findings is the almost perfectly consistent result across

¹⁴We only count the result for an age group as significant if the test meets three requirements: (1) the *signed IMF agreement* indicator is significant at the 0.05 level or better, (2) the Wald

TABLE 3

Infectious Diseases; Number of Age Categories with a Significant Result Reported for the IMF SAP Variable, 1995–1998; and: Treatment Effects Model

Disease	Number of Age Categories with Significant Finding
Malaria	4
AIDS	5
Tuberculosis	5
Respiratory diseases	5
Other infectious diseases	5

disease categories, indicating that the signing of an IMF SAP between 1995 and 1998 is associated with higher DALY scores. Specifically, our finding is that among states that sign an IMF agreement, DALYs are higher for four of five age groups in terms of healthy life years lost to malaria. For the other disease categories of AIDS, tuberculosis, respiratory disease, and the catch-all category of other infectious diseases, we find that DALY scores prove higher for all five age groups within states that signed an IMF SAP in comparison to those states that did not.

Findings for IMF SAPs Signed Between 1985 and 1989

The findings we present in Tables 2 and 3 serve to support the view that IMF SAPs have identifiable, negative consequences for the health of a country's population in the period immediately following the signing of an agreement. Scholars and policymakers who defend the IMF's programs acknowledge that this potential for "short-term pain" exists but maintain that these costs are outweighed by the "long-term gains" apparent in the efficiencies and economic growth facilitated by SAPs.

In order to address this possibility we here consider the long-term effects of IMF SAPs by evaluating the 1999 public health effects of agreements signed during the period between 1985 and 1989. Our initial test is of the relationship between the signing of an IMF agreement between 1985 and 1989 and DALYs attributable to all causes for the year 1999. As with the analyses for the 1995 to 1998 period, for four of five of these tests the Wald likelihood ratio test reports that $\rho \neq 0$. This suggests that the use of a treatment effects model is appropriate for all tests with the exception of the analysis of the 60 and older age group. As with the consideration of the results we present in Table 2, we limit our discussion to the findings for the four age groups in which the use of a selection effects model is suitable.

likelihood ratio test indicates that $\rho \neq 0$, and (3) the exogenous variable of *regime durability* proves significant at the 0.05 level.

We present the first-stage results, predicting when a country will choose to adopt an SAP for the years 1985 to 1989, in the bottom half of Table 4. The two indicators that proved to be consistent predictors of signed IMF agreements for the 1995 to 1998 period remain statistically significant and in the expected direction in this analysis. One of these variables is the negatively signed *average GDP per capita* indicator, reinforcing the conventional wisdom that wealthier states are less likely to require assistance from the IMF. A second variable that proves influential and in the expected direction is the measure reflecting *regime durability*, although this indicator is only significant at the 0.1 level for the 5–14 age group. As noted previously, this measure serves as the exogenous variable from the first stage of the model that is excluded from the second-stage outcome regression.

If there is a surprising finding from these tests, it is the results concerning the measure of *cumulative years under IMF SAP*. In the analysis of factors that shaped the odds of signing an IMF SAP between 1995 and 1998, we did not find this variable to be influential. By contrast, in these tests focused on the signing of SAPs between 1985 and 1989, this indicator proves significant for four tests. This may simply reflect the fact that the sovereignty costs associated with signing onto an SAP during the relatively short period between 1982 and 1984 are more immediate, and thus more likely to influence a government's willingness to sign onto an SAP again over the next four years, than are the costs associated with agreeing to SAPs over a more prolonged period (1982–1994) during which changes of government may have also occurred.

We present the results of the second stage of the model, providing the selection-corrected effects of IMF agreements from 1985 and 1989 on public health performance, in the top half of Table 4. In these tests, the variable representing signed IMF agreements proves positive and statistically significant in each of the four tests for which a two-stage model is appropriate. Turning to the marginal effects that signing an agreement of this nature has on DALY scores, we find that the baseline predicted DALY value for the 0–4 age group with all covariates set to their mean values is 83.3. The predicted level drops to 67.21 when the value of the *signed IMF agreement* indicator is “0” and it increases to 92.09 when it is scored “1.” Similar patterns of results are apparent when calculating the marginal effects of signing an agreement on DALY scores for the other three age groups for which a treatment effects model proves appropriate.

These results concerning marginal effects present some evidence to suggest that the negative consequences of IMF SAPs attenuate, but do not disappear entirely, with the passage of time. When considering the marginal effects of signing an SAP between 1995 and 1998 on DALY scores for the year 1999, we found for the 0–4 age category a dramatic increase from a baseline of 75.39 to a score of 96.97; this constitutes a 21.58 increase from the baseline. By contrast, the marginal effects of signing an SAP between 1985 and 1989 on DALY scores for the year 1999 prove more modest for the same 0–4 age category. The increase from the baseline of 83.3 to only 92.09 reflects a much

TABLE 4

The Public Health Effects of Signed IMF Agreements, 1985–1989; All Causes of Death and Disability; and: Treatment Effects Model

	0–4	5–14	15–44	45–59	60+
<i>Public health equation</i>					
Signed IMF SAP 1985–1989	24.88* (9.87)	5.93*** (1.78)	27.2* (6.12)	13.97*** (3.42)	4.35 (4.18)
Civil war deaths 1991–1997	0.64* (0.23)	0.17*** (0.03)	0.27* (0.13)	0.17* (0.07)	0.11 (0.08)
Urbanization	0.61 (2.52)	1.27*** (0.35)	7.52*** (1.5)	2.91*** (0.83)	0.95 (0.89)
Income inequality	76.43* (35.11)	30.28*** (4.81)	89.54*** (19.92)	26.84* (11.62)	3.67 (12.45)
Ethnic heterogeneity	2.32 (2.84)	0.84* (0.39)	-1.44 (1.55)	-1.14 (0.88)	0.02 (1)
Tropical	-14.38* (6.61)	-1.3 (0.91)	3.55 (3.69)	1.96 (2.1)	-4.61* (2.33)
Contiguous civil war	7.01 (5.23)	0.67 (0.71)	8.96** (2.91)	4.37** (1.69)	2.3 (1.84)
Health expenditure	-30.65*** (3.47)	-4.51*** (0.49)	-7.77*** (1.98)	-6.02*** (1.14)	-3.58** (1.22)
Educational attainment	-48.54*** (7.21)	-1.88 (0.99)	5.02 (4.12)	-1.08 (2.31)	-2.04 (2.54)
Democracy	0.55 (0.47)	0.03 (0.06)	-0.12 (0.28)	0.08 (0.16)	-0.11 (0.16)
Cumulative years under IMF SAP 1990–1998	-1.76 (2.11)	0.11 (0.29)	0.28 (1.14)	-0.9 (0.65)	-2.46*** (0.74)
Constant	250.6*** (28.48)	15.12*** (4.13)	-3.86 (15.83)	40.52*** (9.06)	62.43*** (9.97)
<i>Signed IMF equation 1985–1989</i>					
Avg. GDP per capita 1985–1989	-0.29* (0.11)	-0.32** (0.11)	-0.27** (0.1)	-0.22* (0.1)	-0.29* (0.12)
Avg. level of democracy 1985–1989	-0.004 (0.02)	-0.02 (0.02)	-0.03 (0.01)	-0.02 (0.01)	0.001 (0.02)
Cumulative years under IMF SAP 1982–1984	0.53*** (0.11)	0.5*** (0.11)	0.39*** (0.09)	0.5*** (0.09)	0.5*** (0.12)
Regime durability	-0.01** (0.005)	-0.01# (0.005)	-0.01* (0.004)	-0.01** (0.004)	-0.01** (0.005)
Constant	0.31 (0.17)	0.17 (0.17)	0.09 (0.16)	0.09 (0.16)	0.31 (0.18)
N	220	220	220	220	220
Rho	-0.42 (0.14)	-0.56 (0.17)	-0.82 (0.08)	-0.81 (0.08)	-0.26 (0.19)
Log pseudo-likelihood	-1225.26	-789.18	-1100.88	-975.32	-996.45
LR test indep. eqns. (rho = 0)	5.78	4.77	8.06	16.53	1.8
p > chi-square	0.0162	0.029	0.0045	0.0000	0.1792

NOTE: Standard errors in parentheses. #Regime durability variable only proves significant at $p < 0.1$ level.* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

TABLE 5

Infectious Diseases; Number of Age Categories with a Significant Result Reported for the IMF SAP Variable, 1985–1989; and: Treatment Effects Model

Disease	Number of Age Categories with Significant Finding
Malaria	2
AIDS	1
Tuberculosis	1
Respiratory diseases	1
Other infectious diseases	2

more modest 8.79 increase and indicates that some of the negative health consequences of an IMF SAP have diminished over the years.

Other factors that these tests identify as consistently shaping a country's public health performance are the following: *civil war deaths*, *urbanization*, *income inequality*, and *health expenditure*. These variables all prove statistically significant for at least three of the five age-group-specific tests. We find that higher levels of *civil war deaths*, *urbanization*, and *income inequality* increase DALY rates; conversely, higher rates of *health expenditure* decrease rates of death and disability.

In Table 5 we present summary results concerning the influence of IMF SAPs signed between 1985 and 1989 on 1999 rates of death and disability due to infectious diseases. The table identifies the number of age groups (up to a maximum of five) for which the IMF SAP variable proves a statistically significant predictor of higher DALY scores.¹⁵

In this analysis, we find that an IMF SAP signed between 1985 and 1989 increased rates of death and disability into the year 1999. However, there is also some evidence in these tests to support the viewpoint that the negative consequences of IMF SAPs attenuate over time. We find that the number of age group categories that experience higher rates of death and disability within different disease categories as a result of signing an IMF SAP consistently declined relative to what we identified for the period between 1995 and 1998. For example, in terms of the disease of tuberculosis, SAPs signed between 1985 and 1989 proved to be an influential factor for only a single age group, rather than the five age groups that experienced negative health consequences associated with SAPs signed between 1995 and 1998.

Proponents of the benefits of IMF SAPs might interpret these findings in a positive light as the harmful public health consequences of these programs appear to diminish over time. We do not favor this interpretation, instead finding it notable that even when taking into account a period of greater

¹⁵As with Table 3, we only count a result as significant if the results meet three criteria. See footnote 14 for a discussion of these criteria.

than a decade since the signing of an SAP the harmful effects on a country's population can still be identified. We concede, however, that just as the negative health consequences of a natural disaster may disappear over decades, it is reasonable to anticipate that the harmful consequences of SAPs will prove less and less apparent with the passage of years beyond those accounted for within this study. In contrast to natural disasters, however, these negative health consequences are a function of policy choices that have the capacity to be changed in the interest of the well-being of a country's population.

Conclusions

Advocates of the IMF's economic liberalization programs have acknowledged that SAPs may have a negative influence on public health in the period immediately following the adoption of these policies, but also emphasize that a long-term return to economic growth will ultimately yield a decline in rates of disability and mortality. Our findings do not provide strong support for this claim. Instead, we find that the negative health consequences of SAPs are apparent in the immediate aftermath of signing an agreement as well as years after the adoption of one of these types of loan programs. While our tests do suggest that the negative consequences of IMF SAPs do appear to attenuate over time, we do not find evidence that the harmful effects of these loan programs entirely disappear even when taking into account a span of time up to 14 years.

The results of this study suggest that there is a vital need for the IMF to consider fundamental changes to how it approaches the process of restructuring economies in crisis. The IFI's liberalizing programs produce both direct and indirect effects that have the consequence of endangering the well-being of a state's population. In the absence of a significant shift on the IMF's part in its approach to economic reform, the institution's loan programs are likely to continue negatively to impact the public health sector of the low-income countries that approach the IFI for assistance.¹⁶ The challenge is for the IMF to identify strategies that ensure that the twin goals of economic development and protecting public health can be simultaneously promoted. If such strategies prove elusive, it is apparent that the IMF and other global actors must do more to protect the short-term and long-term health of individuals within societies experiencing the upheaval associated with economic liberalization programs.

¹⁶A more recent case indicates that SAPs continue to have harmful consequences for public health, even when these programs are implemented within relatively wealthy states. The *New York Times* reports that the government of Greece, in response to a financial crisis in 2008, agreed to a series of austerity measures favored by the European Union and IMF. One aspect of these reforms was a 13 percent reduction in government spending for medical care over a two-year period and a commitment to greater cuts in the future (Daley, 2011).

REFERENCES

- Abouharb, M. Rodwan, and David Cingranelli. 2007. *Human Rights and Structural Adjustment*. Cambridge: Cambridge University Press.
- Alesina, Alberto. 1997. "The Political Economy of Macroeconomic Stabilizations and Income Inequality: Myths and Reality." Pp. 229–326 in V. Tanzi and K. Chu, eds., *Income Distribution and High-Quality Growth*. Cambridge, MA: MIT Press.
- Barro, Robert J., and Jong-Wha Lee. 2005. "IMF Programs: Who Is Chosen and What Are the Effects?" *Journal of Monetary Economics* 52(7):1245–69.
- Bond, Patrick, and George Dor. 2003. "Uneven Health Outcomes and Political Resistance Under Residual Neoliberalism in Africa." *International Journal of Health Services* 33(3):607–30.
- Breman, Anna, and Carolyn Shelton. 2007. "Structural Adjustment Programs and Health." Pp. 219–33 in Ichiro Kawachi and Sarah Wamala, eds., *Globalization and Health*. Oxford: Oxford University Press.
- Cardoso, Eliana, and Ann Helwege. 2003. *Latin America's Economy: Diversity, Trends, and Conflicts*. Cambridge, MA: MIT Press.
- Center for Global Development. 2007. "Does the IMF Constrain Health Spending in Poor Countries? Evidence and an Agenda for Action." Report of the Working Group on IMF Programs and Health Spending. Available at <http://www.cgdev.org/doc/IMF/IMF_Report.pdf>.
- Daley, Suzanne. 2011. "Fiscal Crisis Takes Toll on Health of Greeks." *New York Times* December 27: A4 (New York Edition).
- Dreher, A., J.-E. Sturm, and J. R. Vreeland. 2006. "Does Membership on the UN Security Council Influence IMF Decisions? Evidence from Panel Data." KOF-Arbeitspapiere/Working Papers No. 151, October, Zurich. Available at <<http://kof.ethz.ch/en/publications/p/kof-working-papers/151/>>.
- Fearon, James, and David D. Laitin. 2003. "Ethnicity, Insurgency and Civil War." *American Political Science Review* 97(1):75–90.
- Ghobarah, Hazem Adam, Paul Huth, and Bruce Russett. 2003. "Civil Wars Kill and Maim People — Long After the Shooting Stops." *American Political Science Review* 97(2):189–202.
- Hajro, Zlata, and Joseph P. Joyce. 2009. "A True Test: Do IMF Programs Hurt the Poor?" *Applied Economics* 41(3):295–306.
- Hsiao, William, and Peter S. Heller. 2007. "What Should Macroeconomists Know About Health Care Policy?" IMF Working Paper WP/07/13. Available at <<http://www.imf.org/external/pubs/ft/wp/2007/wp0713.pdf>>.
- Jensen, Nathan. 2004. "Crisis, Conditions, and Capital." *Journal of Conflict Resolution* 48(2):194–210.
- Lake, David A., and Matthew A. Baum. 2001. "The Invisible Hand of Democracy: Political Control and the Provision of Public Services." *Comparative Political Studies* 34(6):587–621.
- Maddala, G. S. 1983. *Limited-Dependent and Qualitative Variables in Economics*. Cambridge: Cambridge University Press.
- Marshall, Monty, and Keith Jagers. 2008. "Polity IV Project: Political Regime Characteristics and Transitions, 1800–2006." University of Maryland. Available at <<http://www.systemicpeace.org/polity/polity4.htm>>.
- Murray, Megan, and Gary King. 2008. "The Effects of International Monetary Fund Loans on Health Outcomes." *PLoS Medicine* 5(7):1011–13.

Noorbakhsh, Farhad, and Shadan Noorbakhsh. 2006. "The Effects of Compliance with Structural Adjustment Programmes on Human Development in Sub-Saharan Africa." Pp. 138–54 in Alberto Paloni and Maurizio Zanardi, eds., *The IMF, World Bank and Policy Reform*. New York: Routledge.

Nooruddin, Irfan, and Joel W. Simmons. 2006. "The Politics of Hard Choices: IMF Programs and Government Spending." *International Organization* 60(4):1001–33.

Peabody, John W. 1996. "Economic Reform and Health Sector Policy: Lessons from Structural Adjustment Programs." *Social Science and Medicine* 43(5):823–35.

Stuckler, David, Lawrence P. King, and Sanjay Basu. 2008. "International Monetary Fund Programs and Tuberculosis Outcomes in Post-Communist Countries." *PLoS Medicine* 5(7):1079–90.

Vreeland, James Raymond. 2003. *The IMF and Economic Development*. Cambridge: Cambridge University Press.

World Bank. 1993. *World Development Report 1993: Investing in Health*. New York: Oxford University Press.