The United Nations University

**WIDER**

**World Institute for Development Economics Research**

**Working Papers** No. 120

September 1996

# Health Effects of Market-Based Reforms in Developing Countries

Germano Mwabu

# Health Effects of Market-Based Reforms in Developing Countries

Germano Mwabu
UNU/WIDER

September 1996

This paper benefited from a series of discussions with Nguyuru Lipumba, Wayne Nafziger, Renato Paniccia and Manuel Montes; Marja-Liisa Swantz provided me with valuable documents at an early stage of this paper for which I am most grateful. I thank Liisa Roponen for helping me with word processing. I am, however, solely responsible for any errors in the paper.

## CONTENTS

## LIST OF TABLES AND FIGURES



### Appendix tables and figure

## ABSTRACT

Radical and simultaneous economic reforms were implemented in many developing countries, especially in Africa, Asia and Latin America in the 1980s and early 1990s. Many of these reforms – structural adjustment programmes – were implemented with advice and support from Bretton Woods' institutions. The reforms were intended to strengthen weak economies, and have spawned a large and sharply divided literature as to their distributional and efficiency effects.

The paper uses cross-country regression analysis to assess health effects of structural adjustment reforms in developing countries over the period 1980-93, controlling for effectiveness in their implementation. The main finding is that countries which *effectively* implemented market-based reforms had better health outcomes at the end of the adjustment period than poor adjusters or countries not affected by these reforms. The paper contends that differences in institutional and administrative capacities across countries account for success or failure in reform implementation. Since in general, the nature and magnitude of the effect of *any reform* depend on how well it is implemented by policy-makers, I argue for strengthening of public service institutions in poor countries before the undertaking of development reforms.

# I INTRODUCTION

Radical and simultaneous economic reforms were a common feature of many low-income countries in Africa, Asia and Latin America throughout the 1980s and in the early 1990s. The reforms were a response to sharply deteriorating economic conditions in those countries following a period of oil crisis and heavy external indebtedness in 1970s. The reforms themselves had a common feature: they were market-oriented or market-friendly in that they relied on the *price mechanism* as the principal instrument for reviving economies. Further, due to the influence of the Bretton Woods institutions, the reforms were referred to and continue to be commonly known as *structural adjustment programmes* because they aimed at first stabilizing a crisis ridden economy and then changing or adjusting its structure of incentives and production in a manner that would reorient it toward a sustainable growth path [for details see Williamson (1990, 1994); Rodrik 1996a].

The stabilization requirement of the reforms was implemented mainly by reducing internal and external deficits in order to control inflation and to prevent flight from national currencies, and thus avert a collapse of the domestic exchange system. The structural change requirement – aimed at efficiency enhancement – was achieved by privatization of public enterprises, by the restructuring of government expenditures and by liberalization of service and commodity markets. These reforms were implemented in all sectors of the economy, including the social sectors, where *a priori*, market performance fails to meet social expectations, particularly with regard to equity. The reforms were implemented with and without support from international development agencies, as authorities of each crisis-ridden economy saw the need to respond to adverse social and economic conditions. The international support was motivated by economic theory, and by positive experience with markets in industrialized countries both of which predicted that market-based reforms were the correct remedies for economic problems in low-income countries. It should be noted as well, that in the earlier decades 1950s-70s, theory of development planning had led to implementation of state-oriented reforms in poor countries without the expected results. That is, the theory's prediction that a planned or state controlled economic system would improve people's lives turned out not to be true. Even though some centrally planned economies managed to improve social development indicators such as literacy rates, they failed to deliver widespread material welfare to the population. The failure of strong central planning to lift people out of poverty in Africa and elsewhere in low-income areas was another reason for the embracing of the market mechanism by national and international policy-makers as a development device.

The current view (see e.g., Evans 1996; World Bank 1996) is that both the market and the state as well as the communities have an important role to play in the development process. In this new perspective, neither the state nor the market or the community is seen as the single most important agent of development. The present paper assesses health effects of market-oriented reforms in poor countries over the period 1980-93. In particular, it examines health effects of market liberalization, restructuring of public enterprises and government expenditures, and of reforms in trade, agriculture and other sectors of the economy in a sample of developing countries. The assessment is informed by a model of health effects of economic policies recently suggested by Anand and Chen (1996), the outline of which is sketched below.

## II FRAMEWORK FOR ANALYSIS

### 2.1 Theoretical considerations

Policy-makers in health sectors of developing countries face severe resource constraints in attempts to provide basic health services to everyone in the population: the average share of health expenditure in gross national product in these countries is 4.7 per cent, while the per capita expenditure is only US $41 compared to US $1860 in established market economies (World Bank 1993). Reforms in the health sector were implemented with the hope of alleviating this constraint by generating additional revenue for health ministries, and by enhancing efficiency in the use of available health resources in the public as well as in the private sector. The ultimate aim of the reforms however was to improve the health status of the population.

Evaluation of the extent to which this fundamental objective has been achieved is not an easy task because conventional indicators of health status such as mortality rate and life expectancy tend to be insensitive to short-run changes in the quantity and quality of health care and to changes in economic conditions (Musgrove 1987; Murray and Chen 1993). In a recent contribution, Anand and Chen (1996) propose a rich theoretical model for assessing health impacts of social and economic policies. The model identifies the critical factors that govern short-run responses of health indicators to changes both within and outside the health sector. Further, it explains why short-run health effects of economic reforms as measured for example, by changes in mortality rate might be large or negligible, and shows how the evolution of health status of the population over time might be influenced by public policy.

The model is based on the concept of individual-specific health production function as in Grossman (1972). In the model, an individual's evolution of health

stock over time, from its initial level, is determined by a flow of health and non-health inputs, conditional on individual behaviour and environmental conditions. The health inputs include the amount of nutrients taken, and the quantity of health services used by an individual over a specified time period, whereas the inputs outside the health sector include for instance the quantities of housing, water and sanitation services consumed over the same period. Structural adjustment reforms in the health sector, such as privatization of medical facilities, introduction of user charges, and institution of health insurance were intended to increase availability and utilization of health services and hence the existing stock of health capital. Reforms outside the health sector pursued with other intentions might also have had this effect. Thus, in order to properly assess health effects of reforms within the health sector, effects of reforms outside that sector should be considered while controlling for other determinants of health status. A model that clarifies the key issues involved in such an evaluation follows.

Consistent with the theory of the household, an individual enhances his or her health capital over a given time period using market and non-market inputs. The market inputs include medical services, food, housing, and clothing; a fraction of each of these inputs can be obtained outside the market. The non-market or non-tradeable inputs include an individual's genetic endowment and environmental capital, such as unpolluted air, which is commonly available, and thus has the status of a public good. Note that in contrast to market inputs, the non-market inputs are all non-tradeables. Given the non-tradeable input set, and subject to a full-income constraint as in Becker (1991), an individual purchases quantities of market inputs that minimize the cost of increasing health capital stock to a certain level over a specified time period. Both the purchased inputs and the efficiency at which an individual uses them determine health status at any given period.

In light of the above, an individual's health capital stock at any period t, is assumed to be *self-produced* according to the following production function.

$$H_{it} = f(X_{it}, Z_{it}, V_{it}, S_{it}, Q_{it}, H_{it-1}) \qquad (1)$$

where, $H_{it}$ is *unobservable* stock of health capital for individual i at time t; $X_{it}$ is a vector of nutrients or types of food consumed by i at time t; $Z_{it}$ is a vector of health services used by i at time t; $V_{it}$ is a vector of environmental conditions faced by i at time t; $S_{it}$ is a vector of i's social characteristics at time t; $Q_{it}$ is a vector of indicators of macroeconomic situation faced by i at time t, e.g., unemployment rate, inflation rate, and social infrastructure; and $H_{it-1}$ is individual i's health stock in the previous period.

Note that equation (1) is a meta production function because its arguments include infrastructural and environmental inputs. From equation (1), it can be

seen that the magnitude of the change in health stock from $H_{t-1}$ to $H_t$, depends on the extent of the changes in its determinants. Denoting changes in variables in equation (1) in lower case letters, and suppressing the i subscript, the health capital production function at period t can be expressed as

$$h_t = g(x_t, z_t, v_t, s_t, q_t) \qquad (2)$$

where, $h_t = H_t - H_{t-1}$, is the change in previous period health stock, so that whenever $H_t > H_{t-1}$, $h_t > 0$, indicating that health stock has appreciated. Conversely, if $h_t < 0$, an individual's health status has depreciated.

Economic reforms in the health sector or in any other sector of the economy, generate equation (2) by changing one or more of the determinants of health status. For example, imposition of cost sharing in the health sector is assumed to change the quantity of health services used by the population via its effects on service prices and quality. In equation (2), the change in health services resulting from cost sharing in the health sector is $x_t$ (that is, $X_t - X_{t-1}$). The sign of this change, which might be negative or positive is not possible to determine to start with because the negative demand effect of cost sharing might be offset by effects of other factors. Similarly, $z_t$ is the change in nutrient intake or food consumption resulting from liberalization of food markets. Macroeconomic reforms such as devaluation of the national currency, trade liberalization, and privatization may generate $v_t$ and $q_t$, and these changes might also affect health status. Observe that a given set of reform measures generates specific values for the flow variables in equation (2). Thus, the change in health status in equation (2) can be related directly to reform measures or to reform activities. That is, reform activities can be used as proxies for the flow variables in equation (2); nonetheless as is shown below, a different formulation is needed because many of the flows are unobservable. Equation (2) further emphasizes the need to control for effects of policies outside the health sector when assessing impacts of reforms within that sector.

Equations (1) and (2) describe health capital formation of an individual. To obtain the health status of the whole population, aggregation of health stocks across individuals is required. Despite the great difficulties involved in measuring health status, a variety of aggregation approaches exist (see e.g., World Bank 1993).

Theoretical and empirical problems arise in using equation (2) to assess health effects of economic reforms such as the institution of user charges or of health insurance – reforms that alter health service utilization levels and patterns. The theoretical issue relates to the complexity of the process that generates changes in health stocks. Health effects of a decrease in $X_t$ ($x_t < 0$) for example, might be

offset by countervailing effects of an increase in $Z_t$ or of the changes in other variables in equation (2). Thus, negative health effects of a decrease in health service utilization due to cost sharing may never be observed because of compensating effects, deceptively suggesting that cost sharing has no effect on health status. Similarly, positive health effects of an increase in health care use might not be observed. The empirical issue, as already noted, concerns difficulties in the measurement of health stock. Health stock is typically measured using mortality rates or life expectancy. A decrease in $X_t$ (due to cost sharing) might not lead to a rise in mortality rate if the decrease is not sustained, or if the health status of the population is not close to a minimum level that is critical for survival. Similarly, health improvements of an increase in $X_t$ may never be observed if the increase is not sustained or if at the time it occurs the health stock of the population is already close to the survival minimum. In that case, even with a sustained increase in $X_t$, and a moderately large increase in health stock a decrease in mortality rate may never be observed. A distributional issue also arises in using equation (2) to measure health effects of user charges. If the health stock of a *small* segment of the population is close to the survival threshold, a large and sustained decrease in $X_t$ (due to cost sharing) may have no effect on aggregate mortality, whereas the same change in $X_t$ would likely have a substantial increase in mortality rate if it were to occur when health stock of the bulk of the population is close to survival minima. However, a dramatic decline in aggregate mortality can be observed following a small sustained increase in $X_t$ when health stocks of the majority of the population are sufficiently above survival levels.

Several, testable propositions emerge from the above analysis. First, in a cross section of countries, health care financing reforms that compress health service utilization would, other things being equal, increase mortality in countries where at least one of the following situations obtains (a) health stocks are close to survival levels at the time of reforms; (b) health stocks are above critical survival levels but the reduction in service utilization is sustained for a sufficiently long period; or (c) health care infrastructure as measured for example by the density of health personnel and facilities is weak. A second hypothesis is that a sustained increase in health service utilization following a health sector reform, such as the imposition of user charges that leads to an improvement in service quality, would lower mortality rate in countries with health stocks sufficiently above survival minima within a relatively short period. Finally, for countries with health stocks at intermediate levels (that is, levels just below the stocks required for good health and just above those needed for survival), health care reforms will have no effect on mortality rates in the short-run. It should be stressed that these propositions rest on the assumption that health effects of policies outside the health sector are being considered.

In an attempt to use equations (1) and (2) to examine the above hypotheses, a difficult data problem arises: data on variables specified in health production functions are not easy to obtain. In particular, data on nutrient intake, health care consumption and environmental exposure of the population are currently not available from non-survey sources. To surmount this problem we work with demand-side counterparts of equations (1) and (2). The underlying assumption in equations (1) and (2) is that people minimize the cost of producing a given level of health stock using market and non-market inputs. This assumption simply says that in their health maintenance activities, people do not waste the health care resources they can afford because, if saved, these resources can be used to meet other necessities of life. In this sense, cost minimization is a very reasonable assumption about human behaviour. The demand-side counterpart of this assumption is that people benefit from better health, i.e., from an improvement in health status, and thus they seek better health in the same way that they seek other goods and services. People benefit from better health because as an asset, it raises their productivity or because as an intrinsic good, its mere possession confers personal satisfaction. Moreover, since better health and other goods are obtained at a price, it is a fair assumption that people use their limited resources on these goods in a way that confers them as much benefit as possible. This is the benefit maximization assumption in demand theory, which is maintained in this analysis. Given this assumption, and the fact that people's resources are limited, the reduced-form aggregate demand function for health capital at time t (that is $h_t'$), can be written as

$$h_t' = f(p_t, q_t'; A_t, W_t, Y_t) \qquad (3)$$

where, suppressing the t subscript, $h'$ is demand for health capital stock (a flow variable); p is the price per unit of health stock; $q'$ is per capita income, A is a vector of aggregate social variables such as literacy rates, W is a vector of structural activities such as privatization or price liberalization in the social and other sectors; Y is a vector of environmental and infrastructural factors and inflow of external resources like foreign aid. Notice that, via the duality theorem [see e.g., Varian (1984)] equation (3) can also be derived from the cost functions underlying equations (1) and (2).

Appearance of p in equation (3) immediately signals an estimation problem because health capital is a non-tradeable good, and so, it cannot be bought or sold in the market. Since in general, there is no market for human capital, it appears at first sight that there is no market price for additional health stocks. A shadow price for health capital or investment can of course be computed via estimation of an output production function in which health capital stock is included as one of the input arguments of the function. But computation of the shadow price would be too burdensome in terms of data requirements. As it happens, a *proximate*

market price for health stocks is still possible. A look at equations (1) and (2) shows that health capital is self-produced with market and non-market inputs. We make the assumption that purchased inputs such as medical care, food, and housing are the dominant inputs in the production process. Thus, the higher the prices of these inputs the greater the cost of producing a unit of health stock. From this it follows that the price at which a unit of health stock would be traded in the market (were such a market to exist), would strongly move in the same direction with health production costs. For this reason, we approximate the price of *aggregate* demand for health stock in equation (3) with the consumer price index. To reflect the relative importance of the health sector in the accumulation of health stocks, the consumer price index can be weighted by the share of health expenditure in gross domestic product. However, since in equations (1) and (2) other sectors in the economy play a significant role in health capital formation there is no need to weight the consumer price index. This treatment of the consumer price index is consistent with the view that health capital formation is better promoted through intersectoral activities rather than through activities in a single sector such as the public health sector [see e.g., World Health Organization (1983)].

To be able to interpret the empirical sign of the coefficient on p, it is important that equation (3) be identified as a demand rather than a supply equation before estimation. This is a crucial issue because p is the price at which health capital is self-supplied and it is the same price at which it is bought from self (where self in the case of the aggregate health capital stock is the whole community). Thus, a change in health stock due to a change in p might be a demand or a supply response. An increase in p signals a higher rent to be received from health capital (as a final good); thus more of it is supplied as p rises. However, an increase in p also makes health stock (as a consumer or an intermediate good) more expensive relative to other goods, so that other things being equal, less of it is demanded. Thus, there is a need to determine whether the relation to be estimated in (3) is a demand or a supply function.

Identification of equation (3) is achieved by variables in vector Y that shift the supply of health capital across countries without affecting the position of the demand function. We identify the demand function by population densities across countries and regional dummies.

## 2.2 Data

To examine effects of reforms on the health of the population using the model just outlined, cross sectional data were obtained from developing countries on indicators of health status, on reforms both within and outside the health sector, and on other relevant factors (see Appendix A for data sources). The sample of countries in the study included those that had borrowed loans from the World Bank under the structural adjustment lending facility during the period 1980-91 as well as countries which were not recorded as having taken such loans over same period. Countries without structural adjustment loans were included in the sample to avoid sample selection bias in the estimation of reform effects. A total of 103 countries (51 borrowers and 52 non-borrowers) were selected for study. However, because a complete set of all the relevant variables was not available for some countries, the sample sizes used in various econometric estimations (see section IV) are occasionally considerably smaller than the number of countries in the initial sample. Moreover, data on reforms for all countries do not exist for each year in the period 1980-91. For example, some countries undertook reforms in 1980-88 while others adjusted in 1983-89 or in 1984-91 so that the countries in the sample are those that adjusted during the period 1980-91 irrespective of the year of adjustment.

The data for countries in the sample came from World Bank and the United Nations documents, including the International Monetary Fund sources (see Appendix A). Ideally, the correct measure of the health status of the population should indicate the quantity of the population's health stock at any given point in time. However, data on health stocks are unavailable because true health stocks are unobservable. Anand and Chen (1996) have suggested that health stocks for adults can be approximated by the body mass index (BMI), which is defined as weight in kilograms divided by the square of height in meters. This index shows the quantity of body mass that rests on a square meter of body height. It has been shown that the probability of mortality is strongly correlated with BMI (Fogel 1992, 1993), and by extension life expectancy is correlated with BMI. In particular, as BMI rises, the probability of mortality first falls and then increases, as the body mass on a square meter of height becomes excessive. The BMI, which is essentially a measure of long-run nutritional status, is of course conditional on many other factors such as genetic endowment, and epidemiological environment. In the case of children, the proximate measures for health status are weight-for-height and height-for-age; values of these measures are also conditional on the same factors as those that affect the BMI.

The anthropometric measures of health stocks are individual-specific and can only be obtained via a household survey. Since such a survey is not feasible for this study information on mortality rate and on life expectancy is used as an

indicator of aggregate health stock in the population. With regard to the latter, life expectancy at birth in years is the empirical yardstick used to indicate a population's aggregate health stock (see, e.g., UNDP 1990). Observe that health stock is positively correlated with life expectancy but negatively correlated with mortality rate.

Three variants of mortality rate are used in the econometric evaluation of health effects of reforms: infant mortality rate (number of deaths at age 0-1 per 1,000 live births); under-five mortality rate (number of deaths below age 5 per 1,000); maternal mortality rate (number of maternal deaths per 100,000 live births). Also used in the same analysis is life expectancy in years at birth (see the data appendix for documents from which data on mortality rates, life expectancy and other covariates were derived).

Data on reforms were obtained on sizes of adjustment loans, number and type of conditionalities attached to loans, and types of reform undertaken with support of the loans, and by implication with advice from the World Bank. The rating of performance of countries in implementing reforms by the World Bank Operations and Evaluation Department was used to construct a dummy variable to represent whether or not a reform was successfully implemented. This particular variable helps focus attention on health effects of successfully implementing structural adjustment reforms. Other reform dummies were constructed to represent the type of reform implemented, e.g., whether the loan was used to reform agriculture, the health or other sector of the economy. The idea underlying these dummies is that what is important in terms of health outcomes is the type of reform undertaken rather than its origin in the economy because of the offset effects already noted. For this reason, focus is on ultimate effects of reforms *irrespective* of their sectoral locations. Other variables used in the econometric analysis include gross domestic product per capita, and population density and whether or not the World Bank had issued conditionalities for adjustment loans intended for the social sector.

### 2.3 Estimating equations and nature of reform effects

Double-log linear versions of equation (3) were estimated using ordinary least squares and robust regression methods. Robust regression was used to take account of the fact that the variance of the error term is not constant across countries as assumed in the ordinary least squares estimation. Robust regression parameter estimates are the same as those obtained with ordinary least squares but their heteroskedasticity corrected standard errors are different (Greene 1993). Only the robust regression results are reported in the text; the ordinary least squares results are available from the author on request.

There are three dependent variables for each country in the sample: infant and child mortality rates in 1993; life expectancy at birth in 1993 and maternal mortality rate in 1994. Values for these variables were obtained for the years immediately following the structural adjustment period (1980-91). The explanatory variables such as types of reforms undertaken by countries and the per capita incomes were obtained for the period 1980-91, the structural adjustment period.

The model outlined in foregoing sections was used to examine first- and second-order effects of reforms on health status in developing countries. The first order effects are the direct effects of reforms on the availability and utilization of health services and other goods and services that affect health status. These are effects on inputs into the process of health capital formation. The second-order effects are the outcome effects, e.g., health effects of a change in the consumption of medical care and other goods and services (e.g. a fall in mortality) brought about by the implementation of particular reforms. The direct effects reported in the next section were derived from the information available in the literature, while some of the second order effects are based on regression analysis of the impact of reforms on health status. Sections 3.1 and 3.2 below report first- and second-order effects as gleaned from the literature. Section 4 presents second-order effects obtained from the regression analysis and compares them with effects derived from the literature review; section 5 summarizes and concludes the paper.

## III HEALTH EFFECTS OF REFORMS: A SYNTHESIS OF THE LITERATURE

### 3.1 First-order effects

Since the health status of the population is affected by reforms that take place within and outside the health sector, in a period in which the macro economy is subject to policy shocks, effects of economy-wide reforms should be assessed in addition to partial effects of sectoral adjustments. The present work focuses on both of these effects because it covers the period 1980-93 when health sector reforms and macroeconomic adjustments were undertaken in many developing countries in Africa, Asia and Latin America. For this reason, health effects of policies in the health sector alone over this period are likely to be misleading. We start by looking at effects of reforms on public expenditure patterns.

Since the main aim of the stabilization component of structural adjustment was to reduce fiscal deficits, one would expect successful implementation of these reforms to have curtailed government expenditure. Contrary to this expectation, a recent study (Jayarajah, Branson and Sen 1996) shows that in the majority of

adjusting countries, total government expenditure actually rose over the adjustment period. Further, the composition of public expenditure also changed substantially. Total government expenditure increased because a higher proportion of it had to be devoted to debt servicing in accordance with adjustment conditions. Higher interest payments on loans during this period contributed to higher government expenditures among the adjusting countries. The higher proportional government expenditure on debt service meant a reduction in discretionary expenditure (expenditure not subject to conditionalities of adjustment loans) because fiscal deficits had to be contained. This reduction was widespread, affecting some 75 per cent of the adjusting countries. The details of the decline in discretionary expenditure and of the change in its structure are well documented in Jayarajah, Branson and Sen (1996:78-92). Expenditures on traditional economic investments such as physical infrastructure were cut proportionately more than expenditures on investments in social services (Tables 1 and 2). In particular, the share of economic services expenditure in gross domestic product fell in 85 per cent of adjusting countries, while the share of health services expenditure generally remained intact in most countries. However, the per capita health expenditure fell drastically in many countries during, and immediately after the adjustment period. This expenditure pattern implies a short-run economic hardship for adjusting countries because there was a reduction in physical capital formation. In addition, the conceptual model outlined in section 2, suggests that even though the gross domestic product share of social expenditure was maintained, health capital formation might have suffered due to short-run economic crisis, as well as from other intervening factors such as fast rate of population growth. Tables 1-3 below summarize patterns of government expenditure on health and traditional economic services over the reform period in Africa, Latin America and Asia.

A striking pattern from Tables 1 and 2 is that Asian countries managed to increase spending on social services (including health services) during the period of adjustment, but had to accept a slight decline in economic services expenditure. [Note that the information in column 1 (the 'before' column) shows the expenditure situation before reform implementation in *any year* during 1980-81; similarly, columns 2 and 3 (the 'during' and 'after' columns respectively) depict the expenditure situation during and after reform implementation in any period during 1980-91]. Latin American countries were able to marginally raise

TABLE 1
PATTERN OF GOVERNMENT EXPENDITURE OVER THE ADJUSTMENT PERIOD BY EXPENDITURE ITEM AND GEOGRAPHIC REGION, 1980-91

| Expenditure item and geographic region | Government expenditure as a percentage of gross domestic product before, during and after structural adjustment | | |
|---|---|---|---|
| | Before | During | After |
| Health services | | | |
| Asia | 0.5 | 0.6 | 0.6 |
| Middle East and North Africa | 1.4 | 1.2 | 1.2 |
| Latin America | 1.7 | 2.1 | 2.4 |
| Sub-Saharan Africa | 1.3 | 1.2 | 1.1 |
| Social services | | | |
| Asia | 2.7 | 3.3 | 3.4 |
| Middle East and North Africa | 8.9 | 8.1 | 8.3 |
| Latin America | 7.1 | 7.3 | 7.8 |
| Sub-Saharan Africa | 5.9 | 5.6 | 5.3 |
| Economic services | | | |
| Asia | 5.7 | 5.5 | 5.0 |
| Middle East and North Africa | 10.2 | 8.3 | 6.7 |
| Latin America | 3.3 | 2.7 | 2.2 |
| Sub-Saharan Africa | 5.3 | 5.4 | 4.9 |
| Total expenditure | | | |
| Asia | 16.0 | 16.8 | 17.8 |
| Middle East and North Africa | 32.0 | 30.3 | 28.4 |
| Latin America | 15.7 | 16.9 | 20.3 |
| Sub-Saharan Africa | 22.5 | 22.9 | 21.0 |

Source: Extracted from Jayarajah *et al.* (1996: Tables 4.1 and 4.3; pp. 80 and 83).

public spending on social services, with Middle East countries managing nearly to maintain pre-reform spending patterns on these services. In contrast, public spending on health and other social services in Sub-Saharan Africa declined during the implementation of structural adjustment reforms, as did the spending on economic services. As can be seen from Table 2, per capita government spending on social services in Africa declined by some 35 per cent between 1981 and 1991, with per capita health expenditures declining by about 18 per cent. However, as noted in the analytic model, these declines might not have eroded health stocks of the African population if compensatory effects outside the social sector existed.

TABLE 2
REAL PER CAPITA SOCIAL EXPENDITURE INDICES OVER THE ADJUSTMENT PERIOD, 1980-91

| Expenditure item and geographic region | Per capita social expenditure indices (1981 = 100) | | |
|---|---|---|---|
| | Before | During | After |
| Social Services | | | |
| Asia | 86.6 | 119.9 | 144.4 |
| Middle East and North Africa | 109.9 | 98.6 | 109.2 |
| Latin America | 94.4 | 102.3 | 103.2 |
| Sub-Saharan Africa | 100.2 | 76.5 | 68.0 |
| Health Services | | | |
| Asia | 87.4 | 101.3 | 143.8 |
| Middle East and North Africa | 104.6 | 91.1 | 103.8 |
| Latin America | 87.4 | 104.9 | 105.3 |
| Sub-Saharan Africa | 125.9 | 107.7 | 107.5 |

Source: Jayarajah *et al.* (1996: Table 4.4, p. 85).

Available data (Collins *et al.* 1996; Jayarajah *et al.* 1996) show that reallocation of health expenditure in favour of preventive and primary health care (activities with the highest health payoffs) did not materialize during the adjustment period. Hospital care claimed some 80 per cent of health budgets in African and Latin American countries during this period. Moreover, a similar share of the recurrent expenditure was and continues to be devoted to personnel salaries at the expense of medical supplies and drugs, which makes it difficult to provide services of sufficient quality. The issue of the allocation of the recurrent health budget between medical personnel and medical supplies is important because it affects medical care quality, a key determinant of the rate at which available services are used by the population (Reddy and Vandermoortele 1996; Mwabu *et al.* 1993). To emphasize this point, unless available health services are used by the population, they would have no effect at all on health status.

The next issue to consider, is the health effect of the method used to pay for health services. During the adjustment period under consideration, a large number of developing countries, especially in Africa (Shaw and Griffin 1995) introduced user charges for health services. User charges for health care – and for social services in general – were introduced partly to help reduce fiscal deficits and partly to improve efficiency in the delivery and use of services. Introduction of user charges necessitated introduction of health insurance (where none existed before) in an attempt to mitigate demand reducing effects of user charges. Health insurance schemes are market institutions that enable households to pre-pay for medical services in advance of sickness. They allow patients to use medical care free of charge or at a nominal fee. However, introduction of user charges and

insurance schemes during the adjustment period was an extra financial burden to households. The effect of this burden on health service utilization was a matter of great controversy before and during the adjustment period [see Reddy and Vandermoortele (1996) for a recent survey of the literature]. Evaluations of the effects of user charges on utilization of health services (Sauerborn *et al.* 1994; Collins *et al.* 1996; Mwabu *et al.* 1995; Griffin 1992; Waddington and Enyimayew 1990; Yoder 1989; Griffin 1988) show that service use declined during the adjustment period. In some countries the decline was as much as 40-50 per cent. However, in a few instances, where user charges were used to improve service quality (Litvack and Bodart 1993), the rate of service utilization increased moderately. Even so, the reduction or increase in service utilization resulting from user charges need not have led to a decline or an improvement in people's health status due to offset effects from other factors.

Literature on effects of insurance on health service utilization in developing countries is rare because health insurance coverage (especially in Africa) is limited only to a small segment of the population (Vogel 1988). The problem with insurance as a method of paying for health services is that it is very difficult to implement in low-income areas where most people derive livelihood from subsistence agriculture or from the informal sector; in these segments of the economy, insurance markets are missing or incomplete. Nonetheless, if user charges are to become a dominant mode of health care financing in poor countries, health insurance schemes suitable for people in subsistence agriculture and the informal sector must be developed. In the absence of widespread insurance schemes, the user fee system yields unacceptable inequalities in the use of medical care.

Privatization – transfer of ownership or management of public health facilities to private agents is another method that governments in developing countries employed to increase health finance over the period studied, and in this sense, it is an indirect form of financing health services [see e.g., Makinen, *et al.* (1988)]. Privatization of public health facilities may affect both service availability and prices. Privatization is promoted under the assumption that private, rather than public provision is more efficient so that service availability should increase with privatization [see Creese (1994) and Wouters (1993), however, for arguments and evidence that contradict this view]. Moreover, health service prices after privatization are expected to be determined by market forces and hence should be higher than the ceiling or subsidized prices before privatization. Under competitive private provision, health service prices should also reflect marginal costs of service provision and so such prices could be lower than those charged by a monopolist under public provision. Thus, in principle, privatization might lower or increase health service prices and thus its effects on health service utilization are unclear to start with. This uncertainty does not apply when

privatization transforms a public monopoly such as a referral hospital into a private one. In that case, health care prices at the referral facility would rise without a corresponding increase in service availability, and the rate of service up take by the population would fall.

### 3.2 Second-order effects

We now turn to effects of reforms on health outcome variables, that is, on variables that indicate how health status of the population changed during the adjustment period. The overall health status effects of structural adjustment reforms as measured by changes in mortality rate and life expectancy are difficult to determine from the information available in the literature. Infant mortality rate over the adjustment period continued to decline regardless of direction of changes in social expenditure, with notable exceptions in Uganda and Zambia where mortality rates increased significantly during this period (World Bank 1996). Table 3 shows trends in infant mortality rates in Africa, Asia and Latin America over the period 1980-91.

TABLE 3
TRENDS IN INFANT MORTALITY RATE BEFORE, DURING AND AFTER ADJUSTMENT

| | Percentage change in infant mortality rate | | |
|---|---|---|---|
| Geographic region | Before | During | After |
| Africa | -1.8 | -1.7 | -1.4 |
| Asia | -2.5 | -3.1 | -4.6 |
| Latin America | -5.6 | -2.5 | -2.4 |

Source: Jayarajah *et al.* (1996: p. 95, Table 4.8).

The above table shows that in all the regions of developing countries, the infant mortality rate was falling before the onset of structural adjustment reforms in a country, and that, this decline continued throughout the adjustment period. It should also be noted that during the reform period, the mortality decline slowed down in Africa and in Latin America while it accelerated in Asia. A puzzling observation from Table 3 is that in *general*, infant mortality in developing countries fell during the period when these countries were experiencing extreme economic hardships. Moreover, as already noted, there is no detectable contemporaneous association between changes in social expenditure and movements in mortality rates across countries. These two observations raise a fundamental question: What explains changes in mortality? Three factors have been advanced in the literature (see e.g., Musgrove 1987; Murray and Chen 1993) to explain the temporal decline in mortality under adverse economic conditions: (a) previous investment in social and health infrastructure, which is used for health maintenance; (b) previous accumulation of health capital, which helps

maintain a downward momentum in mortality rate during a short-lived period of economic crisis; (c) external assistance to the social sector when domestic resources are insufficient to finance health maintenance.

The foregoing explanation of a decline in mortality in a period of economic crisis, underscores the importance of past incomes (when properly invested) in improving health status of the population. Results from regression analysis in section 4 below show that the quality of macroeconomic management during a period of crisis is also significantly correlated with mortality rate in the ensuing period. The results further confirm the negative effect of previous periods incomes on mortality, and establish a connection between health status and a range of economic reforms. An overall assessment of statistical results presented in section 4 leads to the conclusion that the declines in mortality rate observed in developing countries during periods of economic stress are due to favourable health effects of investments in human capital and in social infrastructure made in previous periods when such investments could be afforded. Once the dependence of health status on the history of the economy is accounted for, the *automatic* decline in mortality rate implied in Table 3 disappears. Moreover, the results suggest that once mortality has began to rise, it can continue an upward trend for quite some time even as incomes and investments in social capital increase before it begins to fall.

## IV HEALTH EFFECTS OF REFORMS: AN ECONOMETRIC ANALYSIS

### 4.1 Descriptive statistics

The discussion of health effects of reforms in the previous section is based on information obtained from the literature. In the present section, effects based on econometric analysis are presented and discussed at length. As a prelude to econometric results, and as a way of providing a background against which they have to be interpreted, we discuss descriptive statistics presented in Tables 4-6. Table 4 depicts summary statistics for all sample countries for which data are available. Using these statistics, Table 5 compares countries which had borrowed loans from the World Bank under the structural adjustment lending facility with all the countries in the study sample. The comparison is limited to variables that are used in regression analysis and so the sample sizes here are smaller than those shown in Table 4. Table 6 presents a correlation matrix for the variables in Table 5. The correlation matrix was constructed to (a) check whether the stylized facts about mortality rate noted in the literature (e.g., its negative correlation with past incomes) hold for countries in the study sample and (b) to explore whether multicollinearity was likely to be a problem in the regression analysis.

Consistent with results noted from the literature review in section 3 (Table 3), the top panel of Table 4 shows that infant mortality rate in developing countries *declined* during the period of economic crisis. As can be seen from Table 4 (column 2), the mean infant mortality rate fell from 97.4 per thousand live births to 71.4 between 1981 and 1993. Accordingly, life expectancy at birth in these countries increased from 55.4 years to 58.9 over the same period. However, these average trends mask the fact that some of the countries in the sample (notably Zambia, Zaire, Kenya, Uganda, among others) experienced significant increases in mortality rates and/or a deterioration in life expectancy over the adjustment period.

A comparison of borrower countries with all the countries in the study sample (borrowers and non-borrowers) [Table 5, columns 2 and 3] shows that the countries that accepted World Bank loans had lower indicators of health status both at the start and at the end of the adjustment period. As can be seen from the top panel of Table 5, borrower countries had higher mortality rates and lower life expectations at both points of the period. However, the relatively weaker economies (compare logs of per capita incomes in Table 5) are the ones that *did not join* the World Bank economic recovery programmes either because they could not qualify for structural adjustment loans or because they chose to pursue alternative policies. It appears that many of the countries that did not participate in the adjustment programme are those that could not endure the conditionalities that the World Bank imposed on programme participants. On average, each participating country was required to fulfil about 88 conditionalities (with a high variance of 66 conditionalities); one country (Morocco) had 305 conditionalities! About 55 per cent of the participating countries were judged by the Bank's Operations and Evaluation Department as having satisfactorily implemented the structural adjustment programmes. The crucial question here is whether countries that were able to endure loan conditionalities had better health outcomes at the end of the adjustment period than countries that were unable to fulfil these conditionalities or the countries which were not in the adjustment programme. We will have occasion to return to this issue.

As can be seen from Table 5, most of the countries in the adjustment programme were from the Africa region, comprising 59 per cent of borrower countries (Table 5, column 2), with Latin American and Asian countries making up 27 and 14 per cent of the sample respectively. It can be seen from Table 5 that non-sectoral or macroeconomic adjustments constituted the bulk (47 per cent) of reforms undertaken by borrower countries (Table 5, column 2). The remaining reforms were sector-specific; the category 'other sectoral reform' includes mainly reforms undertaken in the social sector.

The correlation coefficients shown in Table 6 have the expected signs and are of reasonable sizes. As can be seen from the top panel of Table 6, both life expectancy and per capita income are inversely correlated with infant and child mortality rates and with maternal mortality as one would expect. The association between any pair of these variables is quite strong, as evidenced by high magnitudes of the correlation coefficients. The rating of a country's performance in implementing structural adjustment programmes (which is equal to one if performance was satisfactory and zero otherwise) is consistently negatively correlated with mortality rates, and positively associated with life expectancy, just as in the case for income. The estimated correlation relationships between mortality, life expectancy and performance rating by the World Bank is independent of level of income because the correlation between income and performance rating is very weak (.03) [see Table 6, row 7 column 6]. The rating is further negatively correlated with consumer price index and with African and Latin American dummies. The association with dummies suggests that Asian countries were more likely to have better performance ratings than African or Latin American countries. Since performance rating is negatively correlated with mortality, other things being equal, Asian countries can be said to have benefited more from the adjustment programmes than countries in other regions. In view of the hypothesized signs of health effects of reforms shown in Table 5 (column 4), it is worthwhile to note the positive association between the consumer price index and mortality rates as well as the negative correlation between it and life expectancy. Also to be noted, is the inverse association between population density and mortality rates and the direct relationship between this measure of population concentration and life expectancy. Lastly, and as a first check, the correlation matrix suggests that the multicollinearity problem (which is always present in regression analysis) is weak in this study because the explanatory variables in the estimating equations are not strongly correlated. The next sub-section is devoted to a discussion of regression results.

TABLE 4
SUMMARY STATISTICS: FULL SAMPLE

| Variables | Logarithmic means | | Arithmetic means | | Sample |
|---|---|---|---|---|---|
| | Mean | Std dev. | Mean | Std dev | sizes |
| *Outcome variables* | | | | | |
| Log of infant mortality rate in 1993 | 4.08 | 0.67 | 71.41 | 38.26 | 70 |
| Log of infant mortality rate in 1981 | 4.43 | 0.59 | 97.42 | 46.68 | 70 |
| Log of child mortality rate in 1994 | 4.35 | 0.89 | 105.84 | 73.25 | 70 |
| Log of maternal mortality rate in 1993 | 5.99 | 1.03 | 616.43 | 498.32 | 70 |
| Log of life expectancy (years) at birth in 1993 | 4.05 | 0.18 | 58.89 | 9.41 | 68 |
| Log of life expectancy at birth in 1981 | 4.00 | 0.16 | 55.54 | 9.34 | 70 |
| [Log of the difference between the target length of life in years and the actual life expectancy at birth in 1993)*(minus 1)]. This is the percentage decline in the gap between achievable life expectancy and actual life expectancy, which in our case is the negative of log of (80 minus actual life expectancy) | -2.88 | 0.57 | -20.11 | 10.36 | 70 |
| *Process and input variables* | | | | | |
| Log of average real consumer price index for the period 1980-91 | 4.46 | 0.35 | 93.23 | 51.58 | 68 |
| Log of average real per capita income for the period 1980-91 in US dollars | 6.47 | 0.92 | 989.07 | 982.20 | 70 |
| Rating of a country's implementation of a structural adjustment reform during the period 1980-91 by the Operations and Evaluation Department of the World Bank (1=satisfactory; 0=unsatisfactory) | 0.35 | 0.48 | 0.35 | 0.48 | 70 |
| Log of the total number of conditionalities attached to structural adjustment loans received by a country over the period 1980-91 in mill. US dollars | 4.38 | 0.75 | 57.87 | 71.60 | 70 |
| Log of average adult literacy rate over the period 1980-91 (per cent literate) | 3.90 | 0.53 | 56.06 | 25.07 | 54 |
| Log of average population density over the period 1981-91 | -3.26 | 1.22 | 0.08 | 0.11 | 69 |
| Dummy for Africa region (=1 if a country is in the Africa and zero otherwise) | 0.47 | 0.50 | 0.47 | 0.50 | 70 |
| Dummy for Latin America region (=1 if a country falls within the Latin America region and zero otherwise) [Asia Region is the excluded dummy] | 0.30 | 0.46 | 0.30 | 0.46 | 70 |
| Dummy for Asia, Middle East and North Africa | 0.23 | 0.42 | 0.23 | 0.42 | 70 |
| Public sector reform =1 if the loan was given to restructure the public sector and zero otherwise [the rest of reform type dummies (see below) are defined similarly] | 0.03 | 0.17 | 0.03 | 0.17 | 70 |
| Agricultural reform | 0.10 | 0.30 | 0.10 | 0.30 | 70 |
| Financial reform | 0.03 | 0.17 | 0.03 | 0.17 | 70 |
| Trade reform | 0.10 | 0.30 | 0.10 | 0.30 | 70 |
| Other sectoral reform | 0.07 | 0.26 | 0.07 | 0.26 | 70 |
| Economy-wide reform | 0.29 | 0.46 | 0.29 | 0.46 | 70 |
| Population in 1981 (millions) | | | 42.35 | 143.16 | 70 |
| Population in 1991 (millions) | | | 52.55 | 171.73 | 70 |

Source: Author's calculations.

TABLE 5
SAMPLE MEANS OF THE VARIABLES USED IN REGRESSION ANALYSIS
(STANDARD DEVIATIONS IN PARENTHESES)

| Dependent variables | Countries with World Bank loans | All countries in study sample | A priori sign of the estimated health effect |
|---|---|---|---|
| Log of infant mortality rate in 1993 | 4.12 | 4.08 | na (not applicable) |
| | (0.69) | (0.68) | |
| Log of child mortality rate in 1994 | 4.44 | 4.34 | na |
| | (0.94) | (0.89) | |
| Log of maternal mortality rate in 1993 | 6.10 | 5.99 | na |
| | (1.00) | (1.03) | |
| Log of infant mortality rate in 1981 | 4.39 | 4.43 | na |
| | (0.63) | (0.59) | |
| Log of life expectancy at birth in 1981 | 3.99 | 4.00 | na |
| | (0.17) | (0.16) | |
| [Log of the difference between the desired length of life (80 years) and the actual life expectancy at birth in 1993)*(minus 1)] | -2.94 | -2.87 | na |
| | (0.60) | (0.57) | |
| Explanatory variables | | | |
| Log of average real consumer price index for the period 1980-91 | 4.43 | 4.46 | negative |
| | (0.32) | (0.35) | |
| Log of average real per capita income for the period 1980-91 | 6.51 | 6.47 | positive |
| | (0.91) | (0.92) | |
| World Bank Rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | 0.55 | 0.35 | uncertain |
| | (0.50) | (0.48) | |
| Log of the total number of conditionalities attached to structural adjustment loans received by a country over the period 1980-91 | 4.37 | 4.28 | uncertain |
| | (0.75) | (0.75) | |
| Log of average population density over the period 1981-91 | -3.35 | -3.26 | positive |
| | (1.28) | (1.22) | |
| Dummy for Africa region (=1 if a country is in Africa and zero otherwise) | 0.59 | 0.47 | uncertain |
| | (0.50) | (0.50) | |
| Dummy for Latin America region (=1 if a country falls within the Latin America region and zero otherwise) | 0.27 | 0.30 | uncertain |
| | (0.45) | (0.46) | |
| Dummy for Asia, Middle East and North Africa | 0.14 | 0.23 | uncertain |
| | (0.35) | (0.42) | |
| Public sector reform =1 if the loan was given to restructure the public sector and zero otherwise | 0.04 | 0.03 | uncertain |
| | (0.20) | (0.17) | |
| Agricultural reform | 0.16 | 0.10 | uncertain |
| | (0.37) | (0.30) | |
| Financial reform | 0.04 | 0.03 | uncertain |
| | (0.20) | (0.17) | |
| Trade reform | 0.14 | 0.10 | uncertain |
| | (0.35) | (0.30) | |
| Other sectoral reform | 0.16 | 0.07 | uncertain |
| | (0.37) | (0.26) | |
| Economy-wide reform | 0.47 | 0.29 | uncertain |
| | (0.50) | (0.46) | |
| Sample size | 43-51 | 68-70 | |

Source: Author's calculations.

TABLE 6
CORRELATION MATRIX OF THE VARIABLES USED IN REGRESSION ANALYSIS
ALL COUNTRIES

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) Log of infant mortality rate | 1.00 | | | | | | | | | | | | | | | |
| (2) Log of maternal mortality rate | 0.88 | 1.00 | | | | | | | | | | | | | | |
| (3) Log of life expectancy | -0.94 | -0.95 | 1.00 | | | | | | | | | | | | | |
| (4) Log of child mortality rate | 0.96 | 0.91 | -0.93 | 1.00 | | | | | | | | | | | | |
| (5) Log of average real price index | 0.01 | -0.1 | 0.05 | 0.02 | 1.00 | | | | | | | | | | | |
| (6) Log of real per capita income | -0.85 | -0.85 | 0.83 | -0.85 | 0.12 | 1.00 | | | | | | | | | | |
| (7) Performance rating by World Bank | -0.15 | -0.13 | 0.15 | -0.19 | -0.12 | 0.03 | 1.00 | | | | | | | | | |
| (8) Log of average population density | -0.22 | -0.07 | 0.17 | -0.25 | -0.27 | -0.02 | 0.12 | 1.00 | | | | | | | | |
| (9) Log of World Bank conditionalities | 0.02 | 0.2 | -0.16 | 0.18 | -0.11 | -0.19 | 0.11 | 0.15 | 1.00 | | | | | | | |
| (10) African region | 0.67 | 0.69 | -0.76 | 0.69 | -0.01 | -0.57 | -0.01 | -0.3 | 0.22 | 1.00 | | | | | | |
| (11) Latin America region | -0.66 | -0.78 | 0.76 | -0.67 | 0.11 | 0.68 | -0.08 | -0.19 | -0.29 | -0.67 | 1.00 | | | | | |
| (12) Public sector reform | 0.3 | 0.26 | -0.25 | 0.31 | 0.08 | -0.23 | -0.05 | -0.34 | -0.03 | 0.22 | -0.15 | 1.00 | | | | |
| (13) Agricultural sector reform | -0.35 | -0.44 | -0.41 | -0.39 | 0.36 | 0.39 | -0.09 | -0.01 | -0.03 | -0.46 | 0.52 | -0.1 | 1.00 | | | |
| (14) Financial sector reform | -0.04 | -0.16 | 0.12 | -0.05 | -0.05 | 0.09 | 0.13 | -0.01 | -0.02 | -0.17 | 0.26 | -0.04 | -0.07 | 1.00 | | |
| (15) Trade sector reform | -0.04 | -0.03 | 0.08 | 0.01 | 0.03 | 0 | 0.11 | 0.21 | -0.25 | -0.09 | 0.00 | -0.11 | -0.21 | -0.08 | 1.00 | |
| (16) Other sectoral reform | 0.17 | 0.15 | -0.19 | 0.16 | -0.11 | -0.21 | -0.07 | -0.08 | 0.06 | 0.33 | -0.22 | -0.08 | -0.15 | -0.06 | -0.16 | 1.00 |

Source: Based on author's calculations.

## 4.2 Estimation results

### *4.2.1 Preliminaries*

Tables 7-10 present results of regression estimation of demand models formulated in section 2 [see equation (3)]. As explained in section 2, the data set used for estimation was created by pooling cross sectional data obtained from countries in Africa, Latin America and Asia. The key assumption in econometric estimations is that the slope coefficients for health capital demand functions in the three regions are the same, but the intercepts of the functions differ because of regional specific effects. This assumption could not be rejected after comparing regression results for countries from each of the three regions. Moreover, the dummy variable test did not reveal any significant changes in slopes of demand functions across regions; hence the pooled regression results are the preferred estimates and are the ones reported. Another preliminary point to be noted is that demand quantities are flow variables and this fact should be taken into account in the estimation of demand models. As it happens, three of the variables used as indicators of health capital stocks in this study are flow variables (the three mortality rates) but the fourth variable (life expectancy at birth) is a stock variable. To stress the discussion in a previous section, the assumption in model estimations is that an increase in mortality over a given time period indicates a reduction in demand for health investment over that period while an increase in life expectancy over the same period indicates an increase in demand for health investment. Since life expectancy is a stock variable, it needs to be transformed into a flow variable before being specified as a dependent variable in a demand model.

If health capital investment is viewed like any other investment good, the theory of demand for durable capital suggests that the difference between actual life expectancy and desired or feasible life longevity is the flow variable that we need. Ideally, any number can be chosen as the desired life expectancy, depending of course, on the choice criterion. In this study, the desired life expectancy is 80 years (see also UNDP 1990 and Anand and Ravallion 1993). In a given time period, the difference between actual life expectancy and the one that is desired declines as demand for health stocks rises. When the two life expectations are the same at a given point in time, any initial (negative or positive) difference between them is zero. We work with the negative discrepancy because for a target life expectancy of 80, the discrepancy increases (from negative values towards the zero value) as actual life expectancy rises. The positive relationship between the *negative discrepancy* and actual life expectancy makes the estimated parameters easier to interpret because the parameters differentiate between the factors which improve health status from those which do not. Also, note that in addition to turning life expectancy into a flow variable, the transformation just outlined accounts for the fact that the cost of an additional

unit of health capital is non-constant at various levels of life expectancy. It should be recalled that the explanatory variables in the demand equations are for the period 1980-91 while the dependent variables are for 1993 (in the case of life expectancy and infant and maternal mortality rates and for 1994 (in the case of child mortality rate); the year 1992 can be counted as part of 1980-91 or as part of 1993-94 without any change in the results presented.

Finally, three specifications of demand models are estimated: (a) model 1 is estimated without inclusion of reform type dummies and the full sample is used for estimation; (b) model 2 includes the number of conditionalities without reform type dummies and is estimated using the sample of only the countries that participated in structural adjustment programmes; (c) model 3 includes reform type dummies and is estimated with data from the full sample.

Note the absence of schooling or literacy variable in all the regression models. Initial exploration of the effect of schooling on health status showed that this effect was always positive (always increasing life expectancy or decreasing mortality rates) and exceptionally strong in terms of statistical significance and impact on health effects of other regressors. Consequently, we concluded, as forcefully argued by Fuchs (1996), that the 'schooling-causes-health hypothesis' is *false* because both schooling and health indicators are measures of the same thing – investment in human capital. Thus, to the extent that schooling and mortality (or longevity) are each a good proxy for human capital, the two variables would by their very nature be strongly correlated; the schooling variable was thus omitted from all regressions.

### *4.2.2 Main findings*

Looking at the top panel of Table 7, the striking observation about health effects of prices and incomes is their consistency across the three specifications. First, the estimated signs of the effects are the same as the theoretical signs: demand for health capital declines with the consumer price index and increases with per capita income. The magnitudes of the estimated effects show that health capital is inelastic with respect to price and income: a ten per cent increase in consumer price index reduces demand for health capital by .35 to .96 per cent across the three specifications, whereas a ten per cent increase in income raises it by 3.1 to 3.3 per cent. The price elasticities however are statistically insignificant. The positive and less than unity demand responses to income indicate that health capital is a necessary good. The inelastic price response indicates that health capital has few substitutes. In a similar specification, but without controlling for other covariates, Anand and Ravallion (1993) obtained an income elasticity of .45: that is, a ten per cent increase in incomes raises health capital demand by 4.5 per cent. These results should be contrasted with findings related to effects of prices and incomes on the demand for health care services (inputs into health

production). Public health expenditure (a proxy for aggregate health care consumption) is generally elastic with respect to per capita income (Gertler and Van der Gaag 1990). However, when health care consumption is approximated by the number of visits to health facilities at the micro level, price and income elasticities of demand for health services vary considerably (from inelastic to elastic estimates) depending on estimation methods and types of data sets used (see, e.g., Reddy and Vandermoortele 1996).

Another noteworthy result from the top panel of Table 7 is the effect of a country's performance in implementing structural adjustment programmes on health status of the population. The coefficient on performance rating shows that other things being equal countries that implemented structural adjustment programmes in a manner considered satisfactory by the World Bank Operations and Evaluation Department had better health outcomes at the end of the adjustment period than countries that had unsatisfactory programme implementation record. In particular, the logarithm of life expectancy was higher by .126 to .183 for good adjusters (or by about 1.13 to 1.20 years). Taking model 3 as the preferred specification, the results show that good adjusters had gained about 1.13 years of extra life over the period 1980-93 relative to poor adjusters or to countries that did not participate in the Bank's economic recovery programmes. An issue now arises as to the criteria used to classify countries as good or poor adjusters.

I did not examine the original documents of the Bank as to specific methods used to assess adjustment performance of countries. However, on the basis of a recent publication by the World Bank, Jayarajah *et al.* (1996: pp.36 and 129), *Social Dimensions of Adjustment: World Bank Experience 1980-93*, a country was a good adjuster if it 'followed the right policy and got the right result', if it followed the right policy but got the wrong result (due perhaps to adverse external shocks), or if it 'implemented 70 percent or more of a core cluster of supply-side policies and measures'. The right policies must have been those agreed upon by a country and by the Bank before the structural adjustment loan was disbursed (e.g., devaluation of a national currency). The outcome of the policy was 'right' if it reduced inflation, increased internal resource balance or increased net foreign exchange reserves. 'Satisfactory' or 'unsatisfactory' implementation of structural adjustment programme is taken, in this study, as an indicator of the quality of macroeconomic management during the adjustment period or of the capacity of governments to implement reforms over the same time interval. Thus the rating dummy in the estimated equations is presumed to capture the quality of public decisions and actions, as well as the national institutional capacities during the adjustment period so that the coefficient on it shows how efficiency in resource use arising from effective management of the economy affected the health status of the population.

The middle panel of Table 7 shows the effects of unobservable region-specific factors on health investment, or equivalently, on health capital formation. Rate of capital formation over the adjustment period was lower in Africa relative to its rates in Asia and Latin America. As a result of regional factors, Africa experienced a decline of about 1.46 to 1.56 years of life expectancy relative to life expectancy in Asia (the coefficient on Africa dummy ranges from -.38 to -.44). Latin American countries had a higher rate of health capital formation (1.23 to 1.36 years) relative to Asian countries.

The last panel of Table 7 (model 3) shows health effects of sectoral reforms relative to macroeconomic reforms. First, except for financial reforms, sectoral reforms were more beneficial to health relative to economy-wide reforms (as the coefficients on sectoral reform dummies are generally positive) but the estimated benefits are statistically insignificant. Similarly health effects of loan conditionalities (model 2) although positive are statistically insignificant. Population density has a positive and statistically significant effect on life expectancy. This variable probably captures the effect of urbanization on health status or of urban bias in resource allocation. In terms of the explanatory power of the estimated models, the overall test statistics at the bottom of Table 7 show that the regression lines fit the pooled data reasonably well. The corrected R-squareds in the three specifications range from .76 to .83, showing that a considerably large percentage of the variation in life expectancy is accounted for by the variables included in the estimated equations.

What was the overall effect of reforms on health status as measured by life expectancy? To answer this question, we make two assumptions (a) reforms had no effect on income and so the impact of income on health status is set to zero (b) reforms increased the consumer price index but since health effects of this variable are insignificant, they can be set to zero. If, following the spirit of assumption (b) the insignificant coefficients in Table 7 are set to zero, the conclusion is that successful implementation of structural adjustment programmes increased health status (the coefficient on the rating dummy is positive). As noted earlier, this gain appears to have come from improved efficiency in macroeconomic management. This efficiency, however, seems to have come at the expense of equity because the sectoral reforms which were targeted to social sectors are generally positively correlated with health status.

Relaxing assumption (b) and aggregating the coefficients on reform dummies (the distributional effects), we note that they sum to -.168, a magnitude greater (in absolute sense) than their efficiency effect, which is .126. From this it can be concluded that structural adjustment reforms were harmful to health. However, since the coefficients on dummies are statistically insignificant, the conclusion

which is consistent with econometric results is that 'good adjusters' had better health outcomes at the end of the adjustment period than 'poor adjusters' or the 'non-adjusters'.

The results concerning mortality rates in Tables 8-10 are similar to those presented in Table 7. Briefly, an increase in consumer price index is associated with an increase in mortality, which implies a decline in health capital formation; an exception is the price coefficient in model 3 Tables 10. Further, price elasticities of the three mortality rates (infant, child and maternal) are all less than unity and statistically insignificant; they range from .027 to .227 for the three mortality rates in all the three specifications. The income elasticities are negative and statistically significant; they range from -.486 to -.707 for three mortality rates across the three specifications. In general, maternal and child mortality rates are more responsive to changes in income than the infant mortality rate. For example, taking model 2 as the preferred specification, a ten per cent increase in income reduces child and maternal mortality rates by 7.1 and 5.9 per cent respectively, while the same proportional increase in income reduces infant mortality by 5.4 per cent. The strong negative effect of income (real per capita expenditure) on mortality (crude death rate) has recently been reported by Cornia and Paniccia (1996) for Central and Eastern Europe, an area outside the regions from which the sample for this study was derived. Controlling for health effects of psychological and physiological stress due to sudden loss of income, they report an elasticity of crude death rate with respect to real per capita expenditure of about .11, so that a ten per cent increase in expenditure reduces crude death rate by 1.1 per cent. This elasticity reinforces the observation that health is a necessary good. The results for Central and Eastern Europe provide *some* justification that the findings for Africa, Asia and Latin America may be generalized to other regions.

The coefficient on Bank rating of reform implementation is negative in all the specifications and for all mortality rates. However, its coefficient is statistically significant in only three specifications (two in the case of child mortality rate and one in the case of maternal mortality). All the three mortality rates decline with increases in population density, with child mortality being the most responsive to changes in population density. All the three mortality rates are positively associated with unobservable locational factors specific to Africa. However, unobservable locational factors in Asia and Latin America do not affect mortality rates differently in the two regions. The coefficients on reform dummies are statistically insignificant in all the specifications; nonetheless, the specifications fit the data quite well (the corrected R-squareds range from .66 to .81).

TABLE 7
ROBUST REGRESSION ESTIMATES OF EFFECTS OF REFORMS ON LIFE EXPECTANCY:
DEPENDENT VARIABLE IS -LOG (80 MINUS LIFE EXPECTANCY IN 1993)*

| | Estimated coefficients | | |
|---|---|---|---|
| Explanatory variables | Model 1 | Model 2 | Model 3 |
| Constant | -4.355 | -4.999 | -4.555 |
| | (8.35) | (5.61) | (8.97) |
| Log of average consumer price index for the period 1980-91 | -0.096 | -0.048 | -0.035 |
| | (1.02) | (0.30) | (0.37) |
| Log of average real per capita income for the period 1980-91 | 0.311 | 0.334 | 0.323 |
| | (9.22) | (7.05) | (8.95) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | 0.139 | 0.183 | 0.126 |
| | (2.02) | (2.34) | (2.12) |
| Log of the total number of conditionalities attached to structural adjustment loans received by a country over the period 1980-91 | | 0.042 | |
| | | (0.76) | |
| Log of average population density over the period 1980-91 | | | 0.060 |
| | | | (2.05) |
| Regional dummies (Asia region is the excluded dummy) | | | |
| Dummy for Africa region (=1 if a country is in Africa and zero otherwise) | -0.444 | -0.401 | -0.378 |
| | (4.75) | (6.23) | (2.12) |
| Dummy for Latin America region (=1 if a country falls within the Latin America region and zero otherwise) | 0.204 | 0.311 | 0.255 |
| | (1.79) | (2.36) | (2.17) |
| Reform type dummies (economy-wide reform is the excluded dummy) | | | |
| Public sector reform = 1 if the loan was given to restructure the public sector and zero otherwise (and so on for other dummies) | | | 0.012 |
| | | | (0.17) |
| Agricultural reform | | | -0.193 |
| | | | (0.19) |
| Financial reform | | | -0.094 |
| | | | (0.99) |
| Trade reform | | | 0.161 |
| | | | (0.11) |
| Other reforms | | | 0.106 |
| | | | (1.32) |
| Adjusted R-squared | 0.77 | 0.83 | 0.76 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.27 | 0.26 | 0.28 |
| Degrees of freedom | 61 | 32 | 54 |
| Mean and [standard deviation of dependent variable] | -2.86 [.57] | -2.88 [.62] | -2.85 [.57] |
| Sample size | 67 | 39 | 66 |

Note: * Absolute t-ratios in parentheses.

TABLE 8
ROBUST REGRESSION ESTIMATES OF EFFECTS OF REFORMS ON INFANT MORTALITY: DEPENDENT VARIABLE IS THE LOG OF INFANT MORTALITY RATE IN 1993*

| Explanatory variables | Estimated coefficients | | |
|---|---|---|---|
| | Model 1 | Model 2 | Model 3 |
| Constant | 6.067 | 6.384 | 6.317 |
| | (8.52) | (5.96) | (8.90) |
| Log of average consumer price index for the period 1980-91 | 0.216 | 0.227 | 0.139 |
| | (1.66) | (1.08) | (1.03) |
| Log of average real per capita income for the period 1980-91 | -0.486 | -0.539 | -0.505 |
| | (8.42) | (6.89) | (9.63) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | -0.128 | -0.184 | -0.123 |
| | (1.39) | (1.85) | (1.59) |
| Log of the total number of conditionalities attached to structural adjustment loans received by a country over the period 1980-91 | | 0.026 | |
| | | (0.38) | |
| Log of average population density over the period 1980-91 | | | -0.085 |
| | | | (2.33) |
| Regional dummies (Asia region is the excluded dummy) | | | |
| Dummy for Africa region (=1 if a country is in Africa and zero otherwise) | 0.479 | 0.338 | 0.367 |
| | (4.22) | (3.76) | (2.92) |
| Dummy for Latin America region (=1 if a country falls within the Latin America region and zero otherwise) | 0.041 | -0.051 | -0.028 |
| | (0.30) | (0.23) | (0.18) |
| Reform type dummies (economy-wide reform is the excluded dummy) | | | |
| Public sector reform = 1 if the loan was given to restructure the public sector and zero otherwise [the remaining reforms (see below) are defined similarly] | | | 0.085 |
| | | | (0.76) |
| Agricultural reform | | | 0.027 |
| | | | (0.14) |
| Financial reform | | | 0.203 |
| | | | (1.29) |
| Trade reform | | | 0.047 |
| | | | (0.31) |
| Other reforms | | | -0.006 |
| | | | (0.05) |
| Adjusted R-squared | 0.72 | 0.77 | 0.71 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.36 | 0.34 | 0.36 |
| Degrees of freedom | 62 | 32 | 55 |
| Mean and [standard deviation of dependent variable] | 4.06[.67] | 4.07 [.71] | 4.05 [.68] |
| Sample size | 68 | 39 | 67 |

Note: * Absolute t-ratios in parentheses

TABLE 9
ROBUST REGRESSION ESTIMATES OF EFFECTS OF REFORMS ON CHILD MORTALITY:
DEPENDENT VARIABLE IS THE LOG OF CHILD MORTALITY RATE IN 1994 *

| Explanatory variables | Estimated coefficients | | |
|---|---|---|---|
| | Model 1 | Model 2 | Model 3 |
| Constant | 7.161 | 7.662 | 7.451 |
| | (9.41) | (6.39) | (9.46) |
| Log of average consumer price index for the period 1980-91 | 0.220 | 0.279 | 0.116 |
| | (1.77) | (1.29) | (0.86) |
| Log of average real per capita income for the period 1980-91 | -0.633 | -0.707 | -0.651 |
| | (10.33) | (7.17) | (10.50) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | -0.196 | -0.323 | -0.219 |
| | (1.76) | (2.54) | (2.31) |
| Log of the total number of conditionalities attached to structural adjustment loans received by a country over the period 1980-91 | | -0.004 | |
| | | (0.05) | |
| Log of average population density over the period 1980-91 | | | -0.108 |
| | | | (2.41) |
| Regional dummies (Asia region is the excluded dummy) | | | |
| Dummy for Africa region (=1 if a country is in Africa and zero otherwise) | 0.716 | 0.524 | 0.561 |
| | (4.40) | (2.99) | (3.62) |
| Dummy for Latin America region (=1 if a country falls within the Latin America region and zero otherwise) | 0.960 | -0.11 | 0.011 |
| | (0.51) | (0.43) | (0.06) |
| Reform type dummies (economy-wide reform is the excluded dummy) | | | |
| Public sector reform = 1 if the loan was given to restructure the public sector and zero otherwise [the remaining reforms (see below) are defined similarly] | | | 0.231 |
| | | | (1.37) |
| Agricultural reform | | | -0.007 |
| | | | (0.03) |
| Financial reform | | | 0.292 |
| | | | (1.61) |
| Trade reform | | | 0.228 |
| | | | (1.32) |
| Other reforms | | | 0.032 |
| | | | (0.18) |
| Adjusted R-squared | 0.75 | 0.80 | 0.75 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.45 | 0.43 | 0.45 |
| Degrees of freedom | 62 | 32 | 55 |
| Mean and [standard deviation of dependent variable] | 4.32 [.89] | 4.36 [.97] | 4.31 [.89] |
| Sample size | 68 | 39 | 67 |

Note: * Absolute t-ratios in parentheses.

TABLE 10
ROBUST REGRESSION ESTIMATES OF EFFECTS OF REFORMS ON MATERNAL MORTALITY: DEPENDENT VARIABLE IS THE LOG OF MATERNAL MORTALITY RATE IN 1993

| | Estimated coefficients | | |
|---|---|---|---|
| Explanatory variables | Model 1 | Model 2 | Model 3 |
| Constant | 9.812 | 10.07 | 10.21 |
| | (8.35) | (6.34) | (8.81) |
| Log of average consumer price index for the period 1980-91 | 0.090 | 0.036 | -0.027 |
| | (0.42) | (0.12) | (0.13) |
| Log of average real per capita income for the period 1980-91 | -0.672 | -0.586 | -0.686 |
| | (8.21) | (5.67) | (8.47) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | -0.109 | -0.297 | -0.090 |
| | (0.82) | (2.16) | (0.70) |
| Log of the total number of conditionalities attached to structural adjustment loans received by a country over the period 1980-91 | | -0.058 | |
| | | (0.69) | |
| Log of average population density over the period 1980-91 | | | -0.084 |
| | | | (1.42) |
| Regional dummies (Asia region is the excluded dummy) | | | |
| Dummy for Africa region (=1 if a country is in Africa and zero otherwise) | 0.532 | 0.401 | 0.392 |
| | (2.43) | (2.21) | (1.63) |
| Dummy for Latin America region (=1 if a country falls within the Latin America region and zero otherwise) | -0.297 | -0.717 | -0.339 |
| | (1.24) | (3.42) | (1.38) |
| Reform type dummies (Economy-wide reform is the excluded dummy) | | | |
| Public sector reform = 1 if the loan was given to restructure the public sector and zero otherwise [the remaining reforms (see below) are defined similarly] | | | 0.076 |
| | | | (0.55) |
| Agricultural reform | | | -0.059 |
| | | | (0.31) |
| Financial reform | | | 0.084 |
| | | | (0.39) |
| Trade reform | | | 0.059 |
| | | | (0.28) |
| Other reforms | | | 0.041 |
| | | | (0.16) |
| Adjusted R-squared | 0.69 | 0.81 | 0.66 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.57 | 0.45 | 0.59 |
| Degrees of freedom | 62 | 32 | 55 |
| Mean and [standard deviation of dependent variable] | 5.96 [1.03] | 6.01 [1.03] | 5.94[1.02] |
| Sample size | 68 | 39 | 67 |

Note: * Absolute t-ratios in parentheses.

# V SUMMARY AND CONCLUSION

## 5.1 Summary of the approach

The main aim of this paper was to assess health effects of structural adjustment programmes in developing countries using cross section data. The reforms for which effects have been assessed were implemented during 1980-93. The evaluation was done under the assumption that 1993-94 was the end of the implementation period, and that the health status observed in developing countries in 1993-94 was a result of accumulated effects of reforms undertaken at various points during 1980-91. The data for the study were obtained from documents of the World Bank, the International Monetary Fund, and United Nations Development Programme (see data appendix). Data on measures of health status (mortality rates and life expectancy) were obtained for countries that participated in the World Bank economic recovery reforms (structural adjustment programmes) and for countries which did not undertake these reforms or undertook them independently of the World Bank. Since no information on reforms was available for countries *not* participating in the World Bank programmes, all such countries were treated as non-reformers in the analysis. Note that treating such countries as having pursued different types of reforms would not change the results of the analysis.

The key variable in the evaluation is the effectiveness of a country in implementing reforms during 1980-91 as rated by the Operations and Evaluation Department of the World Bank for each participating country in a recent publication (World Bank 1996:138-43). The effect of this variable on health status was assessed controlling for effects of other factors such as per capita income and consumer prices. The basic idea is that a reform in any sector of the economy might be beneficial or harmful to health via its effects on factors that are used in health production. If a beneficial reform is successfully implemented, it increases health status, and conversely for a harmful reform. An additional assumption (which was also tested) is that different reforms might affect health status differently even when effectiveness in their implementation is the same, e.g., health effect of a public enterprise reform might be different from that of a trade reform. Thus, in addition to assessing health effects of successful implementation of reforms, reform-specific effects were evaluated. To evaluate these effects dummy variables were constructed for reform types. Since the adjusting countries did not implement the same set of reforms, mutually exclusive dummies were constructed for each country. First, a list of reforms was compiled from the adjusting countries. From this list, six clusters of reforms were formed, namely: trade, financial, agricultural, public enterprise, other sectoral, and macroeconomic reforms. Each country was assigned one of these reform clusters. In a rare case when a country had more than one cluster (or components

of different clusters), the cluster or component with the largest amount of loan was chosen. The coefficients on reform type dummies therefore indicate health effects of particular reform clusters relative to a *reference* reform cluster. A weakness of the reform dummies used is that they were constructed under the assumption that each reform was implemented independently of any other, even though many of the adjustment reforms were negotiated and undertaken as a package (Lipumba 1995). One way of mitigating this problem is to interact the various dummies and to test whether the interaction term coefficients are statistically significant. This approach was not followed because of the sample size problem and also because even without the degrees-of-freedom problem introduction of many dummies in the estimated equations would confound the effects of continuous variables (see e.g., Maddala 1977). Nonetheless, the approach used in the study is reasonable for two reasons. First, even if the reforms were implemented as a package, they might not have had a synergistic effect on health, as the impact of each reform on mortality or longevity could still have been independent of other reforms; there might however be an issue of omitted variable bias in the estimated results since the 'systems effect' of reforms was not controlled for. Second, the reforms might have been negotiated as a package but might not have been implemented as such due to bureaucratic inertia and/or implementation difficulties in borrower countries.

A unique feature of this paper is its 'micro-macro' approach: an articulation of a formal behavioral model of human capital formation at the individual level, estimated with aggregate, country level data. Thus, an issue arises as to the appropriateness of this approach, which attempts to 'explain' observed demographic aggregates – mortality rates and population's life expectancy using a microeconomic model of human capital formation. Another pertinent concern relates to the validity of quantification of health effects of structural adjustment reforms and of the usual economic factors, as carried out in the empirical section of the analysis, despite the fact that *health* is treated as an *unobservable* quantity in the foundational section of the paper [see equations (1 and 2)]. A final point to be noted, with respect to the paper's approach, is the cross-sectional data set that is used to estimate parameters of aggregate demands for health across countries. These three issues need to be clarified so that the findings of the paper can be interpreted objectively.

The question as to whether it is appropriate to embed a structure of human behavior in an aggregative model designed to understand a macro phenomenon such as mortality rate touches on the well known debate as to whether a macro model requires a micro foundation, a matter over which there is no consensus in the literature (see e.g., Snowdon *et al.* 1994). The approach in this paper is consistent with the macroeconomic literature that argues for incorporation of micro-level (human) behavior in aggregate models. Lucas (1988, p. 36) argues

forcefully in support of this approach in his well known *mechanics of economic development* when he states ... 'aggregate models based on constructs that have implications for data *other* (his emphasis) than aggregates – models with 'microeconomic foundations' if you like – permit us to bring evidence to bear on questions of aggregative importance that cannot be resolved with aggregate theory and [aggregate] observations alone. Without the ability to do this, we can do little more than extrapolate into the future, and then be caught by surprise every time one of the trends changes.' Estimation, in this paper, of demographic models based on household behavior using macro rather than micro data, enables us to bring to bear the best available cross-sectional evidence on aggregate demographic patterns that cannot be understood on the basis of aggregate theory and data alone. It should be noted that in this study, as in other cross-sectional studies (see e.g., Slemrod 1995; and Rodrik 1996b) cross-country regression analysis does not reveal differences within countries nor does it take into account the effect of time. Nonetheless, cross-country regressions can be fruitfully used, as in this study, to detect regularities among covariates across countries in a given time period. Lastly, even though health capital is unobservable [as noted in the theoretical section of this paper; see also Lucas (1988:35) for the case of human capital in general], it can be quantified by using measurable variables as its proxies. It has been argued in the paper that at the micro level, body mass index (BMI) is a good proxy for health capital, whereas, at the aggregate level, the appropriate proxies for health capital are mortality rates and life expectancy. It is important to stress that the proxies just mentioned are merely *quantitative approximations* to one of the dimensions of human capital rather the units by which this capital is measured. Note for example that years of schooling or years of life expectancy are *not measures* of human capital, but yardsticks for measuring phenomena, believed at the moment, to be analogous to human capital. As Lucas (1988:35) states, human capital – something that is part and parcel of human beings (see Schultz 1963) – 'is simply an unobservable magnitude or force, with certain assumed properties.' Two properties of this invisible force are that it can be enhanced by observable factors, e.g., medical care and nutrient intake and that it has observable consequences, e.g., increases in labour productivity.

## 5.2 Conclusions and policy implications

This study has four main findings. The first finding is that previous period's income is strongly correlated with all key measures of health status. In particular the higher the previous period's per capita income the higher the life expectancy of a country. Similarly, previous incomes are inversely correlated with infant and child mortality rates and with maternal mortality. The strong association between previous income with current period health status explains why improvements in health in developing countries have been observed during periods of economic

crisis. Such improvements are possible if previous incomes were used to accumulate health capital stocks and to create an effective social service infrastructure. The strong correlation between health status and previous investment record of the economy further helps explain why a deterioration in health status and economic depression can be observed at the same time: such a simultaneous occurrence would be due to insufficient investments in health stocks and health maintenance systems in previous periods. The key fact behind this finding is that health status is a stock variable so that its current period level depends crucially on health investment patterns and policies in previous periods. Thus, a large mortality rate in a period of economic crisis is not merely a result of that particular crisis (which triggers such a mortality rate), but also and *primarily*, a consequence of accumulated erosion in the stock of health capital, and health care infrastructure. A related finding is that the positive response of health capital to income is inelastic, which implies that health capital is a necessary good. The small variation in health capital demand, as one moves from poor to rich countries, suggests that health capital has attributes of a merit good and its provision therefore requires attention of society. Since health demand varies relatively little across income levels, the health expenditure would tend to take a large share of the income of the poor and so distributional issue is another reason why health capital maintenance should be the concern of society.

The second finding of the paper is that developing countries that satisfactorily implemented structural adjustment reforms during the period 1980-93 ended up with better health outcomes than poor adjusters or the countries that did not restructure their economies or did not participate in economic recovery programmes of the *type* sponsored by the World Bank. Note that statistical insignificance of some of the reform-type effects does not imply that they cannot be used to inform economic policy. See, e.g. McCloskey and Ziliak (1996) for a distinction between statistical significance and economic or policy significance of regression results.

The health effect of reform rating hinges on definition of 'satisfactory' implementation of a reform, on what the Bank rating of a country's implementation performance captures, and on magnitudes of offset effects of the reforms implemented. The rating of how well reforms were implemented might be strongly correlated with the quality of public management of the economy so that countries which had effective public institutions before the onset of reforms effected reforms that were beneficial to health better than countries without such institutions. The linkage between effectiveness in reform implementation and well functioning public institutions such as the various ministries of government, implies that reform implementation should be preceded by investments that enhance administrative and managerial capabilities in public service institutions. This institutional dimension of reform is as important as its well known social

dimension in the success or failure of economic policies. Note that the hypothesized positive association between success in reform implementation and institutional capability implies that health status would have improved in countries that had strong institutional capability even without the structural adjustment reforms; it also suggests that health status would have improved even more in such countries if they undertook reforms. Micro-level data however are needed to verify the hypothesized linkage between institutional capacity (the definition of which is outside the scope of this paper) and effective implementation of reforms.

An alternative to the institutional viewpoint is that effectiveness in reform implementation is positively correlated with economic growth; thus, countries with higher growth during the adjustment period (1980-91) were better able to improve the health status of the population than countries with lower growth. Further regression analysis (see Appendix B, Appendix Table 3) supports this observation for it shows that countries which were rated as having satisfactorily implemented structural adjustment reforms grew faster than poor adjusters or countries *not* undertaking market-based reforms. Moreover, economic growth has a favorable effect on health, even though the effect is statistically insignificant. Further, even after controlling for economic growth (Apendix B, Appendix Tables 4-5), the positive health effect of successful implementation of reforms persists. This finding supports the hypothesis that better health outcomes and the Bank rating of countries are both positively correlated with factors specific to countries that were able to implement reforms effectively. It should be noted that the result that efficatious implementation of structural adjustment reforms was beneficial to health (and hence is welfare improving) is an 'average effect' of reforms in all countries; needless to say, the reforms might have hurt some countries.

The positive relationship between better health, economic growth and good rating in reform implementation can be given a strong causal interpretation: that is, well implemented reforms during 1980-91 *did* improve health status via their favourable effects on economic growth. It is a different matter altogether whether or not this gain is sustainable without another wave of reforms. The same relationship can also be given a non-causal interpretation: that is, better health, economic growth, and efficacy in reform implementation are each correlated – and in the same direction – to a fourth factor which has not been examined in the present study. This fourth factor (the 'X-efficiency' factor, for instance) might be culture, political system, extent of openness of the economy, entrepreneurial spirit, institutional capacity and so on. From the viewpoint of the non-causal interpretation, institutional capacity to do things competently is the factor that we believe underlies the correlations we have observed between economic growth, effective reform implementation and better health at the end of the adjustment

period. The recommendation to strengthen institutional capacities of countries is based on non-causal interpretation of the positive association between Bank rating and health status, that is, on the weak interpretation of our finding.

The third finding of the paper is that regional factors matter in human capital formation. The Africa region in particular seems to have peculiar factors that adversely affect the rate of health capital formation there: controlling for other factors, mortality rates are higher, and life expectancy is lower in Africa than in other regions [see e.g., Appleton *et al.* (1996) for a similar finding]. This fact should be taken into account when allocating multilateral aid to poor countries for health development.

The fourth finding of the paper is that population density in developing countries is highly correlated with measures of health status. In particular, mortality rates (infant, child, and maternal) decline as population density increases. Accordingly, life expectancy rises with population density. Population density is probably a proxy for scale economies in the provision of health care and other social services that improve health. The argument is that scale, as well as agglomeration economies in the provision of social services in densely populated areas reduces their delivery costs, thus making it possible to make them broadly available to the population. To the extent that population density coincides with the degree of urbanization of a country, it could be picking up urban bias in the allocation of health and other resources.

The main contribution of this paper is its objective assessment of health effects of efforts of a major international development agency aimed at improving economies of poor countries. The paper highlights the need to consider health effects of reforms irrespective of their sectoral origins. The orientation of the study does not overlook the key role of health ministries in health capital formation: it instead underscores the importance, in health promotion, of intersectoral collaboration and coordination of health care managers with managers in other sectors of the economy. It should be noted that in this study measures of health status, rather than money metrics have been used to quantify effects of economic reforms on people. The principal reason for this (as pointed out by Sen 1995), is that some measures of health status, such as mortality rates are good summary statistics of the effects of economic as well as non-economic policies on people and are thus a better measure of welfare than the money metrics, which focus on wealth. Moreover, since statistics on health status focus on people's state of being and of *not* being, and especially when disaggregated by age group, gender and race are more likely than statistics on income, for instance, to sensitize policy-makers into correcting biases in resource allocation and institutional arrangements in society.

## APPENDIX A

## SAMPLE SELECTION AND DATA SOURCES

This study is based on a sample of economies from developing countries as defined or classified by the International Bank for Reconstruction and Development (World Bank), the International Monetary Fund (IMF), and the United Nations Development Programme (UNDP) [see e.g., World Bank (1993, 1995, 1996); IMF (1994) and UNDP (1990, 1996)]. The initial sample included some 50 countries which participated in the World Bank structural adjustment programme over the period 1980-93 and about a similar number of countries which did not participate in this programme (see Appendix Table 1). However, the final sample used for analysis varies from 43-50 countries for programme participants and from 61-70 countries, including participants and nonparticipants because some countries did not have a complete set of all the variables needed for analysis (see Appendix Table 2 for a listing of countries for which the required data set existed). The list of programme participants during the period 1980-92 was obtained from Jayarajah *et al.* 1996, Annex Table 1.1, pp. 138-143. These are the countries for which the rating of effectiveness in implementing structural adjustment programs exists. The Bank rating of country performance, and the loans received or negotiated by each country were derived from the same table (Annex Table 1.1); the number of conditionalities was extracted from Annex Table 5.1 (pp. 171-2).

The values of the variables obtained from Annex Tables 1.1 and 5.1 (Jayarajah *et al.*, 1996) were set to zero for nonparticipants in the structutral adjustment programme between the period 1980/81 and 1992/93. These are countries included in the study sample, but which do not appear in Appendix Tables 1.1 and 5.1. As a slight digression, it is important to note that some of these countries might have participated in adjustment programmes but were not included in the sample used by the Operations and Evaluation Department of the World Bank in assessing implementation effectiveness; others might have initiated similar economic recovery programmes on their own. Suppose the countries which might have been wrongly classified as nonparticipants (while in fact they were particiapnts) also implemented their programmes in a manner that the Bank would have considered as satisfactory, does this fact affect the results of the analysis? In this case, the impact of effectiveness of programme implementation on health outcomes would be understated; that is, inclusion of these countries in the study sample would strengthen the results reported in the paper.

Nonprogramme participants were included in the study sample to avoid the well kown problem of sample selection bias in econometric analysis (Heckman 1979),

i.e., the problem of a non-representative sample. Nonprogramme participants include countries which belong to the same group as the programme participants on the basis of per capita income classification. Information on health outcomes (and other variables not in Annex Tables 1.1 and 5.1) for programme participants and nonparticipants was obtained from various sources. Data on income per capita were obtained from *World Development Reports* for 1983 and 1993 (World Bank, 1983, Table 1, p. 148 and World Bank, 1993, Table 1, p. 238). Data on health outcome indicators (infant mortality, under-five mortality, maternal mortality and life expectancy at birth) were obtained from the following documents: *Social Indicators of Development*, World Bank (1995,Table 1, p. x-xiii); *Human Development Reports*, UNDP (1996, Table 11, pp. 158-159; 1990). In case of a conflict between World Bank and UNDP figures, the figures from the UNDP were taken as the correct ones; this however happened rarely. Data on consumer price indices were obtained from the *International Financial Statistics*, International Monetary Fund (1994; various country tables). In summary, the various data sources are as follows:

I981 infant mortality rate [World Bank Development Report (1983, Table 1, pp. 148-149)]; 1993 infant mortality rate [World Bank Social Indicators of Development (1995, Table 1, pp. x-xiii)]; 1993 maternal mortality [Human Development Report (1996, Table 11, pp. 158-159)]; 1994 under-five mortality [Human Development Report (1996, Table 11, pp. 158-159)]; 1981 life expectancy [World Bank Development Report (1983, Table 1, pp. 148-149); 1991 life expectancy at birth [World Development Report (1993, Table 1, pp. 338-339)]; 1993 life expectancy at birth [Human Development Report (1996, Table 11, pp. x-xiii)]; 1981 per capita income [World Development Report (1983, Table 1, pp. 148-149)]; 1991 per capita income [World Development Report (1993, Table 1, pp. 338-339)]; 1980 and 1991consumer price indices (International Financial Statistics Year Book of IMF (1994, country tables for developing countries, line 64)].

APPENDIX TABLE 1
DATA AND BASIC VARIABLES

| Country | 1981 Infant mortality | Region code | 1991 Per capita income | 1991 Life expectancy | 1980 Consumer price index | 1991 Consumer price index | 1981 Per capita income | 1981 Life expectancy | SAP partici-pation | Reform type | OED rating | Loan amount ($ mill) | 1993 Infant mortality | 1993 Life expectancy | 1994 Under five mortality | 1993 Maternal mortality | Con-ditions number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 44 | 2 | 2790 | 71 | 0.1 | 272 | 2560 | 71 | 1 | 1 | 0 | 750 | 24 | 72.2 | 27 | 100 | 63 |
| Bolivia | 51 | 2 | 650 | 59 | 0.1 | 121 | 600 | 51 | 1 | 4 | 0 | 50 | 74 | 59.7 | 107 | 560 | 33 |
| Brazil | 64 | 2 | 2940 | 66 | 4.0 | 498 | 2220 | 64 | 1 | 1 | 0 | 500 | 57 | 66.5 | 61 | 220 | 55 |
| Chile | 42 | 2 | 2160 | 72 | 15.0 | 122 | 2560 | 68 | 1 | 4 | 1 | 250 | 15 | 73.9 | 15 | 65 | 100 |
| Colombia | 55 | 2 | 1260 | 69 | 12.0 | 130 | 1380 | 63 | 1 | 1 | 1 | 550 | 37 | 69.4 | 19 | 100 | 51 |
| Costa Rica | 27 | 2 | 1850 | 76 | 10.3 | 129 | 1430 | 66 | 1 | 3 | 1 | 252 | 13 | 76.4 | 16 | 60 | 27 |
| Ecuador | 80 | 2 | 1000 | 66 | 4.5 | 149 | 1180 | 62 | 1 | 2 | 1 | 100 | 49 | 69 | 57 | 150 | 78 |
| Guyana | | 2 | 300 | | 19.5 | 102 | | | 1 | 4 | 0 | 22 | 47 | 65.4 | 61 | | 40 |
| Haiti | 112 | 2 | 370 | 55 | 52.3 | 100 | 300 | 54 | 1 | 6 | 1 | 40 | 84 | 56.8 | 127 | 1000 | 0 |
| Jamaica | 16 | 2 | 1380 | 73 | 25.1 | 151 | 1180 | 71 | 1 | 1 | 1 | 25 | 14 | 73.7 | 13 | 120 | 166 |
| Mexico | 54 | 2 | 3030 | 70 | 0.7 | 123 | 2250 | 72 | 1 | 3 | 1 | 1600 | 35 | 71 | 32 | 110 | 111 |
| Panama | 21 | 2 | 2130 | 73 | 83.5 | 101 | 1910 | 71 | 1 | 4 | 0 | 160 | 25 | 72.9 | 20 | 55 | 68 |
| Uruguay | 39 | 2 | 2840 | 73 | 1.0 | 202 | 2820 | 71 | 1 | 1 | 0 | 60 | 20 | 72.6 | 21 | 85 | 23 |
| Venezuela | 40 | 2 | 2730 | 70 | 12.3 | 134 | 4220 | 68 | 1 | 2 | 0 | 150 | 23 | 71.8 | 24 | 120 | 0 |
| Benin | 152 | 1 | 380 | 51 | 61.8 | 102 | 320 | 50 | 1 | 4 | 1 | 45 | 86 | 47.8 | 142 | 900 | 56 |
| Burundi | 120 | 1 | 210 | 48 | 48.3 | 109 | 230 | 45 | 1 | 4 | 0 | 121 | 101 | 49.5 | 176 | 1300 | 142 |
| CA Republic | 146 | 1 | 390 | 47 | 74.0 | 97.2 | 320 | 43 | 1 | 4 | 0 | 30 | 101 | 50.3 | 175 | 700 | 110 |
| Cote d'Ivoire | 125 | 1 | 690 | 52 | 62.2 | 102 | 1200 | 47 | 1 | 4 | 0 | 501 | 91 | 50.9 | 150 | 810 | 161 |
| E-Guinea | | 1 | | | 127.4 | 96.8 | | | 1 | 6 | 0 | 10 | 116 | 48.2 | 177 | 820 | 24 |
| Gabon | | 1 | 3780 | 54 | 56.9 | 100 | | | 1 | 4 | 0 | 50 | 93 | 53.7 | 151 | 500 | 73 |
| Gambia | | 1 | 300 | | 20.3 | 109 | | | 1 | 4 | 1 | 16.5 | 131 | 45.2 | 213 | 1100 | 51 |
| Ghana | 19 | 1 | 400 | 55 | 2.8 | 118 | 400 | 54 | 1 | 4 | 1 | 264 | 80 | 56.2 | 131 | 740 | 245 |
| Guinea | 163 | 1 | 460 | 44 | | | 300 | 67 | 1 | 4 | 1 | 42 | 133 | 44.7 | 223 | 1600 | 40 |
| Guinea Bissau | | 1 | 180 | 39 | 25.9 | 158 | | | 1 | 6 | 0 | 25 | 139 | 43.7 | 231 | 910 | 80 |
| Kenya | 85 | 1 | 340 | 59 | 32.7 | 120 | 420 | 56 | 1 | 4 | 0 | 186 | 69 | 55.5 | 90 | 650 | 160 |
| Madagascar | 69 | 1 | 210 | 51 | 19.7 | 587 | 330 | 48 | 1 | 3 | 1 | 83 | 91 | 56.8 | 164 | 490 | 59 |
| Malawi | 169 | 1 | 230 | | 22.5 | 127 | 200 | 44 | 1 | 4 | 1 | 135 | 142 | 45.5 | 221 | 560 | 140 |
| Mali | 152 | 1 | 280 | 48 | 99.5 | 102 | 190 | 44 | 1 | 5 | 1 | 40 | 158 | 46.2 | 214 | 1200 | 83 |
| Mauritan | 141 | 1 | 510 | 47 | 70.6 | 106 | 460 | 44 | 1 | 4 | 1 | 42.4 | 100 | 51.7 | 199 | 930 | 169 |
| Mauritius | | 1 | 2410 | 70 | 45.4 | 107 | | | 1 | 4 | 1 | 35 | 18 | 70.4 | 23 | 120 | 33 |
| Niger | 143 | 1 | 300 | 46 | 81.1 | 92.2 | 330 | 45 | 1 | 5 | 0 | 80 | 123 | 46.7 | 320 | 1200 | 69 |

table continues

| Country | 1981 Infant mortality | Region code | 1991 Per capita income | 1991 Life expectancy | 1980 Consumer price index | 1991 Consumer price index | 1981 Per capita income | 1981 Life expectancy | SAP partici-pation | Reform type | OED rating | Loan amount ($ mill) | 1993 Infant mortality | 1993 Life expectancy | 1994 Under five mortality | 1993 Maternal mortality | Con-ditions number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nigeria | 133 | 1 | 340 | 52 | 14.2 | 113 | 870 | 49 | 1 | 3 | 0 | 250 | 84 | 50.6 | 191 | 1000 | 22 |
| Senegal | 145 | 1 | 720 | 48 | 56.7 | 98.2 | 430 | 44 | 1 | 4 | 1 | 215 | 67 | 49.5 | 115 | 1200 | 187 |
| Somalia | 145 | 1 | 640 | | 15.6 | 317 | 280 | 39 | 1 | 1 | 0 | 62.6 | 121 | 47.2 | 211 | 1600 | 27 |
| Sudan | 122 | 1 | | 51 | 3.7 | 224 | 380 | 48 | 1 | 1 | 1 | 115 | 77 | 53.2 | 122 | 660 | 21 |
| Tanzania | 101 | 1 | 100 | 51 | 7.9 | 122 | 280 | 52 | 1 | 6 | 1 | 152 | 85 | 52.1 | 159 | 770 | 67 |
| Togo | 107 | 1 | 410 | 54 | 69.6 | 100 | 380 | 48 | 1 | 4 | 1 | 77.8 | 85 | 55.2 | 132 | 640 | 113 |
| Uganda | 96 | 1 | 170 | 46 | 0.3 | 128 | 220 | 48 | 1 | 6 | 0 | 250 | 115 | 44.7 | 185 | 1200 | 81 |
| Zaire | 110 | 1 | | | 0.2 | 100 | 210 | 50 | 1 | 6 | 0 | 243 | 92 | 52 | 186 | 870 | 87 |
| Zambia | 104 | 1 | 190 | 49 | 3.0 | 197 | 600 | 51 | 1 | 6 | 0 | 212 | 103 | 48.6 | 203 | 940 | 91 |
| Zimbabwe | 72 | 1 | 650 | 60 | 27.2 | 123 | 870 | 55 | 1 | 3 | 1 | 70.6 | 67 | 53.4 | 81 | 570 | 12 |
| Indonesia | 105 | 3 | 610 | 60 | 42.1 | 109 | 530 | 54 | 1 | 3 | 1 | 600 | 56 | 63 | 111 | 650 | 221 |
| KoreaRep | 33 | 3 | 6330 | 70 | 54.5 | 109 | 1700 | 66 | 1 | 4 | 1 | 600 | 11 | 71.3 | 9 | 130 | 51 |
| Philippines | 53 | 3 | 730 | 65 | 23.2 | 119 | 790 | 63 | 1 | 4 | 0 | 502 | 43 | 66.5 | 57 | 280 | 88 |
| Thailand | 53 | 3 | 1570 | 69 | 65.1 | 106 | 770 | 63 | 1 | 4 | 1 | 326 | 36 | 69.2 | 32 | 200 | 78 |
| Morocco | 104 | 1 | 1030 | 63 | 49.6 | 108 | 860 | 57 | 1 | 4 | 1 | 350 | 67 | 63.6 | 56 | 610 | 305 |
| Tunisia | 88 | 1 | 1500 | 67 | 45.8 | 108 | 1420 | 61 | 1 | 6 | 1 | 450 | 43 | 68 | 34 | 170 | 158 |
| Bangladesh | 135 | 3 | 220 | 51 | 36.2 | 107 | 140 | 48 | 1 | 3 | 0 | 370 | 106 | 55.9 | 117 | 850 | 188 |
| Nepal | 148 | 3 | 180 | 53 | 38.1 | 116 | 150 | 45 | 1 | 4 | 1 | 50 | 98 | 53.8 | 118 | 1500 | 26 |
| Pakistan | 123 | 3 | 400 | 59 | 51.1 | 112 | 350 | 50 | 1 | 1 | 1 | 200 | 89 | 61.8 | 137 | 340 | 127 |
| Angola | 152 | 1 | | | | | | 42 | 0 | 0 | 0 | 0 | 123 | 46.8 | 292 | 1500 | 0 |
| Burkina Faso | 208 | 1 | 290 | 48 | 70.1 | 103 | 240 | 44 | 0 | 0 | 0 | 0 | 129 | 47.5 | 169 | 930 | 0 |
| Cameroon | 106 | 1 | 850 | 55 | 44.8 | 100 | 880 | 50 | 0 | 0 | 0 | 0 | 62 | 56.3 | 109 | 550 | 0 |
| Chad | 146 | 1 | 210 | 47 | 87.5 | 104 | 110 | 43 | 0 | 0 | 0 | 0 | 121 | 47.7 | 202 | 1500 | 0 |
| Congo | 127 | 1 | 1120 | 52 | 54.7 | 109 | 1110 | 60 | 1 | 4 | 0 | 70 | 84 | 51.2 | 109 | 890 | 0 |
| Ethiopia | 145 | 1 | 120 | 48 | 65.0 | 136 | 140 | 46 | 0 | 0 | 0 | 0 | 118 | 43.7 | 200 | 1400 | 0 |
| Lesotho | 113 | 1 | 580 | 56 | 28.5 | 118 | 540 | 52 | 0 | 0 | 0 | 0 | 78 | 60.8 | 156 | 610 | 0 |
| Liberia | 152 | 1 | | | 85.2 | 131 | 520 | 54 | 0 | 0 | 0 | 0 | 124 | 55.6 | 217 | 560 | 0 |
| Mozambique | 113 | 1 | 80 | 47 | 8.9 | 133 | | | 0 | 0 | 0 | 0 | 147 | 46.4 | 277 | 1500 | 0 |
| Rwanda | 137 | 1 | 270 | 46 | 65.4 | 120 | 250 | 46 | 0 | 0 | 0 | 0 | 110 | 47.2 | 139 | 1300 | 0 |
| Sierra Leone | 205 | 1 | 210 | 42 | 0.7 | 203 | 320 | 47 | 0 | 0 | 0 | 0 | 165 | 39.2 | 284 | 1800 | 0 |
| S. Africa | 94 | 1 | 2560 | 63 | 25.5 | 115 | 2770 | 63 | 0 | 0 | 0 | 0 | 52 | 63.2 | 68 | 230 | 0 |
| Algeria | 114 | 1 | 1980 | 66 | 39.6 | 126 | 2140 | 56 | 0 | 0 | 0 | 0 | 54 | 67.3 | 65 | 160 | 0 |
| Egypt | 110 | 1 | 610 | 61 | 21.0 | 120 | 650 | 57 | 0 | 0 | 0 | 0 | 66 | 63.9 | 52 | 170 | 0 |

table continues

| Country | 1981 Infant mortality | Region code | 1991 Per capita income | 1991 Life expectancy | 1980 Consumer price index | 1991 Consumer price index | 1981 Per capita income | 1981 Life expectancy | SAP partici-pation | Reform type | OED rating | Loan amount ($ mill) | 1993 Infant mortality | 1993 Life expectancy | 1994 Under five mortality | 1993 Maternal mortality | Con-ditions number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Iran | 105 | 3 | 2170 | 65 | 18.7 | 117 | | 58 | 0 | 0 | 0 | 0 | 34 | 67.7 | 51 | 120 | 0 |
| Iraq | 76 | 3 | | | 132.2 | 13.6 | | 57 | 0 | 0 | 0 | 0 | 58 | 66.1 | 71 | 310 | 0 |
| Jordan | 67 | 3 | 1050 | 69 | 49.5 | 108 | 1620 | 62 | 0 | 0 | 0 | 0 | 35 | 68.1 | 25 | 150 | 0 |
| Lebanon | 40 | 3 | | | | | | 66 | 0 | 0 | 0 | 0 | 34 | 68.7 | 40 | 300 | 0 |
| Libya | 97 | 1 | | | | | | 57 | 0 | 0 | 0 | 0 | 67 | 63.4 | 95 | 220 | 0 |
| Yemen | 190 | 3 | 520 | 52 | 74.5 | 100 | 460 | 43 | 0 | 0 | 0 | 0 | 119 | 50.4 | 112 | 1400 | 0 |
| Oman | | 3 | 6120 | 69 | 118.8 | 88.6 | | | 0 | 0 | 0 | 0 | 29 | 69.8 | 27 | 190 | 0 |
| Cambodia | | 3 | | | | | | | 0 | 0 | 0 | 0 | 115 | 51.9 | 177 | 900 | 0 |
| China | 71 | 3 | 370 | 69 | 49.3 | 105 | 300 | 67 | 0 | 0 | 0 | 0 | 44 | 68.6 | 43 | 95 | 0 |
| KoreaDR | 33 | 3 | | | | | | 66 | 0 | 0 | 0 | 0 | 24 | 71.2 | 31 | 70 | 0 |
| Laos | 126 | 3 | 220 | 50 | | | 80 | 43 | 0 | 0 | 0 | 0 | 96 | 51.3 | 138 | 650 | 0 |
| Malaysia | 30 | 3 | 2520 | 71 | 42.4 | 104 | 1840 | 65 | 0 | 0 | 0 | 0 | 13 | 70.9 | 15 | 80 | 0 |
| Mongolia | 53 | 3 | 1540 | | | | | 64 | 0 | 0 | 0 | 0 | 59 | 63.9 | 76 | 65 | 0 |
| Myanmar | | 3 | | | 33.8 | 132 | | | 0 | 0 | 0 | 0 | 82 | 57.9 | 109 | 580 | 0 |
| Papua | 102 | 3 | 830 | 56 | 56.8 | 107 | 840 | 51 | 0 | 0 | 0 | 0 | 68 | 56 | 95 | 930 | 0 |
| Vietnam | 97 | 3 | | | | | | 63 | 0 | 0 | 0 | 0 | 42 | 65.5 | 46 | 160 | 0 |
| Afghanistan | 205 | 3 | | | 11.8 | 157 | | 37 | 0 | 0 | 0 | 0 | 163 | 43.7 | 257 | 1700 | 0 |
| India | 121 | 3 | 330 | 60 | 42.8 | 114 | 260 | 52 | 0 | 0 | 0 | 0 | 81 | 60.7 | 119 | 570 | 0 |
| Sri Lanka | 43 | 3 | 500 | 71 | 31.6 | 112 | 300 | 69 | 0 | 0 | 0 | 0 | 17 | 72 | 19 | 140 | 0 |
| Cuba | 19 | 2 | | | | | | 73 | 0 | 0 | 0 | 0 | 12 | 75.4 | 10 | 95 | 0 |
| Dominica | 66 | 2 | 940 | 67 | 11.1 | 154 | 1260 | 62 | 0 | 0 | 0 | 0 | 41 | 69.7 | 45 | 110 | 0 |
| El Salvador | 75 | 2 | 1080 | 66 | 17.5 | 114 | 650 | 63 | 0 | 0 | 0 | 0 | 44 | 66.8 | 56 | 300 | 0 |
| Guatemala | 66 | 2 | 930 | 64 | 26.0 | 133 | 1140 | 59 | 0 | 0 | 0 | 0 | 48 | 65.1 | 70 | 200 | 0 |
| Honduras | 86 | 2 | 550 | 52 | 47.3 | 134 | 600 | 59 | 0 | 0 | 0 | 0 | 42 | 67.9 | 54 | 220 | 0 |
| Nicaragua | 88 | 2 | 460 | 66 | 100.0 | 476 | 860 | 57 | 0 | 0 | 0 | 0 | 50 | 67.1 | 68 | 160 | 0 |
| Peru | 85 | 2 | 1070 | 64 | 100.0 | 510 | 1170 | 58 | 0 | 0 | 0 | 0 | 64 | 66.3 | 58 | 280 | 0 |
| Puerto Rico | | 2 | 6320 | 76 | | | | | 0 | 0 | 0 | 0 | 11 | | | | 0 |
| Paraguay | 46 | 2 | 1270 | 67 | 14.0 | 124 | 1630 | 65 | 0 | 0 | 0 | 0 | 38 | 70.1 | 34 | 160 | 0 |
| Namibia | | 1 | 1460 | 58 | 29.7 | 112 | | | 0 | 0 | 0 | 0 | 59 | 59.1 | 78 | 370 | 0 |
| Botswana | | 1 | 2530 | 68 | 36.6 | 112 | | | 0 | 0 | 0 | 0 | 42 | 65.2 | 54 | 250 | 0 |
| Swaziland | | 1 | | | 28.4 | 111 | | | 0 | 0 | 0 | 0 | 74 | 57.8 | 107 | 560 | 0 |
| Djibouti | | 1 | | | | | | | 0 | 0 | 0 | 0 | 114 | 48.4 | 158 | 570 | 0 |
| Cape Verde | | 1 | | | 61.2 | 133 | | | 0 | 0 | 0 | 0 | 49 | 64.9 | 73 | | 0 |
| Trinidad | 31 | 2 | 3670 | 71 | 35.1 | 104 | 5670 | 72 | 0 | 0 | 0 | 0 | 17 | 71.7 | 20 | 90 | 0 |

table continues

| Country | 1981 Infant mortality | Region code | 1991 Per capita income | 1991 Life expectancy | 1980 Consumer price index | 1991 Consumer price index | 1981 Per capita income | 1981 Life expectancy | SAP partici-pation | Reform type | OED rating | Loan amount ($ mill) | 1993 Infant mortality | 1993 Life expectancy | 1994 Under five mortality | 1993 Maternal mortality | Con-ditions number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barbados | | 2 | | | 57.5 | 106 | | | 0 | 0 | 0 | 0 | 9 | 75.7 | 10 | 43 | 0 |
| Maldives | | 3 | | | 53.8 | 115 | | | 0 | 0 | 0 | 0 | 58 | 62.4 | 78 | | 0 |
| Comoros | | 1 | | | | | | | 0 | 0 | 0 | 0 | 88 | 65.2 | 126 | 950 | 0 |
| Bhutan | 148 | 3 | 180 | 48 | 44.9 | 100 | 80 | 45 | 0 | 0 | 0 | 0 | 122 | 51 | 193 | 1600 | 0 |
| Fiji | | 3 | | | 62.0 | 105 | | | 0 | 0 | 0 | 0 | 23 | 71.6 | 27 | 90 | 0 |

Source: World Bank, UNDP, IMF.

Legend

Reform type:
- 1 Agricultural reform
- 2 Financial reform
- 3 Trade reform
- 4 Macroeconomic reform
- 5 Public enterprise reform
- 6 Other sectoral reform

Region code:
- 1 Africa
- 2 Latin America
- 3 Asia (including Middle East and North Africa)

OED rating (rating of implementation and effectiveness)
- 1 Satisfactory
- 0 Unsatisfactory

SAP participation: 1 if a country had a structural adjustment loan during 1980-93 and zero otherwise.

APPENDIX TABLE 2
COUNTRIES WITH COMPLETE DATA SETS

| Country | Sample | Rating | Country | Sample | Rating |
|---|---|---|---|---|---|
| Argentina | 1 | 0 | Philippines | 1 | 0 |
| Bolivia | 1 | 0 | Thailand | 1 | 1 |
| Brazil | 1 | 0 | Morocco | 1 | 1 |
| Chile | 1 | 1 | Tunisia | 1 | 1 |
| Colombia | 1 | 1 | Bangladesh | 1 | 0 |
| Costa Rica | 1 | 1 | Nepal | 1 | 1 |
| Ecuador | 1 | 1 | Pakistan | 1 | 1 |
| Guyana | 1 | 0 | Burkina Faso | 0 | 0 |
| Haiti | 1 | 1 | Cameroon | 0 | 0 |
| Jamaica | 1 | 1 | Chad | 0 | 0 |
| Mexico | 1 | 1 | Congo | 1 | 0 |
| Panama | 1 | 0 | Ethiopia | 0 | 0 |
| Uruguay | 1 | 0 | Lesotho | 0 | 0 |
| Venezuela | 1 | 0 | Mozambique | 0 | 0 |
| Benin | 1 | 1 | Rwanda | 0 | 0 |
| Burundi | 1 | 0 | Sierra Leone | 0 | 0 |
| Central African Republic | 1 | 0 | South Africa | 0 | 0 |
| Côte d'Ivoire | 1 | 0 | Algeria | 0 | 0 |
| Gabon | 1 | 0 | Egypt | 0 | 0 |
| Gambia | 1 | 1 | Iran | 0 | 0 |
| Ghana | 1 | 1 | Jordan | 0 | 0 |
| Guinea Bissau | 1 | 0 | Yemen | 0 | 0 |
| Kenya | 1 | 0 | Oman | 0 | 0 |
| Madagascar | 1 | 1 | China | 0 | 0 |
| Malawi | 1 | 1 | Malaysia | 0 | 0 |
| Mali | 1 | 1 | Papua | 0 | 0 |
| Mauritania | 1 | 1 | India | 0 | 0 |
| Mauritius | 1 | 1 | Sri Lanka | 0 | 0 |
| Niger | 1 | 0 | Dominican Republic | 0 | 0 |
| Nigeria | 1 | 0 | El Salvador | 0 | 0 |
| Senegal | 1 | 1 | Guatemala | 0 | 0 |
| Somalia | 1 | 0 | Honduras | 0 | 0 |
| Tanzania | 1 | 1 | Nicaragua | 0 | 0 |
| Togo | 1 | 1 | Peru | 0 | 0 |
| Uganda | 1 | 0 | Paraguay | 0 | 0 |
| Zambia | 1 | 0 | Namibia | 0 | 0 |
| Zimbabwe | 1 | 1 | Botswana | 0 | 0 |
| Indonesia | 1 | 1 | Trinidad | 0 | 0 |
| Korea, Rep. of | 1 | 1 | Bhutan | 0 | 0 |

Legend: Sample: 1 if the country was a participant in the structural adjustment programme and 0 otherwise.

Rating: 1 if a country's implementation of a structural adjustment programme was satisfactory and zero otherwise.

# APPENDIX B

# ADDITIONAL REGRESSION RESULTS

APPENDIX TABLE 3

**Growth effects of reform implementation effectiveness: Dependent variable is growth rate of per capita income (absolute t-ratios in parentheses)**

| Explanatory variables | Estimated coefficients | | |
|---|---|---|---|
| | All countries | Borrower countries | Borrower countries |
| Constant | 1.127 | 0.648 | 0.559 |
| | (3.06) | (1.03) | (1.11) |
| Log of per capita income in 1981 (beginning of reform) | -0.137 | -0.050 | -0.047 |
| | (2.18) | (0.47) | (.51) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | 0.231 | 0.220 | 0.187 |
| | (2.37) | (2.07) | (1.53) |
| *Regional Dummies (Asia region is the excluded dummy)* | | | |
| Dummy for Africa Region (=1 if a country is in Africa and zero otherwise) | -0.354 | -0.428 | -0.467 |
| | (2.97) | (2.20) | (2.54) |
| Dummy for Latin America Region (=1 if a country falls within the Latin America region and zero otherwise) | -0.204 | -.0.187 | -0.269 |
| | (1.26) | (0.76) | (1.09) |
| *Reform type Dummies (Economy-wide reform is the excluded dummy)* | | | |
| | 0.012 | 0.093 | |
| Public sector reform =1 if the loan was given to restructure the public sector and zero otherwise | (0.14) | (0.76) | |
| | .133 | 0.006 | |
| Agricultural reform | (.73) | (0.03) | |
| | -0.285 | -0.483 | |
| Financial reform | (2.49) | (2.91) | |
| | -0.269 | -0.317 | |
| Trade Reform | (1.75) | (2.11) | |
| | -0.543 | -0.527 | |
| Other reforms | (2.36) | (2.32) | |
| Adjusted R-squared | 0.31 | 0.26 | 0.12 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.35 | 0.38 | 0.42 |
| Degrees of freedom | 60 | 33 | 38 |
| Mean and [standard deviation of dependent variable] | 0.04[.42] | .03 [.45] | .03 [.45] |
| Sample size | 70 | 43 | 43 |

Source: Based on author's calculations.

APPENDIX TABLE 4

**Health effects of reform implementation effectiveness controlling for economic growth: all countries (absolute t-ratios in parentheses)**

| Explanatory variables | Estimated equations | | |
|---|---|---|---|
| | -log (80 *minus* '93 life expectancy) | 1993 Infant mortality | 1994 Under-five mortality |
| Constant | -4.546 | 6.144 | 7.239 |
| | (8.95) | (8.11) | (8.39) |
| Log of average consumer index for 1980-91 | -0.082 | 0.206 | 0.206 |
| | (0.89) | (1.50) | (1.41) |
| Log of average per capita income for 1980-91 | 0.330 | -0.489 | -0.632 |
| | (9.27) | (8.94) | (10.20) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | 0.104 | -0.126 | -0.213 |
| | (1.81) | (1.48) | (1.99) |
| Growth rate [log (1991 per capita income/1981 per capita income)] | 0.040 | (-0.066 | -0.140 |
| | (0.49) | (0.60) | (1.02) |
| *Regional Dummies (Asia region is the excluded dummy)* | | | |
| Dummy for Africa Region (=1 if a country is in Africa and zero otherwise) | -0.417 | 0.450 | 0.655 |
| | (4.26) | (3.55) | (4.08) |
| Dummy for Latin America Region (=1 if a country falls within the Latin America region and zero otherwise) | 0.186 | -.0.007 | 0.016 |
| | (1.45) | (0.04) | (0.81) |
| *Reform type Dummies (Economy-wide reform is the excluded dummy)* | | | |
| Public sector reform =1 if the loan was given to restructure the public sector and zero otherwise | -0.089 | 0.221 | 0.409 |
| | (2.03) | (2.23) | (2.88) |
| Agricultural reform | -0.019 | 0.059 | 0.066 |
| | (.20) | (0.34) | (0.29) |
| Financial reform | -0.080 | 0.232 | 0.319 |
| | (1.09) | (1.58) | (1.86) |
| Trade Reform | 0.062 | 0.003 | 0.156 |
| | (0.43) | (0.00) | (0.91) |
| Other reforms | 0.002 | -0.050 | -0.053 |
| | (0.01) | (0.37) | (0.25) |
| Adjusted R-squared | 0.74 | 0.70 | 0.74 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.29 | 0.37 | 0.46 |
| Degrees of freedom | 56 | 56 | 56 |
| Mean and [standard deviation of dependent variable] | -.2.86[.57] | 4.06 [.68] | 4.32 [.89] |
| Sample size | 68 | 68 | 68 |

Source: Based on author's calculations.

APPENDIX TABLE 5

**Health effects of reform implementation effectiveness controlling for economic growth: borrower countries only (absolute t-ratios in parentheses)**

| Explanatory Variables | Estimated equations | | |
|---|---|---|---|
| | -log (80 *minus* '93 life expectancy) | 1993 Infant mortality | 1994 Under-five mortality |
| Constant | -5.142 | 6.826 | 7.80 |
| | (7.40) | (6.66) | (5.86) |
| Log of average consumer index for 1980-91 | -0.030 | 0.164 | 0.263 |
| | (0.20) | (0.75) | (0.96) |
| Log of average per capita income for 1980-91 | 0.374 | -0.551 | -0.723 |
| | (6.83) | (7.92) | (8.20) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | 0.196 | -0.197 | -0.315 |
| | (3.06) | (2.18) | (2.45) |
| Growth rate [log (1991 per capita income/1981 per capita income)] | 0.076 | (0.060 | 0.066 |
| | (0.79) | (0.49) | (0.42) |
| *Regional Dummies (Asia region is the excluded dummy)* | | | |
| Dummy for Africa Region (=1 if a country is in Africa and zero otherwise) | -0.435 | 0.385 | 0.508 |
| | (4.70) | (3.68) | (3.18) |
| Dummy for Latin America Region (=1 if a country falls within the Latin America region and zero otherwise) | 0.210 | -.0.053 | -0.098 |
| | (1.19) | (0.26) | (0.38) |
| *Reform type Dummies (Economy-wide reform is the excluded dummy)* | | | |
| Public sector reform =1 if the loan was given to restructure the public sector and zero otherwise | 0.010 | 0.159 | 0.282 |
| | (0.18) | (1.41) | (1.81) |
| Agricultural reform | 0.018 | 0.068 | 0.011 |
| | (.15) | (0.36) | (0.04) |
| Financial reform | -0.148 | 0.320 | 0.383 |
| | (1.34) | (1.94) | (1.83) |
| Trade Reform | 0.065 | 0.009 | 0.102 |
| | (0.42) | (0.06) | (0.52) |
| Other reforms | 0.015 | -0.026 | -0.092 |
| | (0.10) | (0.19) | (0.45) |
| Adjusted R-squared | 0.79 | 0.75 | 0.79 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.28 | 0.35 | 0.44 |
| Degrees of freedom | 30 | 30 | 30 |
| Mean and [standard deviation of dependent variable] | -.2.88[.57] | 4.07 [.70] | 4.35 [.95] |
| Sample size | 42 | 42 | 42 |

Source: Based on author's calculations.

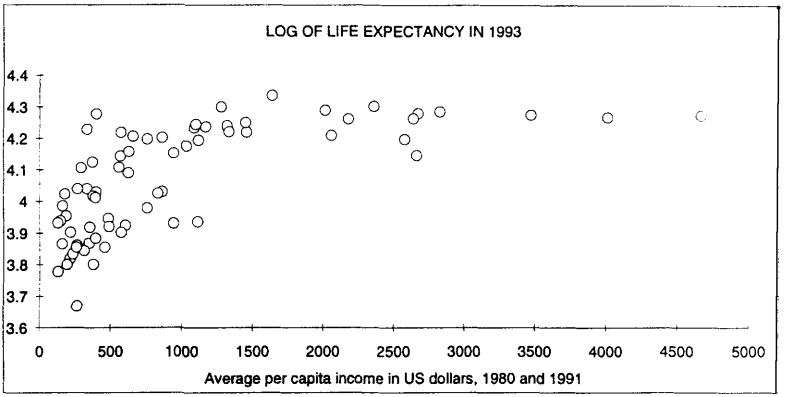
APPENDIX TABLE 6

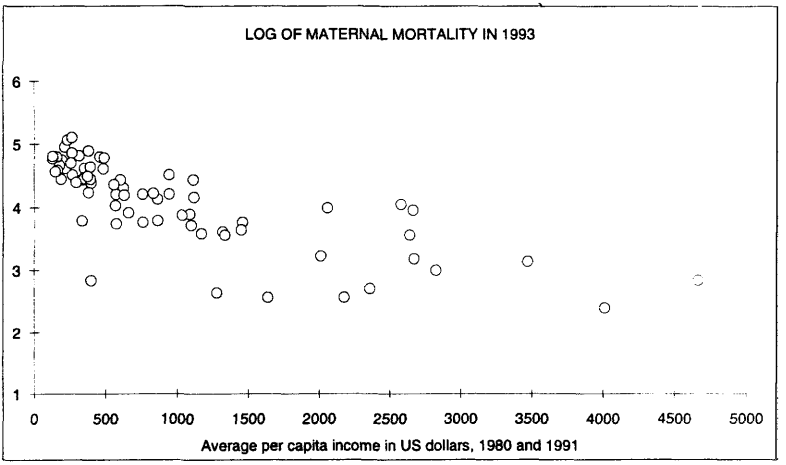
**Health effects of current and previous income controlling for other covariates: borrower countries only (absolute t-ratios in parentheses)**

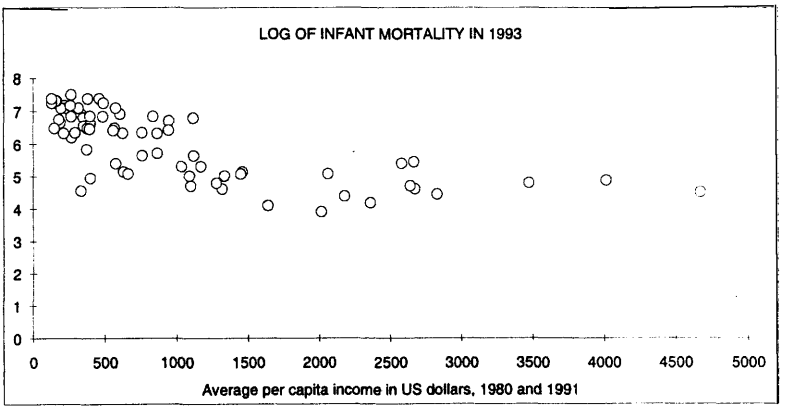
| Explanatory variables | Estimated equations | | |
|---|---|---|---|
| | -log (80 *minus* '91 life expectancy) | 1993 Infant mortality | 1994 Under-five mortality |
| Constant | -4.98 | 6.883 | 7.90 |
| | (8.61) | (6.63) | (5.90) |
| Log of average consumer index for 1980-91 | -0.117 | 0.155 | 0.253 |
| | (0.96) | (0.71) | (0.92) |
| Log of per capita income for 1991 (current income) | 0.104 | -0.219 | -0.433 |
| | (1.19) | (1.54) | (2.74) |
| Log of per capita income for 1981 (previous income) | 0.293 | -0.338 | -0.305 |
| | (2.84) | (2.76) | (1.78) |
| Bank rating of a country's implementation of a structural adjustment reform during the period 1980-91 (1=satisfactory) | 0.160 | -0.193 | -0.311 |
| | (2.58) | (2.14) | (2.44) |
| *Regional Dummies (Asia region is the excluded dummy)* | | | |
| Dummy for Africa Region (=1 if a country is in Africa and zero otherwise) | -0.336 | 0.397 | 0.523 |
| | (3.41) | (3.64) | (3.23) |
| Dummy for Latin America Region (=1 if a country falls within the Latin America region and zero otherwise) | 0.196 | -.0.022 | -0.051 |
| | (1.13) | (0.10) | (0.19) |
| *Reform type Dummies (Economy-wide reform is the excluded dummy)* | | | |
| Public sector reform =1 if the loan was given to restructure the public sector and zero otherwise | 0.058 | 0.163 | 0.283 |
| | (0.71) | (1.49) | (1.77) |
| Agricultural reform | 0.021 | 0.068 | 0.010 |
| | (.15) | (0.35) | (0.04) |
| | -0.230 | 0.311 | 0.373 |
| Financial reform | (2.33) | (1.89) | (1.81) |
| | 0.073 | 0.004 | 0.095 |
| Trade Reform | (0.52) | (0.03) | (0.49) |
| | 0.024 | -0.054 | -0.132 |
| Other reforms | (0.19) | (0.39) | (0.66) |
| Adjusted R-squared | 0.76 | 0.74 | 0.78 |
| Significance level of F-statistic | 0.00 | 0.00 | 0.00 |
| Standard error of regression | 0.28 | 0.36 | 0.45 |
| Degrees of freedom | 28 | 28 | 30 |
| Mean and [standard deviation of dependent variable] | -.2.90[.57] | 4.07 [.70] | 4.35 [.95] |
| Sample size | 40 | 40 | 42 |

Source: Based on author's calculations.

FIGURE 1
HEALTH STATUS VERSUS PER CAPITA INCOME




Soure: Based on the author's computations.

## REFERENCES


Anand, Sudhir and Lincoln Chen. 1996. Health implications of Economic Policies: A Framework for Analysis. United Nations Development Programme, Office of Development Studies, Discussion Paper Series. Mimeo. New York: UNDP.

Anand, Sudhir and Martin Ravallion. 1993. Human Development in Poor Countries: On the Role of Private Incomes and Public Services. *Journal of Economic Perspectives* 7(1): 133-50.

Appleton, Simon, John Hoddinot and John Mackinnon. 1996. Education and Health in Sub-Saharan Africa. *Journal of International Development* 8(3): 307-39.

Becker, Gary. 1991. *A Treatise on the Family*. Cambridge, Massachusetts: Harvard University Press.

Collins, David H., J. D. Quick, S. N. Musau and D. L. Kraushaar. 1996. *Health Financing Reform in Kenya: The Fall and Rise of Cost Sharing, 1989-94*, Management Sciences for Health. Boston, Massachusetts: Stubbs Monograph Series.

Cornia, G. A., and R. Paniccia. 1996. The Transition's Population Crisis: An Econometric Investigation of Nuptionality, Fertility and Mortality in Severely Distressed Economies. *MOCT-MOST* 6, 95-129.

Creese, Andrew. 1994. Global Trends in Health Care Reform. *World Health Forum* 15: 317-22.

Evans, P. 1996. Government Action, Social Capital and Development: Reviewing the Evidence on Synergy. *World Development* 24(6): 1119-32.

Fogel, Robert W. 1993. New Sources, and New Technique for the Study of Secular Trends in Nutritional Status, Health, Mortality and the Process of Aging. *Historical Methods* (Also see Historical Working Paper Series, no. 26. Cambridge Mass., National Bureau of Economic Research).

Fogel, Robert W. 1992. Second Thoughts on the European Escape from Hunger: Famines, Chronic Malnutrition, and Mortality Rates, in: Osmani, S. R. ed., *Nutrition and Poverty*, New York: Oxford University Press (for UNU/WIDER, Helsinki).

Fuchs, V. R. 1996. Economics, Values and Health Care Reform *American Economic Review* March: 1-24.

Gertler, Paul and Van der Gaag. 1990. *The Willingness to Pay for Medical care: Evidence from Two Developing Countries*. Baltimore: The Johns Hopkins University Press.

Greene, William. 1993. *Econometric Analysis*. New York, NY: Macmillan Publishing Company.

Griffin, Charles C. 1987. User Charges for Health Care in Principle and Practice. In Asian Development Bank (Manila). World Bank Economic Development Institute Seminar Paper No. 37 (Washington, DC) and East-West Center: Health Care Financing (Honolulu).

Griffin, Charles C. 1992. Health care in Asia: A Comparative Study of Cost and Financing. World Bank Regional and Sectoral Studies. Washington DC.

Grossman, Michael.1972. *The Demand for Health: A Theoretical and Empirical Investigation*. New York: Columbia University Press and Boston, Mass: National Bureau of Economic Research.

Heckman, J. 1979. Sample Selection Bias on a Specification Error. *Econometrica* 47: 153-61.

International Monetary Fund. 1994. *International Financial Statistics Yearbook*. Washington, DC: International Monetary Fund.

Jayarajah, Carl, William Branson, and Binayak Sen. 1996. *Social Dimensions of Adjustment: World Bank Experience*. Washington, DC: World Bank.

Lipumba, Nguyuru H. I. 1995. Structural Adjustment Policies and Economic Performance of African Countries. In *International Monetary and Financial Issues for the 1990s* Vol. 5, New York, NY: United Nations.

Litvack, J., and C. Bodart 1993. User Fees Plus Quality Equals Improved Access to Health Care: Results of a Field Experiment in Cameroon. *Social Science and Medicine* 37(3): 465-69.

Lucas, Robert, E. 1988. On the Mechanics of Economic Development, *Journal of Monetary Economics*, 22(1): 3-42.

Maddala, G. 1977. *Econometrics*, New York: McGraw-Hill.

Makinen, M. *et al.* 1988. *Kenyatta National Hospital Board Plan for Action for Reform* Resources for Child Health. Arlington, VA: John Snow, Inc.

McCloskey, D. N. and S. T. Ziliak. 1996. The Standard Error of Regressions. *Journal of Economic Literature* 34(1): 97-114.

Murray, Christopher J. L., and Lincoln C. Chen. 1993. In Search of a Contemporary Theory for Understanding Mortality Change. *Social Science and Medicine* 36(2): 143-55.

Musgrove, Philip. 1987. The Economic Crisis and its Impact on Health and Health care in Latin America and the Caribbean. *International Journal of Health Sciences* 7(3): 411-41.

Mwabu, G., J. Mwanzia and W. Liambila. 1995. User Charges in Government Health Facilities in Kenya: Effect on Attendance and Revenue. *Health Policy and Planning* 10(2): 164-70.

Mwabu, G., M. Ainsworth and A. Nyamete. 1993. Quality of Medical Care and Choice of Medical Treatment in Kenya: An Empirical Analysis. Technical Working Paper No. 9, Washington, DC: World Bank.

Reddy, Sanjay and Jan Vandermoortele. 1996. User Financing of Basic Services: A Review of Theoretical Arguments and Empirical Evidence. Office of the Evaluation, Policy and Planning. New York, NY: UNICEF. Mimeo.

Rodrik, Dani. 1996a. Understanding Economic Policy Reform. *Journal of Economic Literature* 34(1): 9-41.

Rodrik, Dani. 1996b. Why Do More Open Economies Have Larger Governments?, Columbia University, New York, mimeo.

Sauerborn, R., A. Nougtara and E. Latimer. 1994. The Elasticity of Demand for Health Care in Burkina Faso: Differences Across Age and Income Groups. *Health Policy and Planning* 9(2): 185-92.

Schultz, Theodore W. 1963. *The Economic Value of Education*, New York: Columbia University Press.

Sen, Amartya. 1995. *Mortality as an Indicator of Economic Success and Failure*, International Child Development Centre, Innocenti Lectures. Florence, Italy: UNICEF.

Shaw, R. P., and C. C. Griffin. 1995. *Financing Health Care in Sub-Saharan Africa Through User Fees and Insurance*. Washington, DC: World Bank.

Slemrod, Joel. 1995. What Do Cross-Country Studies Teach about Government Involvement, Prosperity, and Economic Growth?, *Brookings Papers on Economic Activity*, 2, 373-431.

Snowdon, Brian, Howard Vane, and Peter Wynarczyk. 1994. *A Modern Guide to Macroeconomics: An Introduction to Competing Schools of Thought*, Edward Elgar Publishing Company, Vermont, USA.

United Nations Development Programme. 1990. *Human Development Report.* New York, NY: UNDP.

United Nations Development Programme. 1996. *Human Development Report.* New York, NY: UNDP.

Varian, H. R. 1984. *Microeconomic Analysis*. Second Edition. New York: W.W. Norton.

Vogel, R. 1988. *Cost Recovery in Health Care Sector: Selected Country Studies in West Africa*. World Bank Technical Paper No. 82. Washington, DC: World Bank.

Waddington, C., and K. Enyimayew. 1990. A Price to Pay, Part 2: The Impact of User Charges in the Volta Region of Ghana. *International Journal of Health Planning and Management* 5(4): 287-312.

Williamson, John. 1990. *Latin American Adjustment: How Much Has Happened*?, Washington, DC: Institute For International Economics.

Williamson, John. 1994. *The Political Economy of Reform.* Washington, DC: Institute for International Economics.

World Bank. 1983. *World Development Report: World Economic Recession and Prospects for Recovery.* Washington, DC: World Bank.

World Bank. 1993. *World Development Report: Investing in Health.* Washington, DC: World Bank.

World Bank. 1995. *Social Indicators of Development.* Washington, DC: World Bank.

World Bank. 1996. *World Development Report: From Plan to Market.* Washington, DC: World Bank.

World Health Organization. 1983 *Research for the Reorientation of National Health Systems.* Report of a WHO Study Group. Technical Report Series 694. Geneva: WHO.

Wouters, Annemarie (1993), The Cost and Efficiency of Public and Private Health care Facilities in Ogun State, Nigeria, *Health Economics*, 2(1): 31-42.

Yoder, R. 1989. Are People Willing and Able to Pay for Health Services. *Social Science and Medicine* 29(1): 35-42.

# UNU/WIDER Working Papers

WP 1. Amartya Sen: Food, Economics and Entitlements, February 1986
WP 2. Nanak Kakwani: Decomposition of Normalization Axiom in the Measurement of Poverty: a Comment, March 1986
WP 3. Pertti Haaparanta: The Intertemporal Effects of International Transfers, April 1986
WP 4. Nanak Kakwani: Income Inequality, Welfare and Poverty in a Developing Economy with Applications to Sri Lanka, April 1986
WP 5. Pertti Haaparanta: and Juha Kähkönen: Liberalization of Capital Movements and Trade: Real Appreciation, Employment and Welfare, August 1986
WP 6. Pertti Haaparanta: Dual Exchange Markets and Intervention, August 1986
WP 7. Pertti Haaparanta: Real and Relative Wage Rigidities – Wage Indexation in the Open Economy Staggered Contracts Model, August 1986
WP 8. Nanak Kakwani: On Measuring Undernutrition, December 1986
WP 9. Nanak Kakwani: Is Sex Bias Significant? December 1986
WP 10. Partha Dasgupta and Debraj Ray: Adapting to Undernourishment: The Clinical Evidence and Its Implications, April 1987
WP 11. Bernard Wood: Middle Powers in the International System: A Preliminary Assessment of Potential, June 1987
WP 12. Stephany Griffith-Jones: The International Debt Problem – Prospects and Solutions, June 1987
WP 13. Don Patinkin: Walras' Law, June 1987
WP 14. Kaushik Basu: Technological Stagnation, Tenurial Laws and Adverse Selection, June 1987
WP 15. Peter Svedberg: Undernutrition in Sub-Saharan Africa: A Critical Assessment of the Evidence, June 1987
WP 16. S. R. Osmani: Controversies in Nutrition and their Implications for the Economics of Food, July 1987
WP 17. Frédérique Apffel Marglin: Smallpox in Two Systems of Knowledge, Revised, July 1987
WP 18. Amartya Sen: Gender and Cooperative Conlicts, July 1987
WP 19. Amartya Sen: Africa and India: What Do We Have to Learn from Each Other? August 1987
WP 20. Kaushik Basu: A Theory of Association: Social Status, Prices and Markets, August 1987
WP 21. Kaushik Basu: A Theory of Surplus Labour, August 1987
WP 22. Albert Fishlow: Some Reflections on Comparative Latin American Economic Performance and Policy, August 1987
WP 23. Sukhamoy Chakravarty: Post-Keynesian Theorists and the Theory of Economic Development, August 1987
WP 24. Georgy Skorov: Economic Reform in the USSR, August 1987
WP 25. Amartya Sen: Freedom of Choice: Concept and Content, August 1987
WP 26. Gopalakrishna Kumar: Ethiopian Famines 1973–1985: A Case-Study, November 1987
WP 27. Carl Riskin: Feeding China: The Experience since 1949, November 1987
WP 28. Martin Ravallion: Market Responses to Anti-Hunger Policies: Effects on Wages, Prices and Employment, November 1987
WP 29. S. R. Osmani: The Food Problems of Bangladesh, November 1987
WP 30. Martha Nussbaum and Amartya Sen: Internal Criticism and Indian Rationalist Traditions, December 1987
WP 31. Martha Nussbaum: Nature, Function and Cabability: Aristotle on Political Distribution, December 1987
WP 32. Martha Nussbaum: Non-Relative Virtues: An Aristotelian Approach, December 1987
WP 33. Tariq Banuri: Modernization and its Discontents, a Perspective from the Sociology of Knowledge, December 1987
WP 34. Alfred Maizels: Commodity Instability and Developing Countries: The Debate, January 1988
WP 35. Jukka Pekkarinen: Keynesianism and the Scandinavian Models of Economic Policy, February 1988
WP 36. Masahiko Aoki: A New Paradigm of Work Organization: The Japanese Experience, February 1988
WP 37. Dragoslav Avramovic: Conditionality: Facts, Theory and Policy – Contribution to the Reconstruction of the International Financial System, February 1988
WP 38. Gerald Esptein and Juliet Schor: Macropolicy in the Rise and Fall of the Golden Age, February 1988
WP 39. Stephen Marglin and Amit Bhaduri: Profit Squeeze and Keynesian Theory, April 1988
WP 40. Bob Rowthorn and Andrew Glyn: The Diversity of Unemployment Experience since 1973, April 1988
WP 41. Lance Taylor: Economic Openness – Problems to the Century's End , April 1988
WP 42. Alan Hughes and Ajit Singh: The World Economic Slowdown and the Asian and Latin American Economies: A Comparative Analysis of Economic Structure, Policy and Performance, April 1988
WP 43. Andrew Glyn, Alan Hughes, Alan Lipietz and Ajit Singh: The Rise and Fall of the Golden Age, April 1988
WP 44. Jean-Philippe Platteau: The Food Crisis in Africa: A Comparative Structural Analysis, April 1988
WP 45. Jean Drèze: Famine Prevention in India, May 1988
WP 46. Peter Svedberg: A Model of Nutrition, Health and Economic Productivity, September 1988
WP 47. Peter Svedberg: Undernutrition in Sub-Saharan Africa: Is There a Sex-Bias?, September 1988
WP 48. S. R. Osmani: Wage Determination in Rural Labour Markets: The Theory of Implicit Co-operation, December 1988
WP 49. S. R. Osmani: Social Security in South Asia, December 1988
WP 50. S. R. Osmani: Food and the History of India – An 'Entitlement' Approach, December 1988

WP 51. Grzegorz W. Kolodko: Reform, Stabilization Policies, and Economic Adjustment in Poland, January 1989
WP 52. Dariusz Rosati and Kalman Mizsei: Adjustment through Opening of Socialist Economies, January 1989
WP 53. Andrei Vernikov: Reforming Process and Consolidation in the Soviet Economy, January 1989
WP 54. Adam Török: Stabilisation and Reform in the Hungarian Economy of the late 1980's, March 1989
WP 55. Zhang Yuyan: Economic System Reform in China, March 1989
WP 56. Amitava Krishna Dutt: Sectoral Balance: A Survey, March 1989
WP 57. Robert Pringle: Financial Markets and Governments, June 1989
WP 58. Marja-Liisa Swantz: Grassroots Strategies and Directed Development in Tanzania: The Case of the Fishing Sector, August 1989
WP 59. Aili Mari Tripp: Defending the Right to Subsist: The State vs. the Urban Informal Economy in Tanzania, August 1989
WP 60. Jacques H. Drèze, Albert Kervyn de Lettenhove, Jean-Philippe Platteau and Paul Reding: A Proposal for "Co-operative Relief of Debt in Africa" (CORDA), August 1989
WP 61. Kaushik Basu: Limited Liability and the Existence of Share Tenancy, August 1989
WP 62. Tariq Banuri: Black Markets, Openness, and Central Bank Autonomy, August 1989
WP 63. Amit Bhaduri: The Soft Option of the Reserve Currency Status, August 1989
WP 64. Andrew Glyn: Exchange Controls and Policy Autonomy – The Case of Australia 1983–88, August 1989
WP 65. Jaime Ros: Capital Mobility and Policy Effectiveness in a Solvency Crisis. The Mexican Economy in the 1980s, August 1989
WP 66. Dan W. Brock: Quality of Life Measures in Health Care and Medical Ethics, August 1989
WP 67. Robert Erikson: Descriptions of Inequality. The Swedish Approach to Welfare Research, August 1989
WP 68. Onora O'Neill: Justice, Gender and International Boundaries, August 1989
WP 69. Bernard M. S. van Praag: The Relativity of the Welfare Concept, August 1989
WP 70. Hilary Putnam: Objectivity and the Science/Ethics Distinction, August 1989
WP 71. John E. Roemer: Distributing Health: The Allocation of Resources by an International Agency, August 1989
WP 72. Charles Taylor: Explanation and Practical Reason, August 1989
WP 73. Gerald Epstein and Herbert Gintis: International Capital Markets and the Limits of National Economic Policy, October 1989
WP 74. A. D. Cosh, A. Hughes and A. Singh: Openness, Innovation and Share Ownership: The Changing Structure of Financial Markets, October 1989
WP 75. Robert B. Zevin: Are World Financial Markets more Open? If so Why and with What Effects?, October 1989
WP 76. Lance Taylor: Gap Disequilibria: Inflation, Investment, Saving and Foreign Exchange, October 1989
WP 77. Andrei Vernikov: Soviet Economy: Opening up and Stabilization, October 1989
WP 78. Kaushik Basu: The International Debt Problem: Could Someone Please Explain it to Me?, October 1989
WP 79. C. K. Omari: Rural Women, Informal Sector and Household Economy in Tanzania, October 1989
WP 80. Partha Dasgupta: Well-Being: Foundations, and the Extent of Its Realization in Poor Countries, October 1989
WP 81. Grzegorz W. Kolodko, Marian Ostrowski, Dariusz Rosati: Stabilization Policy in Poland. Challenges and Constraints, February 1990
WP 82. S. R. Osmani: Food Deprivation and Undernutrition in Rural Bangladesh, February 1990
WP 83. Kálman Mizsei, Adám Török: Modified Planned Economies at the Crossroads: The Case of Hungary, March 1990
WP 84. Partha Dasgupta: The Environment as a Commodity, March 1990
WP 85. V. M. Moghadam: Determinants of Female Labor Force Participation in the Middle East and North Africa, May 1990
WP 86. Lauri Siitonen: Political Theories of Development Cooperation – A Study of Theories of International Cooperation, July 1990
WP 87. Valentine M. Moghadam: Gender and Restructuring: Perestroika, the 1989 Revolutions, and Women, November 1990
WP 88. Walter C. Labys and Alfred Maizels: Commodity Price Fluctuations and Macro-economic Adjustments in the Developed Countries, November 1990
WP 89. Siddig A. Salih, William H. Branson and Yusuf H. Al Ebraheem: Oil Driven Macroeconometric Model of Kuwait, March 1991
WP 90. Simon Johnson and Bakhtior Islamov: Property Rights and Economic Reform in Uzbekistan, September 1991
WP 91. Simon Johnson: Spontaneous Privatization in the Soviet Union. How, Why and for Whom?, September 1991
WP 92. Jeffrey D. Sachs: Accelerating Privatization in Eastern Europe: The Case of Poland, September 1991
WP 93. Ardo H. Hansson: The Emergence and Stabilization of Extreme Inflationary Pressures in the Soviet Union, September 1991
WP 94. Ardo H. Hansson: The Importance of Being Earnest: Early Stages of the West German Wirtschaftswunder, September 1991
WP 95. Madhura Swaminathan: Understanding the "Informal Sector": A Survey, December 1991
WP 96. Stanislav V. Zhukov and Alexander Yu. Vorobyov: Reforming the Soviet Union: Lessons from Structural Experience, January 1992
WP 97. Siddig A. Salih: Managing Renewable Natural Capital in Africa, February 1992
WP 98. Haris Gazdar: Rural Poverty, Public Policy and Social Change: Some Findings from Surveys of Six Villages, May 1992
WP 99. Valentine M. Moghadam: Development and Patriarchy: The Middle East and North Africa in Economic and Demographic Transition, July 1992
WP 100. Bela Bhatia: Lush Fields and Parched Throats: The Political Economy of Groundwater in Gujarat, August 1992

WP 101. John C. Harsanyi: Utilities, Preferences and Substantive Goods, December 1992
WP 102. Derseh Endale: The Ethiopian Famines, Entitlements and Governance, February 1993
WP 103. Derseh Endale: External Imbalances, Famines and Entitlements: A Case Study, February 1993
WP 104. Derseh Endale: Rural Markets, Food-Grain Prices and Famines: A Study on Selected Regions in Ethiopia, February 1993
WP 105. Alexander Yu. Vorobyov: Production Aspects of Russian Transition, June 1993
WP 106. Stanislav Zhukov: Monetary Aspects of Russian Transition, June 1993
WP 107. S. R. Osmani: The Entitlement Approach to Famine: An Assessment, June 1993
WP 108. S. R. Osmani: Growth and Entitlements: The Analytics of the Green Revolution, June 1993
WP 109. S. R. Osmani: Is There a Conflict between Growth and Welfarism? The Tale of Sri Lanka, June 1993
WP 110. Valentine M. Moghadam: Social Protection and Women Workers in Asia, June 1993
WP 111. Alain de Crombrugghe and David Lipton: The Government Budget and the Economic Transformation of Poland, July 1993
WP 112. Gang Fan and Wing Thye Woo: Decentralized Socialism and Macroeconomic Stability: Lessons from China, July 1993
WP 113. Ardo H. Hansson: Transforming an Economy while Building a Nation: The Case of Estonia, July 1993
WP 114. Bryan W. Roberts: The J-curve is a Gamma-curve: Initial Welfare Consequences of Price Liberalization in Eastern Europe, July 1993
WP 115. Eira Varis: The Restructuring Process of Rural Russian Karelia: A Case Study of Two Karelian Villages, February 1994
WP 116. Valentine M. Moghadam: Market Reforms and Women Workers in Vietnam: A Case Study of Hanoi and Ho Chi Minh City, July 1994
WP 117. Siddig A. Salih: Sustainable Ecosystem in Africa: Managing Natural Forest in Sudan, December 1994
WP 118. Derseh Endale: Employment-Based Safety Nets: Exploring an Alternative Approach to Limit the Adverse Consequences of Recurrent Droughts in Ethiopia, April 1995
WP 119. E Wayne Nafziger: The Economics of Complex Humanitarian Emergencies: Preliminary Approaches and Findings, September 1996
WP 120. Germano Mwabu: Health Effects of Market-Based Reforms in Developing Countries, September 1996

*Please note that certain WP issues are no longer available. For further information, please contact UNU/WIDER Publications at the address given at the beginning of this publication.*