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DOES OPENNESS LEAD TO MORE OR LESS DEVELOPMENT? THE CASE OF HEALTH DETERIORATION

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Does Openness Lead to More or Less Development? The Case of Health Deterioration[1]

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Abstract

This paper is an attempt to test country claims on the social costs of openness especially in the case of poor developing countries. The intent of this paper is to extend the research on the costs and benefits of economic openness by trying to look at one dimension in particular, health, and to answer two distinct but linked questions. How does openness affect government spending? What are the true determinants behind public health spending? The paper finds a positive relationship between openness and government size for poor, less developed countries, and negative in the case of rich, developed economies. The paper also finds that poor, less developed countries rank healthcare spending lower than defense but higher than education in government spending allocation and are, therefore, spending more than proportionately on healthcare than they are spending on defense and less than proportionately than on education.

Keywords: Health; Public Health Expenditure; Government Expenditure; Openness
JEL classification: I10; I18; H7; F10;

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1. Introduction

"While terrorism may kill thousands, and sometimes hundreds of thousands, it is estimated that more than 20 million deaths from illnesses each year (out of 57 million total mortality in 2003) are entirely preventable. And yet the money spent on aiding health care in developing countries is a tiny fraction of what goes into military expenditure, including the so-called war on terrorism." Amartya Sen

Globalization has received heavy criticism in the last two decades. Among the critics are those who claim that, against expectations, openness and trade liberalization tend to harm developing countries, especially poor and heavily-indebted developing countries. The argument used circles around the idea that most of these countries have not yet achieved the necessary level of development required before opening themselves to global trade. What is more, these countries have not yet established the necessary institutional infrastructure to accommodate the increasing volume of trade. Therefore, instead of merely reaping the benefits of openness, as should have been the case, they end up in a worse situation from a socio-economic perspective.

One such social cost is health deterioration. Levine and Rothman (2006), who look at the effect of openness on child health, explain that, to sustain long-run economic growth, trade openness should not be harmful to health outcomes. According to Amartya Sen, "good health is its own reward and economics has to be subservient to health - not the other way around". People place huge value on their health, so if the claims of critics on openness causing health deterioration are remotely possible, research in this area becomes extremely important.

In economics, there is a consensus that economic openness is beneficial. Theoretical trade theory of comparative advantage[3] predicts that openness leads to higher standards of living, through productivity gains and terms of trade improvements, and that it is mutually beneficial to trading parties. Even recently, economists have been debating on whether comparative advantage

[3] Krueger (1974).

applies to the 21st century[4] and have ruled in favor; though Krugman's new trade theory reduces the role played by comparative advantage, it identifies new sources of benefits from trade such as reduced average production costs and access to a wider variety of products. In addition, a multitude of empirical evidence proves the positive relationship between trade openness and rising living standards.[5]

The costs of openness for low income and heavily indebted developing countries are subtler and are not as well explained by economic theory. Some critics profess that trade does not improve living standards,[6] others claim that trade does not promote economic growth and others purport that even if growth occurs not all consumers benefit. Specifically, critics have argued that the experience of openness in low income and heavily indebted developing countries has created social costs such as health deterioration, compromises in education and environmental degradation that more than outweigh the benefits. These costs are usually linked to the decrease in the ability to tax capital which is associated with openness and trade liberalization, which in turn leads to decreased government expenditure. To analyze such contentions one has to look at the links between trade policy and households. Winters (2000), for instance, summarizes the static links between trade policy and poverty in three major components: enterprises, wealth distribution and the government. The common presumption is that openness and trade liberalization lead to falling government revenues that can squeeze social expenditure and hurt the poor. So when concentrating on one such social expenditure (public health expenditure) the claim is that as total public spending rises (falls), public health expenditure rises (falls) more than proportionately.

[4] Bhagwati et al (2004), Samuelson (2004).
[5] Cleanthous (2000), Dollar and Kraay (2004), Frankel and Romer (1999).
[6] Mayda and Rodrik (2001), Weissman (2003).

The purpose of this paper is to, first, show the effect of open trade on government spending, just as the literature has done, but with larger, longer and newer panel data, and second, using the same panel data, to determine the criteria that governments use in determining the proportion of spending to be allocated to public health. The aim is to test the claim that openness leads to a more than proportionate change in public health expenditure than in government spending. At the same time, the paper will try to explain the possible discrepancy in expenditure growth by looking at two potential competitors of healthcare for public spending, name military and education expenditures.

The paper uses rich data on macroeconomic variables on openness, income, population, government spending allocation, and demographics for 189 countries over a 50-year period, 1960-2009, and employs two panel data models to address the abovementioned claims. Fixed-effects and random-effects formulations are compared and contrasted in both models and are checked for robustness using pooled, between-effects, cross-sectional, logarithmic and per capita analyses. Model specifications are then run for two subsets of countries: one that divides all countries into five income groups and another that selects least-developed and heavily-indebted poor countries.

When looking at all countries together the paper finds an ambiguous relationship between government size and openness: there is a positive relationship that turns negative when we control for country size. When looking at subsets of countries, however, two main findings are evident: government size increases in poor, less developed countries, against their claims, as a result of openness, possibly due to the fact that they are seeking more public insurance against the risks of openness at its early stages; second, government size decreases in richer, more developed countries as a result of openness, perhaps because once openness has been in place for a while, governments seek less insurance against risk.

The second model shows that poor, less developed countries rank healthcare spending lower than defense but higher than education. Nevertheless, as they become more open to trade their government spending increases. As a result of openness, poor, less developed countries are spending on healthcare more than proportionately than they are spending on defense and less than proportionately than on education. Therefore, even though it is alarming that poor, less develop countries, that have much need for better health and more education, are ranking military expenditure higher than health and education, openness leads to more public health expenditure through bigger government size. At the same time, poor less developed countries are spending more proportionately on education, which is, in itself, effective in advancing health achievements.

The remainder of the paper is organized as follows. Section 2 reviews the relevant empirical literature. Section 3 presents the empirical methodology in determining the relationship between openness and public health expenditures via government spending. The data, estimation procedure and results are presented and discussed in Sections 4, 5 and 6, respectively. Section 7 concludes.

2. Openness, Government Size and Health

Economic openness can potentially affect health in various ways. Classical economic theory predicts that trade improves countries' standards of living through increased economic growth. Pritchett and Summers (1996) find a strong link between economic performance and health outcomes by using cross-country, time-series data on health, specifically, infant and child mortality rates and life expectancy. They conclude that wealthier nations are healthier nations. However, one has to be careful when looking directly at the relationship between health and trade

openness as the causality might work both ways;[7] what is more, openness may not be the sole determinant of health.[8]

Levine and Rothman (2006) report possible channels that improvement in health may take place. One such channel is the access to healthcare, that is, governments may invest tax revenue in public health. Openness, they argue, may influence the degree to which governments are willing to, and are able to, fund public health. On one hand, openness may expose countries to the financial instability of trading partners and countries may end up importing financial crises and debts. This, in turn, invites in organizations, such as the IMF that, many a times, push for cuts in public social spending;[9] and, in addition, open economies may have a harder time to tax capital. On the other hand, openness may result in increases in government safety nets[10] and increases in government spending[11] that governments may choose to direct towards public health.

Besides financial crises, open economies may import other positive or negative determinants of health. New treatments of diseases, innovative healthcare, laws on safekeeping the environment and better education practices, to name a few, may lead to improvements in health. Crowded urban areas, increased pollution and disease importation may, on the other hand, lead to health deterioration.

In the case of poor developing countries the aforementioned effects of openness on health become more pronounced. Many low income countries liberalized trade in the 1980s and 1990s by converting quantitative restrictions and other regulations into tariffs and then gradually reducing their tariff rates to the liberalized levels. As a result, one would expect to see a decline in tariff revenues. Pritchett and Sethi (1991), however, showed that when, in addition to reducing

[7] Rodrik and Rodriguez (2001), Helpman (1988), Harrison (1996).
[8] McArthur and Sachs (2001).
[9] Weissman (2003).
[10] Rodrik (2000).
[11] Epifani and Gancia (2009).

tariff rates, governments also reduced the scope of tariff exemptions and exceptions there was an equal probability of observing an increase in tariff revenues or a decrease. Hood (1998) arrived to the same result. Though it seems at first that the negative effect on tariff revenues may be overstated, reducing exemptions usually leads to higher taxes which in turn may lead to higher prices. Both increases result in a worsening of economic welfare for the poor: the poor can no longer afford to pay for health and have to depend fully on the provision of public health. Since the governments in question are not efficient in spending the revenues they collect, the provision of public health is further restrained.

Nevertheless, it can be shown that openness and trade liberalization eventually reduce tariff rates so far that government revenue falls. Rodrik (1997, 1998, 2000) has argued that increased openness reduces governments' abilities to raise revenue because mobile factors can no longer be taxed so readily. This puts a further restraint on social spending and hence on public expenditure. Consequently, the falling revenues in these countries trigger a government behavior least favorable to the poor. Instead of evenly reducing all allocations of government spending, it is argued that governments rush to curtail social expenditure first, such as public health expenditure.

Epifani and Gancia (2009) test empirically a theoretical model that shows that openness increases the size of governments through either a terms of trade externality (trade lowers domestic cost of taxation) and/or the demand for insurance (trade raises risk and public transfers). They use a lagged openness variable to test its effect on government size and take five-year averages of their variables to allow for the effects of openness to kick in. They carry out cross-sectional and panel data analysis and find that their results hold in both cases, that is, globalization may have led to inefficiently large governments.

While many researchers have tried to estimate specific social costs of openness, including the cost on health,[12] and in other research the effects of openness on government size, the literature lacks research on the two together. Shelton (2007) investigates the determinants of government expenditure, in total and by individual category, for example, public health expenditure, and at different government levels. What is more important, he includes trade openness as one of the determinants of public expenditures and finds that much of the expenditure associated with increased trade openness is not in categories that explicitly insure for risk. His results are especially true in less-developed countries, which tend to centralize public expenditures the more open they are. However, Shelton does not find a significant relationship between openness and healthcare spending at any level of government.[13]

The first goal of this paper, therefore, is to estimate the relationship between openness and government spending.[14] Whatever the effect on government spending, the second, and main, goal of the paper is to investigate how the provision of public health changes with regards to changes in government spending, and will go further into analyzing the determinants that affect a government's decision on allocating spending to public health. In particular, I will be looking at health outcomes, demographics, private health, military and education expenditures.

[12] Levine and Rothman (2006), for example, look at the effects of openness on child health.

[13] Only in his extended specification (between estimator) that he uses for robustness checks does Shelton find a small, positive significant relationship between openness and health expenditure.

[14] Alesina and Wacziarg (1998) show that smaller countries have larger shares of public spending in GDP and are more open to trade. They support that this result may be driving the positive empirical relationship between government size and trade openness. In fact, in some of their specifications they find that country size is inversely related to government spending while openness is unrelated. On the contrary, Epifani and Gancia (2009) find their results to be robust on the positive relationship between government size and openness, even after the inclusion of country size. They conclude that this discrepancy arises because of two data reasons: they use newer data, which capture the increase in correlation between government size and openness over time, and they include more, and some different, countries in their sample; for instance, they exclude countries with more than 200% openness. This is why it is necessary, in this paper, to empirically test the relationship between government spending and openness first and then the relationship between public health expenditure and government size so that the results we report are not driven by sample choice or by the extended time series.

3. Empirical Analysis

3.1. Model 1: The effect of openness on government spending

To first show the effect of open trade on government spending a linear regression model of the form

$$y_{it} = a_i + X_{it}\beta + \varepsilon_{it} \quad (1)$$

is employed under the assumptions that (i) the ε_{it} are iid, normally distributed and serially uncorrelated, (ii) $E[\varepsilon_{it}|X, \alpha_i] = 0$, (iii) $E[\varepsilon_{it}, a_i] = 0$ and (iv) $Var(a_i) = \sigma_\alpha^2$. y_{it} denotes government spending of country *i* at time *t* and is modeled to depend on an explanatory variable, X_{it}, an error term ε_{it} and an unobserved country specific characteristic, α_i, which, for the purposes of this model, could be interpreted as the form of trade liberalization that country *i* has chosen to undertake. Considering the analysis of the effects of openness on government spending, we might suspect that a country's chosen path to freer trade plays a dominant role on a government's ability to raise tariff and tax revenues and as a result, a specification like (1), which combines a cross section, a time dimension and allows for unobserved effects has considerable benefits over a pure cross sectional formulation. The explanatory variable is going to be a measure of country *i*'s openness at time *t*, where openness will act as an indicator for freer trade in general. The hypothesis is that the more open an economy is to trade, the less government revenue is raised and thus less spending is carried out. Openness, by definition, is calculated as the sum of a country *i*'s total imports and exports over that country's Gross Domestic Product (GDP).

In the second specification, I add per capita income and population just as Epifani and Gancia (2009). Income controls for the fact that the level of development may affect the availability of tax bases and the preference for public goods. Population, just as Alesina and Wacziarg (1988), controls for the possibility that the correlation between openness and government size may be

driven by country size. They argue, as many researchers in the relevant literature, that larger countries trade less and may have smaller governments due to economies of scale in the provision of public goods. In the third specification, following the suggestion in Epifani and Gancia (2009), I add two variables that may capture the effect of external shocks on government spending: the standard deviation of terms of trade (lagged one period) and its interaction with openness. Rodrik (1998) suggests that the interaction term is meant to capture the fact that more open economies may be more exposed to external shocks, and hence, demand more public insurance. In the fourth specification, I include time dummies.[15] Finally, in the fifth specification, I add a measure of the political regime using the proxy *polity2* (drawn from the Polity IV dataset),[16] removing the external shock proxies from the previous two specifications.

All specifications[17] were then run 8 more times for 8 income regions: Low-Income (LI), Lower-Middle-Income (LMI), Upper-Middle-Income (UMI), High-Income (HI) OECD-member and High-Income (HI) non-OECD regions. Lower-income regions are also classified into Least Developed Countries (LDC) and Highly-Indebted Poor Countries (HIPC). The final income region is the union of LDC and HIPC. Countries are listed by region in Table A1 in the appendix.

3.2 Model 2: The effect of government spending on health expenditure

To determine the criteria that governments actually use in determining the right proportion of spending to be allocated to public health, we again propose a model as in (1), under the same five assumptions. This time, y_{it} denotes the proportion of government expenditure allocated to public

[15] According to Epifani and Gancia (2009), the inclusion of time dummies is not sufficient to avoid spurious results if the main variables are nonstationary. I have performed panel unit root tests on my measures of openness and government consumption using the t -test based on OLS estimates.
[16] This variable takes values in the range −10 (autocracy) to 10 (democracy) according to the degree of openness of political institutions.
[17] Of these, only the third specification is presented for each region but important results from all specifications are mentioned in the text.

health for country i at time t and is modeled to depend on a set of explanatory variables denoted by X_{it}, an error term ε_{it} and an unobserved country specific characteristic α_i as before. For the purposes of this model, such an unobserved country specific characteristic could be interpreted as the ranking country i's government places on people's health as opposed to other social needs, such as education.

The set of explanatory variables will be divided into those that a government should use in determining the right proportion of government spending to be allocated to public health and those that should not, but still do affect spending allocation decisions. To measure the former I use, first, an indicator for a country's population's health status (in the previous time period), the hypothesis being that countries with worse health indicators should try and allocate a higher proportion of their spending to public health. Secondly, I use the country's private health expenditure, the hypothesis being that countries with higher private health expenditure need not allocate as much spending to public health.

The factors that should not, but do affect public health expenditure will be measured by, first, the country's government expenditure, where the hypothesis is that as government spending increases (decreases), the proportion allocated to health rises (drops) because other spending components are ranked as more important than health. Hence, as government expenditure increases (falls) the proportion of spending allocated to health should increase (fall) more than proportionately. A second factor is a country's other public expenditure such as military expenditure and education expenditure. Here, the hypothesis is that countries that rank defense higher than health for public spending will increase the proportion of spending allocated to health as the proportion allocated to defense expenditure drops and decrease it as the proportion of defense expenditure rises. This is because the drop or rise in defense expenditure is independent of health expenditure decisions. On the other hand, in the case of countries that rank defense

lower than health the level of defense expenditure should not affect the proportion of public spending allocated to health. A similar argument holds for education.

In addition, we will test the hypothesis that countries with a higher GDP will allocate a higher proportion of spending to public health since economic theory predicts that as GDP rises, government spending also goes up and hence as explained above the proportion of spending allocated to health is also expected to rise. Thus, the set of explanatory variables should also include GDP.[18]

Finally, population will also be an explanatory variable. This is needed given that none of the independent variables are expressed in per capita terms. Hence, we will be testing the hypothesis that as the population of a country increases, a country's government will allocate more funds to public health.

In other specifications we include various controls. In the third specification, I add polity2 just as in model 1 and, in the fourth specification, I include, in addition, its interaction with military expenditure. The interaction term is meant to capture the fact that economies with more democratic political regimes may be spending less on defense and hence more on public health.

In the fifth specification, I include education expenditure, as explained above, and in the sixth specification a measure of education and its interaction with its corresponding public expenditure. The more educated a country's population is the more they would be spending on health. I chose tertiary education so as the variable would be comparable across all regions.[19] The interaction term is meant to capture the fact that economies with more educated populations would spend

[18] However, it was instead decided to redefine all expenditures as percentages of GDP so as to conform to the formal definition of openness, which is also expressed as a percentage of GDP. Therefore, it is unwise to include GDP as an explanatory variable as it would induce simultaneity.
[19] I also tried secondary education in the case of lower income countries and the results were similar.

more on public education as people would value education more and, hence, more on health if they value health more than education and less, otherwise.

In the 7th specification, I use the portion of the population over 65 years of age to capture the effect of an aging population. This should have a positive effect on health expenditure. I also include its interaction with the death rate to capture the fact that an older population may have higher death rates and would more than increase the effect of the health indicator on public health expenditure. In the final specification, instead of government expenditure, I use the sum of government expenditure and foreign aid. This is meant as a robustness check. Poor countries that get more foreign aid may act differently when it comes to allocating public expenditure than countries that get less aid.

Just as in model 1, all specifications[20] of model 2 were then run for each of the 8 income regions: LI, LMI, UMI, HI/OECD, HI/non-OECD, LDC, HIPC, LDC/HIPC. As already mentioned, countries are listed by region in Table A1 in the appendix.

4. Data

Data were collected from the integrated databases of the International Monetary Fund (IMF) and the World Bank, the Center for International Comparisons of Production, Income and Prices of the University of Pennsylvania, the Center for Systemic Peace, and the United Nations (UN). The databases that gathered the required information, respective to their sources, are the International Financial Statistics (IFS) and Government Financial Statistics (GFS),[21] the World Development Indicators (WDI), release PWT 6.3 of the Penn World Tables (PWT), the Polity IV

[20] Of these, only the second and fourth specification is presented for each region but important results from all specifications are mentioned in the text.
[21] Data for 1972-1989 are from the GFSM Historical Database.

Project, Political Regime Characteristics and Transitions, 1800-2007, and the current list of LDC and HIPC countries from the UN.[22]

The panels of data collected are for 189 countries. These countries are subdivided by WDI into five income regions: 48 low-income (LI) countries, 55 lower-middle-income (LMI) countries, 38 upper-middle-income (UMI) countries, 20 high-income (HI) non-OECD countries, 28 high-income OECD countries. Of these countries, 46 countries are LDC, 41 countries are HIPC and 31 countries are both LDC and HIPC. I run regressions for the five income regions, LDC, HIPC and their union of 56 countries.[23] Countries are reported by income region in Table A1 in the appendix. Countries missing considerable data were excluded from the dataset as well as outlier countries with a trade share greater than 200%.

To construct the final dataset I used the following variables by category. My main measure for government size is general government consumption expenditure (G), comes from GFS,[24] and is expressed in national currencies. I use the average exchange rates (XR rf) and the GDP deflator with 2000 as the base year, drawn from the WDI and IFS, to convert G to constant United States dollars (USD). GDP is expressed in 2000 USD. Government expenditure is then converted to a

[22] In 1971, the United Nations Development Program (UNDP) created a list of the 48 least developed nations according to GDP per capita. HIPCs were a list of 40 nations, 30 of which were also LDC. Therefore, the union of LDC and HIPC are 58 countries. The numbers in the paper are 46, 41, 31 and 56, respectively.

[23] LDC are not necessarily a subset of LI and vice versa. LDCs are either LI or LMI apart for Equatorial Guinea which, though an LDC, is HI. In its latest triennial review of the list of Least Developed Countries, the Economic and Social Council of the United Nations used the following three criteria for the identification of the LDCs, as proposed by the Committee for Development Policy (CDP): a low-income criterion, based on a three-year average estimate of the gross national income (GNI) per capita (under $750 for inclusion, above $900 for graduation); a human resource weakness criterion, involving a composite Human Assets Index (HAI) based on indicators of: (a) nutrition; (b) health; (c) education; and (d) adult literacy; and an economic vulnerability criterion, involving a composite Economic Vulnerability Index (EVI) based on indicators of: (a) the instability of agricultural production; (b) the instability of exports of goods and services; (c) the economic importance of non-traditional activities (share of manufacturing and modern services in GDP); (d) merchandise export concentration; and (e) the handicap of economic smallness (as measured through the population in logarithm); and the percentage of population displaced by natural disasters. To be added to the list, a country must satisfy all three criteria. To qualify for graduation, a country must meet the thresholds for two of the three criteria in two consecutive triennial reviews by the CDP. In addition, since the fundamental meaning of the LDC category, i.e. the recognition of structural handicaps, excludes large economies, the population must not exceed 75 million.

[24] Cross checked with PWT.

percentage of GDP. WDI and GFS[25] provided the data on public health expenditure (PuH), private health expenditure (PrH), education expenditure (EDU), and military expenditure (MIL); all are expressed as percentages of GDP. Foreign aid (FA) comes as a percentage of imports of goods and services, which I convert to a percentage of GDP. Measures of exports (X) and imports of goods and services (M) allow me to construct openness and supplement the PWT data on openness (OPEN). Population (POP) is used to calculate per capita GDP and all per capita measures used in robustness checks. Health indexes come from the WDI: The death rate (DR) is the number of deaths per 1000 people; the child mortality rate (MR5) is the number of deaths per 1000 children under the age of 5 years; the infant mortality rate (MRI) is the number of deaths per 1000 children under the age of one year; and life expectancy (LE) is an average number of years. The pre-constructed net barter terms of trade (ToT) variable is the percentage ratio of the export price index to the corresponding import price index measured relative to the base year 2000 and polity2 from Polity IV is an index of the level of democracy of a country's political regime. The WDI also provided demographic measures of the age of a country's population, the percentage of the total population that is 65 or older, and education, percentage of gross enrollment enrolled in tertiary school enrollment.[26]

The time series were adjusted to span the 50-year period from 1960 to 2009. All variables are computed as five-year averages from 1960-1964 to 2005-2009 so there are a total of 10 five-year periods. For lagged variables, the 1955-1959 period was also used, wherever it existed. The health index used is lagged one period. Naturally, decisions on health spending allocations

[25] I use the classification of the functions of government (COFOG) by GFS, which breaks total expenditure into categories such as healthcare, education, and defense, each of which include both current and capital expenditure. The detailed analysis of how each category is defined and how expenditures are classified is available in *A Manual on Government Financial Statistics* (1986).

[26] Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

depend on the population's health status of earlier years. The openness ratio is also lagged one period to allow for the effects of freer trade to kick in. Finally, the private on total health ratio is lagged. The hypothesis here is that governments substitute away increases (toward decreases) in private health expenditures in previous periods.

INSERT TABLE 1 ABOUT HERE

Table 1 summarizes the means and standard deviations of all the variables used in the two models and in all 13 specifications for the most recent 5-year period in the data, 2005-2009. Variables are averaged over all countries and by income region.[27] The one striking observation is that HI/OECD countries are spending more than twice the share of their government expenditure on health than do HI/non-OECD, UMI and LMI countries, more than three times than LDC and LDC/HIPC countries and more than four times as much as HIPC and LI. LDC have almost twice the government size (as a share of their GDP) than do HI countries. In fact, government size seems to be decreasing by income.[28] Comparing public health expenditure to the other two public expenditures, military and education, we can see that health fairs worse against education in all regions but HI/OECD countries and against military for LDC, HIPC and LI. LMI and HI/non-OECD spend about the same on health and defense, whereas UMI spend twice as much on health, and HI/OECD more than four times as much. Compared to defense, countries spend more on education for all regions but LMI where they spend about the same.

Worthy of note, in Table 1, is the share of private health expenditure over total health expenditure. It seems that private health plays a very important role for lower-income countries than it does for higher-income countries, especially OECD countries. A possible explanation is that public health is better organized in these countries so that their citizens entrust their health to

[27] Countries are listed by income region in Table A1 in the appendix.
[28] It is interesting to note that when looking at 2005-2009, the average income for LDC is higher than for LI countries. This is because some of the LDC belong in the LMI region.

the public health system. In the case of lower-income countries, there is more distrust. However, comparing LI to LDC we see that private health is more important in the former which proves that it is more of a story about expenditures than social development, the key differential between the two groups. This observation supports research in the direction of this paper.

Looking at the demographics of the population, low-income countries, LDC and HIPC have younger populations as shown by the portion of the population over 65. The portion of aging population increases by income. One more time, HI non-OECD countries upset the trend. It is possible that these countries have climbed the income ladder faster than they could develop. Very similar results apply for tertiary education. The ratio is about the same for low-income countries, LDC and HIPC, for the rest education increases by income apart from the HI non-OECD group. Finally, country size as measured by population paints an interesting picture. This increases by income until we reach the LMI, decreases for UMI and increases again for the HI/OECD countries, still remaining at half the level of the LMI. Of course, India and China may be driving these results. Non-OECD HI countries are again an outlier. This time it becomes evident that the group consists of very small but very open countries, which might be the reason why they are able to achieve high per capita incomes.

As far as democratization is concerned, the results are very similar to demographics with an improvement varying positively with income; same outlier group as before, this time with a negative average rating. Finally, foreign aid is decreasing with income and is non-existent for HI countries.

INSERT FIGURES 1 AND 2 ABOUT HERE

Openness in Table 1 increases with income: the most open countries are the HI/non-OECD countries. Many of these countries are either small and/or tend to lack industries of their own so they have to rely heavily on imports to satisfy demand for goods and services. Terms of trade

variability works in the opposite direction: diminishes with income apart for the volatile outlier group. This variable is the standard deviation of terms of trade (lagged one period, from the PWT) and is meant to capture the effect of external shocks on government spending. Obviously, shocks diminish with income, but income is not a causation, rather a by-product as witnessed by the non-OECD Hi countries. A quick glance at Table 1 exposes an obvious trend in terms of the health index variables. DR, MRI and MR5 fall with income; LE rises with income. The trends in the mortality rates are more pronounced. The relationship between health, as expressed by these indexes, income, as expressed by income regions, and openness can be seen in Figure 1 and Figure 2 for LDC and HIPC. The indexes are demeaned within corresponding time periods and weighted by country size,[29] to reveal the true cross-sectional relationship between health, income and openness. We notice that MRI, MR5 and DR follow the same general trend, LE also but in reverse; the ranges of the indexes, however, reveal that MR5 has a steeper decline both across openness and across income. Figure 2 for LDC/HIPC depict similar trends and, in addition, show that countries in these groups that are very open show some instability in terms of health. It may be the case that these countries tried to achieve too much openness, too fast.

INSERT FIGURES 3 AND 4 ABOUT HERE

Figures 3 and 4 allow us to isolate the relationship of health and income over the fifty-year period to 2009. In Figure 3 we notice a steady difference in health across income groups (health improves by income), however, over time there is a convergence towards the global mean. It is evident that the difference in health between LI and LMI is more than between LMI, UMI and HI. Again, the trend is more pronounced in the case of MR5. Figure 4 shows a sharp improvement in help in the '60s which slowed down from then on. This is not the case for DR.

[29] In other words, the mean of each health indicator weighted by a country's population was computed at each time period; a much better average than the simple average across countries.

Recall that death rate does not react immediately to health improvement. In fact, there is health deterioration in the '60s, slow improvement in the 70s and 80s and faster improvement in the 90w and 2000s.

INSERT FIGURES 5 AND 6 ABOUT HERE

Figures 5 and 6 depict the openness and income relationship over time. Figure 5 shows that, on average, openness increases for all income groups over time, which hold true for LDC/HIPC in Figure 6. In the latter we see the slow and steady increase in openness over time that is also evident for the low-income groups in Figure 5. High-income groups, instead, open faster to trade in the first three decades, but slow down in the last two decades.

INSERT FIGURE 7 ABOUT HERE

Figures 7 and 8 combine the rest of the figures to show the relationship between openness and health, which is evaluated in this paper. In Figure 7 countries are grouped by openness and indexes are averages over all countries. In general, we notice a two-way convergence toward a global mean over time. On one hand, health indexes vary less in recent years than in earlier years and, on the other hand, they are less volatile across openness groups over the years. However, an observation of interest is that for openness levels above 150% of GDP there is a volatility in health indexes across time; visually more pronounced for death rates, but looking closer at the vertical axes, more prominent in the case of child mortality. It is possible, that the claim of too much openness, too soon is causing this volatility.

INSERT FIGURE 8 ABOUT HERE

Figure 8 focuses on LDC and HIPC to look at the same relationship. We observe a definite improvement in health over time and as economies become more open, which is definitely more intense than when averaging across all countries in Figure 7. However, the observed volatility in the top openness levels is still evident here and is also more intense. The volatility does reduce

over time but still exists today. What is more important to identify in this graph, is that the overall intertemporal improvement in health is much slower in the case of less open economies than in the case of more open economies. In other words, openness has acted as a catalyst for health improvement, over and above the improvement in health that happened over time.

5. Estimation

The final formulations of the two models, including all possible specifications, are given by:

$$G_{it} = a_{it} + \beta_0 + \beta_1 O_{it} + \beta_2 GDP_{it} + \beta_3 Pop_{it} + \beta_4 ToT_{it} + \beta_5 (O_{it} * ToT_{it}) + \beta_6 D_{it} + \varepsilon_{it} \quad (2)$$

$$PuH_{it} = a_{it} + \beta_0 + \beta_1 G_{it} + \beta_2 H_{it} + \beta_3 PrH_{it} + \beta_4 Mil_{it} + \beta_5 D_{it} + +\beta_6 (Mil_{it} * D_{it}) +$$

$$\beta_7 Pop_{it} + \beta_8 E_{it} + \beta_9 TE_{it} + \beta_{10} (E_{it} * TE_{it}) + \beta_{11} P65_{it} + \beta_{12} (H_{it} * P65_{it}) + \zeta_{it} \quad (3)$$

where

G_{it} = (country *i*'s government expenditure + foreign aid, at time *t*)/ GDP_{it} [30]

O_{it} = (country *i*'s openness, at time *t*) = [(X_{it} + M_{it})/ GDP_{it}]

X_{it} = (country *i*'s exports in 2000 USD, at time *t*)

M_{it} = (country *i*'s imports in 2000 USD, at time *t*)

GDP_{it} = (country *i*'s GDP in 2000 USD, at time *t*)

Pop_{it} = (country *i*'s population in billion of people, at time *t*)

ToT_{it} = (country *i*'s terms of trade variability, at time *t*)

D_{it} = (country *i*'s measure of democratization, at time *t*)

PuH_{it} = (country *i*'s public health expenditure, at time *t*) / (GDP_{it})

H_{it} = (country *i*'s change in health, e.g. death rate, at time *t-1*)

[30] In the last specification, instead of G_{it}, GFA_{it} = (country *i*'s government expenditure + foreign aid, at time *t*)/ GDP_{it} is used as an explanatory variable. This is because countries may use foreign aid also to fund health.

PrH_{it} = (country *i*'s private health expenditure, at time *t*)/ G_{it}

Mil_{it} = (country *i*'s military expenditure, at time *t*)/ GDP_{it}

E_{it} = (country *i*'s education expenditure, at time *t*)/ GDP_{it}

TE_{it} = (country *i*'s portion of potential students in tertiary education, at time *t*)

$P65_{it}$ = (country *i*'s portion of the population over 65 years old, at time *t*)

The estimation of each model is sensitive to whether the assumption

$$E[a_i | X_{i1} \ldots . X_{iT}] = 0 \tag{4}$$

holds or not. Under (4), the model is random effects and a consistent estimator of β is obtained by feasible generalized least squares estimation (FGLS). If (4) fails the model is fixed effects. Once the null hypothesis that (4) holds is tested directly we can then derive a consistent estimator by carrying out the following steps: First, transform (1) into deviations from time means and obtain the within regression $y_{it} - \bar{y}_{it} = (X_{it} - \bar{X}_\iota)\beta + (\varepsilon_{it} - \bar{\varepsilon}_t)$ and estimate β^{within} with OLS using the residuals from an estimate of σ_ε^2. Second, obtain the between regression, $\bar{y}_{it} = \bar{X}_i\beta + (\alpha + \bar{\varepsilon}_i)$ estimate $\beta^{between}$ with OLS. Using the residual sum of square form an estimate of $\sigma_\varepsilon^2 + T\sigma_\alpha^2$. Third, estimates (1) with GLS. Since the covariance matrix of the error term is unknown, use the estimates of σ_ε^2 and $\sigma_\varepsilon^2 + T\sigma_\alpha^2$ to estimate β^{GLS} with feasible GLS. Finally, under the random effects null hypothesis of $E[a_i | X_{i1} \ldots . X_{iT}] = 0$, $(\beta^w - \beta^{GLS})'\big(Var(\beta^w) - Var(\beta^{GLS})\big)(\beta^w - \beta^{GLS})$ follows a $\chi^2(k)$. If we fail to reject, β^{GLS} is consistent. Otherwise, a consistent estimator is given by β^w.

Tables 2-5 summarize the results for model 1 and Tables 6-9 for model 2. Note that the $\chi^2(.)$ test statistics for model 1 reject the null hypothesis in 5 out of 13 specifications, so the correct specification for model 1 is provided by a random effects formulation. In the case of model 2, the relatively higher $\chi^2(.)$ test statistics, accept the null hypothesis in 18 out of 24 specifications.

Thus, we can safely assume that the correct specification for model 2 is provided by the random effects formulation. This result comes as no surprise, since one would expect that variables such as a country's government, military and education expenditure and so on would be correlated with the unobserved characteristic of each country.

An alternative to dealing with the possibility that the assumption $E[a_i|\, X_{i1} \ldots . X_{iT}] = 0$ may be violated is to model the possible correlation of each country specific effect α_i with the explanatory variables directly, by projecting each α_i on $[X_{i1} \ldots . X_{iT}]$. As a result, $E[a_i|\, X_{i1} \ldots . X_{iT}] = X_{i1}\lambda_1 + X_{iT}\lambda_1 + \ldots . + X_{iT}\lambda_T + v_\iota$ with $E[v_i\,|X] = 0$. This reduces equation (1) to $y_{it} = X_{it}(\beta + \lambda) + \sum_{s\neq t}^{T} X_{is}\lambda_s + v_i + \varepsilon_{it}$. An efficient estimate of β can then be obtained in the following two steps: First, obtain an unrestricted estimate of β by OLS[31] on (9) and obtain an estimate of $Var(\beta^{unrest})$, through the residuals. Second, impose a matrix of restrictions R and obtain a restricted estimate of β from the unrestricted estimate of β by performing GLS on $\beta^{unrest} = R\beta^{rest} + \phi$.

In order to make this alternative method of estimation go through, two simplifications had to be made. First, I pooled countries according to income groupings. Second, population was dropped as an explanatory variable. The first simplification was necessary, because with the original set of countries, there would not be enough degrees of freedom in these regressions. The second simplification was necessary, because population did not change much over time, thus inducing multicollinearity with the constant term in the first step. However, it is important to note that under these two modifications, the first estimation procedure, described above, yielded almost identical estimates as those in Tables 2-9. Thus, suggesting that there is no significant price to be paid for imposing these simplifications and deviating from the original model.

[31] Note that the structure of the X matrix is such that OLS and GLS are equivalent.

An advantage of the correlated random effects estimation procedure is that it gives us the opportunity to conduct an omnibus test of specification. Thus, under the null hypothesis that $y_{it} = X_{it}(\beta + \lambda) + \sum_{s \neq t}^{T} X_{is} + \nu_i + \varepsilon_i$ is the correct specification, the test statistic $(\beta^{unrest} - R\beta^{rest})' \Psi^{-1} (\beta^{unrest} - R\beta^{rest})$ follows a χ^2 distribution with degrees of freedom equal to the number of elements in β^{unrest} minus the number of elements in β^{rest}. This result is due to Chamberlain (1984).

High values for $\chi^2(k)$ were detected for both models and all specifications reject the restricted specification. An attempt to find the correct specification would be to let the slope coefficients vary over time. However, such a more flexible specification is not expected to accept the null. At this point, it should be emphasized that the test implied by $E[a_i | X_{i1} \ldots . X_{iT}] = X_{i1}\lambda_1 + X_{iT}\lambda_1 + \ldots . + X_{iT}\lambda_T + \nu_t$ is an omnibus test of specification, and as a result a rejection of the null does not tell us which part of the specification is incorrectly specified.

Given the nature of the data, macro-indicators for 189 countries, averaged over 5-year periods, there might exist measurement error, as suggested by Shelton (2007). Also, measurement error arises due to the distance between the measure used and the theoretical concept it is meant to capture due to the lack of direct measures for many of the theoretical concepts. Finally, the differential quality of data for rich versus poor countries results in measurement error. This means there is heteroskedasticity in the error term, which I adjust for by using robust standard errors. I deal with the differential availability by running two specifications: a restricted one including the variables with the widest coverage and a complete specification with fewer countries.

INSERT TABLES 2-5 ABOUT HERE

6. Results

6.1. Model 1: The effect of openness on government spending

Having rejected the null that (4) holds using the Hausman test statistic in 5 out of 13 specifications, I know that the correct formulation for these specifications treats the unobserved α_i as fixed effects A consistent estimator is thus given by β^{within} in Table 3. For the other 8 specifications, a consistent estimator is given by β^{GLS} in Table 5. The corresponding results from pooled OLS, the between estimators and cross-section (2005-2009) are given in Tables 2, 4, and 10, respectively.

Openness, as expressed by the ratio of trade over GDP, is either negative and significant or statistically insignificant in its correct specifications. The negative coefficient on openness supports the hypothesis that free trade as expressed by openness shrinks the country's government spending. Only in the case of low-income countries, in the random effects specification, do we find that government size rises as a result of openness, as do Epifani and Gancia (2009) and the literature on which they built on. However, when looking at the pooled OLS results and the between effects in Tables 2 and 4, we see again the positive, significant relationship between government size and openness in the case of all the lower income groups including the LMI. When looking at all regions together, the coefficient of openness is positive and significant, though small, in column (1) in this simple univariate regression. It changes sign, but still significant, when we add per capita income and population, and also holds for upper-middle and high-income countries.[32] It is possible that in the case of lower-income countries, the

[32] This finding is in agreement to previous evidence by Alesina and Wacziarg (1998) but in contrast to Epifani and Gancia (2009) who find a robust positive effect of openness on government size. The latter argue that they find robust results due to a newer and larger dataset. However, having done what they prescribe, and using even newer data, I still support the result of the former. In fact, I replicated the results of Epifani and Gancia (2009) when I used the same PWT version. When, however, I ran the regressions using the newer version, the results changed to the

fear for external risk is higher, hence, a greater demand for public insurance is generated. This result holds for high-income countries when using older data, but does not hold when using newer data. Potentially, in the first stages of openness a country faces an uncertain environment and tries to insure against risk and when it has been open for a while the risk is less and consequently the demand for insurance is less.[33] These results reinforce the need to estimate the second model so as to see the implications of changes in government expenditure on public health expenditure, which in turn have implications on the status of health in each country.[34] In either case, we need the result to test the hypothesis that the change in public health expenditure is more or less, proportionately.

The results in the correct specifications in Tables 3 and 5 show that income and population are negatively correlated with government consumption. The results are robust in Tables 2, 4, and 10. Richer and larger countries tend to need governments less.[35] In specification (3), I add two variables that may capture the effect of external shocks on government spending: the standard deviation of terms of trade (lagged 5 years, from the PWT) and its interaction with openness, as prescribed by Rodrik (1998) who claims that more open economies may be more exposed to these shocks, and hence, demand more public insurance. These controls do not alter the results and are insignificant most of the time. In the correct specification for OECD countries, column (12) in Table 5, they are significant and have the correct signs: positive for terms of trade and larger negative for its interaction with openness. In specification (4), I included time dummies to specification (3); they do not change the results. Finally, adding the polity2 variable, in column

reported results. It is possible that there is no persistence in the positive relationship between openness and government expenditure over time as they claim.

[33] The results on the relationship of openness and government size are not robust when we look at just the cross section of 2005-2009. Openness seems to have no effect on government size in all specifications.

[34] These results do change under the correlated random effects estimation procedure, though as discussed above the omnibus test does not give much emphasis on these results.

[35] Alesina and Wacziarg (1998) also find that large countries should have smaller (larger) governments if the elasticity of substitution between private and public goods is lower (higher) than one.

(5), to measure the effect of democratization on government size, we find a negative significant result only in Table 2, the pooled OLS case. A possible explanation is that less democratic regimes seek more power in the form of bigger government. In the correct panel data specifications the political regime indicator does not explain variation in government size.

INSERT TABLES 6-9 ABOUT HERE

6.2 Model 2: The determinants of health expenditure

Having rejected the null that assumption (4) holds using the Hausman test statistic in 18 out of 24 specifications, I know that the correct formulation treats the unobserved α_i as fixed effects and a consistent estimator is given by β^{within} in Table 7 (and in Table 9 for the other 6 specifications). Looking at the results for all regions in Table 7, from specification (1), there are two significant variables, namely government and military expenditure. The positive coefficient on government expenditure suggests that governments do not rank health highly, accepting the hypothesis that as government expenditure drops (rises) economies shrink (expand) their social spending (as much as that is represented by public health spending) in favor of military and other forms of expenditure. As government expenditure increases, the proportion spent on public health increases as now there are extra revenues to spend on public health that were set aside in favor of other forms of expenditure in the past. The result is robust to specifications (2)-(4) and (7) as it does not change with the addition of population, political regime controls, or aging population controls. The coefficient turns negative when we add education expenditure in specifications (5) and (6). The variables were tested for multicollinearity but there does not seem to be a problem. When adding another social cost, like education, countries seem to rank health relatively higher than other public spending. As government expenditure drops (rises) spending on health increases (decreases). We obtain the same negative estimate when instead of government expenditure we

include the summation of government spending and foreign aid. For many countries, the amount of foreign aid is a major driver for the allocation of funds to social spending. When including foreign aid, the relative importance of public health expenditure has increased, in other words, though not the most important category of public transfers, the relative importance of health is high. In specifications (9)-(16), (19)-(22) were we look at specific regions, we find that government size does not explain public health spending. Where it does, it is negative for lower-middle-income countries[36] and positive for high-income non-OECD countries[37]. The latter group consists of countries unrelated in any other way than income and population size; it may be the case that they are concerned less with healthcare than other public spending. Moreover, the data on these countries are slim so there could be measurement error.[38]

The highly significant negative coefficient of military expenditure in specifications (1)-(3) in Table 7 suggests that, as defense spending increases, less is spent on health, and vice versa. This builds on the previous finding, that countries rank health expenditure lower than other forms of expenditure; military expenditure is a key component of government spending in many countries and, therefore, affects decisions on spending on health when ranked higher than health in public spending. As we add the interaction of military spending with the political regime control in specification (4), the coefficient on defense spending changes such that if a country is more democratic (polity measure more than -3.331) defense is a complement to public health, though the size of the coefficient shows that, on average, governments spend more than proportionately on health. For more autocratic countries, defense spending becomes a substitute to health spending. At the same time, as we discussed above, the inclusion of this interaction alters the

[36] Specifications (17)-(18).
[37] Specifications (23)-(24).
[38] Note that the correct specification for HI countries is random effects were a similar result appears.

effect of government size on public health expenditure, increasing the relative importance of public health.

Similarly, when we add education in specification (6), healthcare gains in relative importance and is a complement to defense and education as targets of public funds; the size of the coefficients shows that, on average, governments spend more (less) than proportionately on defense (education). When looking at regional estimates, spending on defense is a complement to public health spending and significant most of the times. What is more important, is that for LDC, HIPC and lower-income countries the relative importance of defense to health varies with income from 1:6 to 1:5, for upper-middle income countries the ratio becomes 4:5 and drops to 1:2 for OECD countries. The result is robust when we interact military spending to the political regime measure.

The negative coefficient on private health expenditure, albeit not significant in all-region specifications and significant in lower-income region specifications, suggests that public and private health expenditures are substitutes, rather than complements of each other. So, for whichever reason private health expenditure may increase (say, for example, health deterioration as evidenced by a higher death rate), public health expenditure decreases, and vice versa. This result is robust in almost all specifications, even in the cross-sectional specifications in Table 11 and the all-log specifications in Table 12. In the LMI case, private health expenditure comes out as a complement to public health expenditure.

INSERT TABLES 10-12 ABOUT HERE

Surprisingly, the coefficient on DR (the change in the death rate, a health indicator), though not significant in most occasions, is many times negative. This suggests that as the health status of the country has deteriorated in the past five years, the government spends a smaller proportion of its revenues on public health. Possible explanations could be that the chosen health indicator

may not be the best one. However, results are robust by trying the infant mortality rate, five-year mortality rate and life expectancy instead. Possible replacements could include some sort of health index either from the World Health Organization. It may also be the case, that by taking five-year averages there is not a lot of variability in the health indicators. This is evident in the time-series plots in Figures 1-6, when looking at specific regions and health over time. In the few specifications that the health outcome coefficient is significant, it has the correct positive sign: specifications (19)-(20). When checking for robustness of the results by using logs for all variables to mitigate the effect of oultiers in Table 12, we find that the health index as measured by death rate is both positive and significant as expected. Perhaps, removing outliers and, at the same time, looking at changes in health outcomes instead, helped obtain the expected results.

Not surprisingly, the coefficient on population is not significant. This implies that country size per se, measured by population, does not affect the proportion of government spending allocated to healthcare. When running regressions with per capita values for expenditure variables rather than GDP ratios, I find that there is a substantial increase in the significance of the coefficients but no major differences in the direction of the effects, strengthening the robustness of the results. One key finding is that defense spending, when we look at per capita valuations of expenditures, becomes even more important than health and education.

6.3 Robustness Checks

Several other controls were used for robustness. Many of these are viewed throughout Tables 2-12, others were carried out and important findings are summarized here. Moreover, Tables 2 and 6 carry the pooled OLS results for the two models respectively to identify whether non-country specific trends hold; Tables 4 and 8 include the between effects that are meant to check the effects of explanatory variables that persist over time; Tables 10 and 11 list the cross-

sectional specifications for the most current 5-year period, 2005-2009, with regional dummies and without; Table 12 reports the all-log specifications that mitigate the effects of outliers. Other robustness checks include: running specifications with per capita valuations of expenditures rather than shares or indexes; using different health indexes in raw form, in logs, demeaned by period (either removing the simple average over all countries at each time period or removing the population-weighted average at each time period); using secondary education as a measure of education rather than tertiary education; repeating the estimation with 3-year averages and annual data; removing outliers and re-estimating. Let us consider the most important findings.

I have already discussed the inclusion of the political regime measure and its interaction with military expenditure in specifications (3) and (4). Specification (4) was chosen to be repeated for all income regions as it revealed interesting results. For LDC and HIPC countries, the effect of military expenditure on public health expenditure depends on the political regime. If the regime is positive (negative), then defense and health expenditures are complements (substitutes).

I also discussed above the inclusion of education, measure of education (tertiary), and their interaction in specifications (5) and (6). The interaction captures the effect that countries with more educated populations spend more on education and, consequently, on health. Table 7 reports the fixed effects results which is the correct specification according to the Hausman test statistic. It seems that including the interaction has just split the positive effect of education into two. The joint effect is the same when the portion of tertiary education approaches 100%. With an average of 33% across all regions and a range 4-65% across income regions, this means that the interaction term mitigates the positive effect of education, which fairs more important than health, proportionately. The direction of this result is robust in Tables 11 and 12 and in the per capita formulations. Note, though, that the size of the effect changes considerably: it reduces to below 1 in this order: per capita, logs, cross-section. In fact, in the latter case, most of the effect is

driven by the interaction. This means that in poorer countries were less people are educated, more weight is given to health than to education. As the portion of educated individuals increases, the relative importance of health to education in public spending decreases, yet health remains more important.

In specification (7), I add the portion of the population over 65 years of age and its interaction with the health indicator as controls. The coefficient for the population over 65 does not explain public health spending. Its interaction with the death rate, included to capture the fact that older populations tend to have higher death rates, and demand more public health spending, as a result, has a wrong-signed coefficient in Table 7. However, in Table 12 the coefficient has the correct sign, size, and is very significant.

When trying out different health indicators the insignificance of the health-outcome effect does not improve. Only in the all-log fixed and random effect specifications, where the effect of outliers is mitigated, do we see an improvement in the health index coefficients in direction and significance. In fact, the explicit removal of outliers in terms of openness, as prescribed by Epifani and Gancia (2009), has indeed corrected the results.

These results do not change dramatically under the correlated random effects estimation procedure. The results maintain the same direction and size but are now more significant. The negative relation between government spending and the proportion spent on public health has been reversed. In fact, the new coefficient further strengthens the claim of poor developing countries that globalization forces them, through reduced government revenues to more than reduce their social spending in order to maintain their debt repayment and other key government expenditures. Of course, as explained for model 1, we should not place too much weight on the results of the correlated random effects estimation since it appears that there might exist some misspecification.

7. Summary and discussion

This paper has been an attempt to test both economic theory and country claims on what openness and trade liberalization entail. Trade theory predicts, and substantial empirical literature proves, that freer trade contributes positively to social surplus. Do the results hold for small, poor and ill-prepared (in terms of institutional infrastructure) countries, or do they disappear in the competitive arena? This paper tried to address this question. The concerns of many countries in lower income groups focus on the fact that they are not yet ready to face severe reductions in their government revenues because they do not have the institutional infrastructure prescribed by global organizations, such as the WTO, to maintain the necessary social spending. The results of model 1 show that there is an ambiguous relationship between government size and openness when looking at all countries together: there is a positive relationship that turns negative when we control for country size. When looking at subsets of countries, however, two main findings are evident: first, for lower income countries and less developed countries, against their claims, there is a positive relationship between openness and government size, possibly due to the fact that they are seeking more public insurance against the risks of openness at its early stages; second, for higher income and more developed countries, the results of model 1 demonstrate that once openness has been in place for a while, government revenues are indeed reducing as a result of more openness and trade liberalization.

Should governments of poor developing countries be afraid that this would mean the end of any attempt to maintain social spending at the necessary level? The second model tried to investigate the case of public health expenditure. It proved that countries do reduce the proportion of health expenditure as a result of the dampening in government revenues and vice versa. So indeed there is valid concern. Health has proved to be secondary in government allocation

decisions, to military spending, in particular. Also, the determinants of a country's health status proved to be bad indexes and warrants the use of more reliable health indexes. So is there a flaw in the model? Should we have tried to see what happens in other social spending? Or, can we extend our results to all forms of social spending?

It now becomes important to look at the findings of the two models in conjunction. Poor, less developed countries rank healthcare spending lower than defense but higher than education, nevertheless, as they become more open to trade their government spending increases. So, in fact, this is translated into spending in healthcare more than proportionately than spending in defense and less than proportionately than spending in education. Therefore, even though it is alarming that poor, less develop countries, that have much need for better health and more education, are ranking military expenditure higher than health and education, openness leads to more public health expenditure through bigger government size.

What is more, the results of this paper obtain that openness is working in favor of health advancement in another way, namely educational expansion. As education expenditure is ranked lower to public health in poor, less developed countries, this means that as government size increases with openness, governments are spending more proportionately in education than healthcare. Empirical evidence suggests that general education in schools may be more effective in advancing health achievements that is specialized health education.[39]

The search for the social costs and benefits of openness is nevertheless far from complete. A more complex model is needed to investigate all types of government spending and to see what happens to the social indicators as government-spending allocations vary. As Rodrik (1998) claims, richer countries with the proper infrastructure mitigate external risk that comes with openness through spending on social protection while developing countries, lacking the capacity

[39] Sen (1999), Krueger and Lindahl (2001).

to administer large-scale social transfer programs, rely on simpler, less-targeted solutions including public employment. Other ventures, therefore, include looking at education, the environment, unemployment, prevention of child labor, poverty and income inequality and so on. Shelton (2007) attempts to look at all components of government spending together and his major finding regarding openness is that much of the expenditure associated with increased trade openness is not in categories that explicitly insure for risk: the relationship between healthcare, education and military spending with openness was unanswered.

Moreover, there is room for improvements on the model proposed here in three directions. First, the possibility of endogeneity of some of the explanatory variables could be addressed. For example, it is natural to think that the health indicator affects both the private and public health spending. Of course, it should be noted that part of the endogeneity problem is already being treated, since the health indicator variable used here is lagged. Second, the health indicator could be chosen in a better fashion. I have tried to use the four macroeconomic indicators used in the relevant literature but all produced similar results. Third, we could present the same model regressions using per capita values instead of proportions over GDP as done in the robustness checks. In the case of health, per capita valuations become important. For example, in two countries with the same total health expenditure but larger population in one country than the other, the latter should be viewed as spending more on healthcare than the former.

The division of countries into income regions has shed some light on the differences between poor, developing countries and rich developed economies. The problem with any division of this kind, however, is ad hoc and could not be easily justified with any kind of rigorous theoretical tools. However, empirical results conveyed valuable information that is usually lost in the all-country specifications.

Appendix A

The following countries have been used in this paper with some attrition for missing values in some specifications. The largest sample has 189 countries. These countries are subdivided into five income regions: 49 lower-income (LI) countries, 56 lower-middle-income (LMI) countries, 37 upper-middle-income (UMI) countries, 20 high-income (HI) non-OECD countries, 27 high-income OECD countries. Of these countries, 47 countries are LDC, 42 countries are HIPC and 32 countries are both LDC and HIPC.

INSERT TABLE A1 ABOUT HERE

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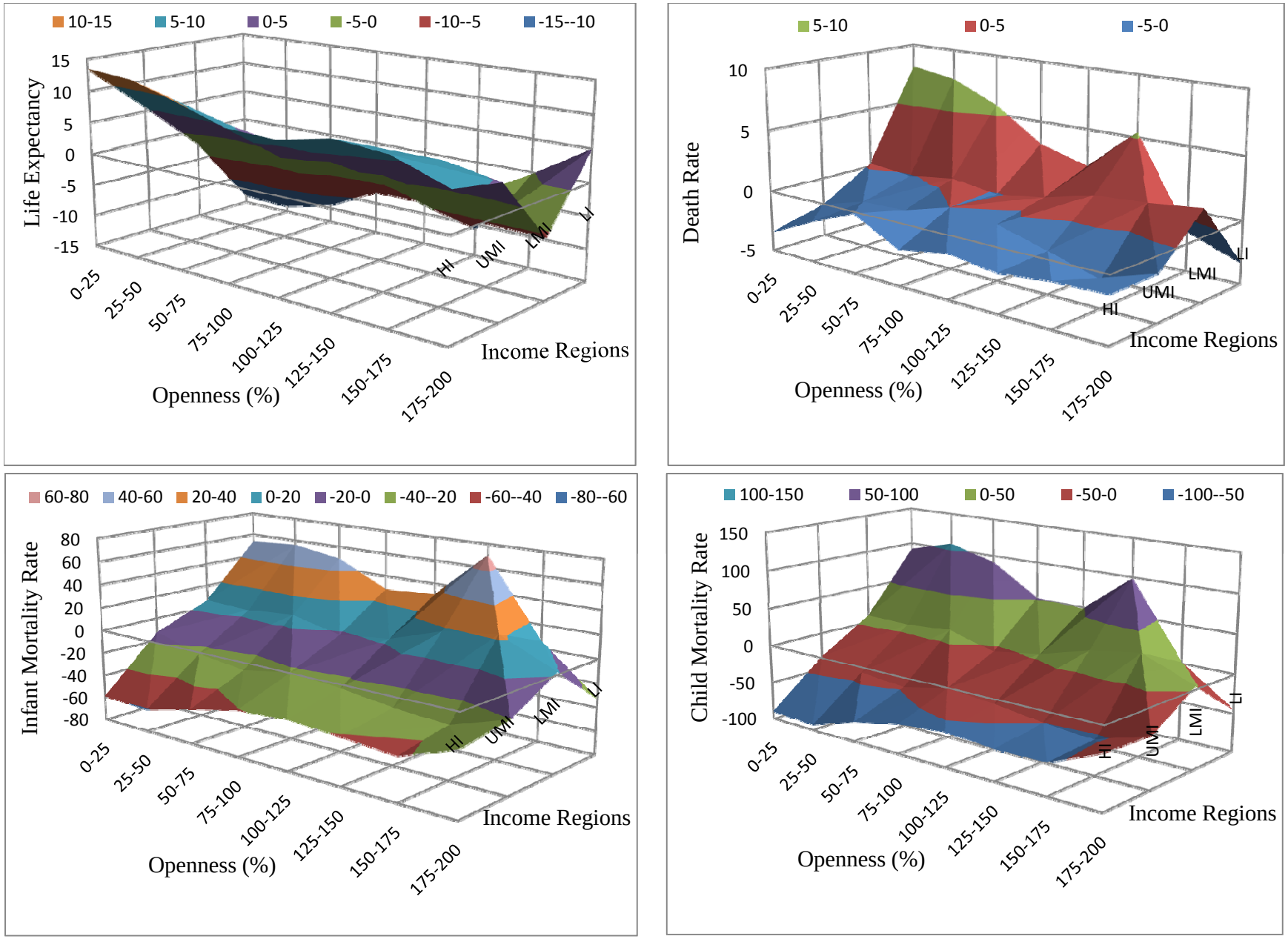


Figure 1

Health, Income & Openness

Notes: Countries are grouped by openness. Income regions are High Income (HI), Upper Middle Income (UMI), Lower Middle Income (LMI), Low Income (LI). Health indicators are explained in the paper in detail, are all demeaned by period and are color-coded.

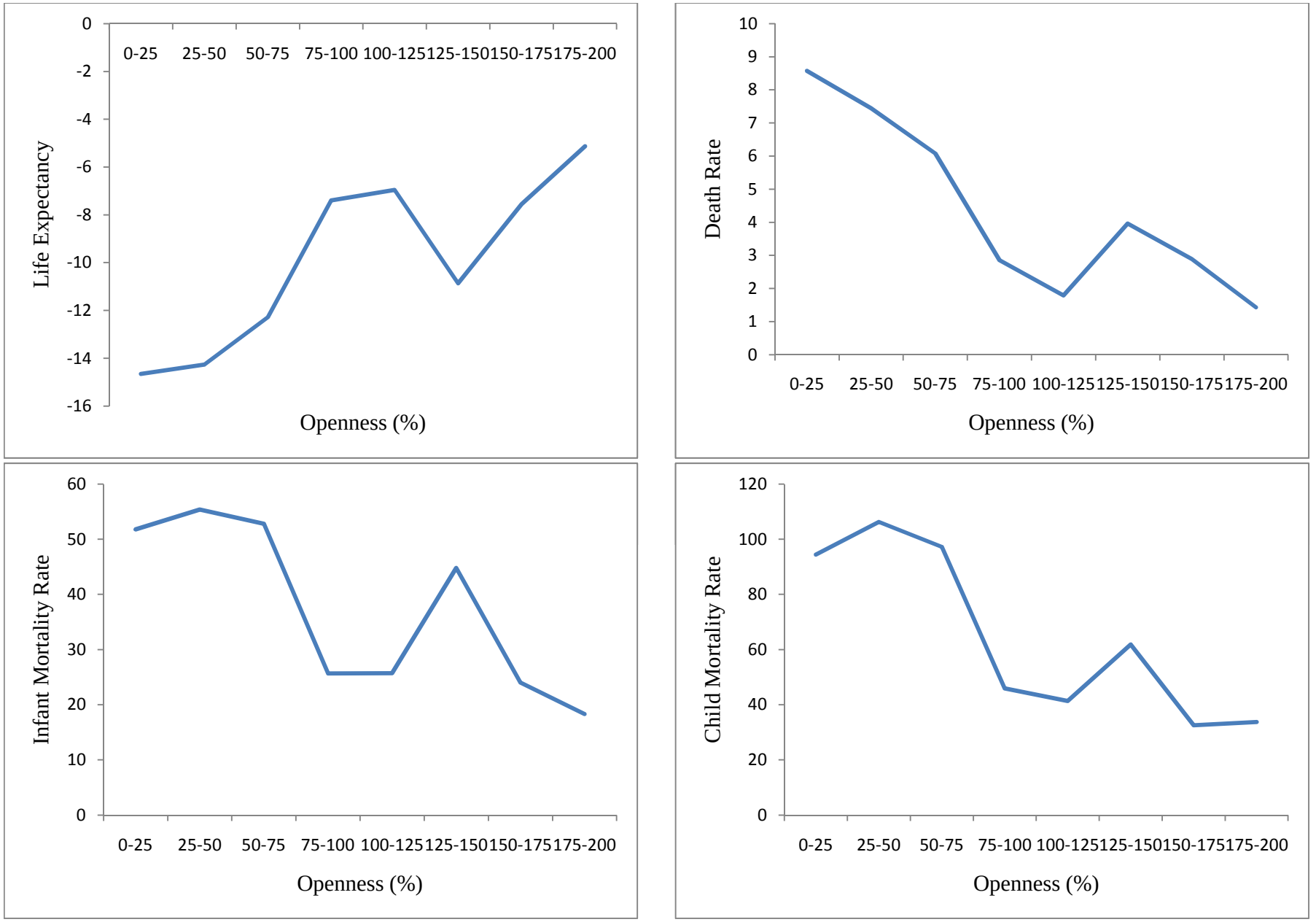


Figure 2

Health & Openness for LDC and HIPC countries

Notes: Countries are grouped by openness for Least Developed (LDC) and Highly-Indebted Poor Countries (HIPC). Health indicators are explained in the paper in detail, are all demeaned by period.

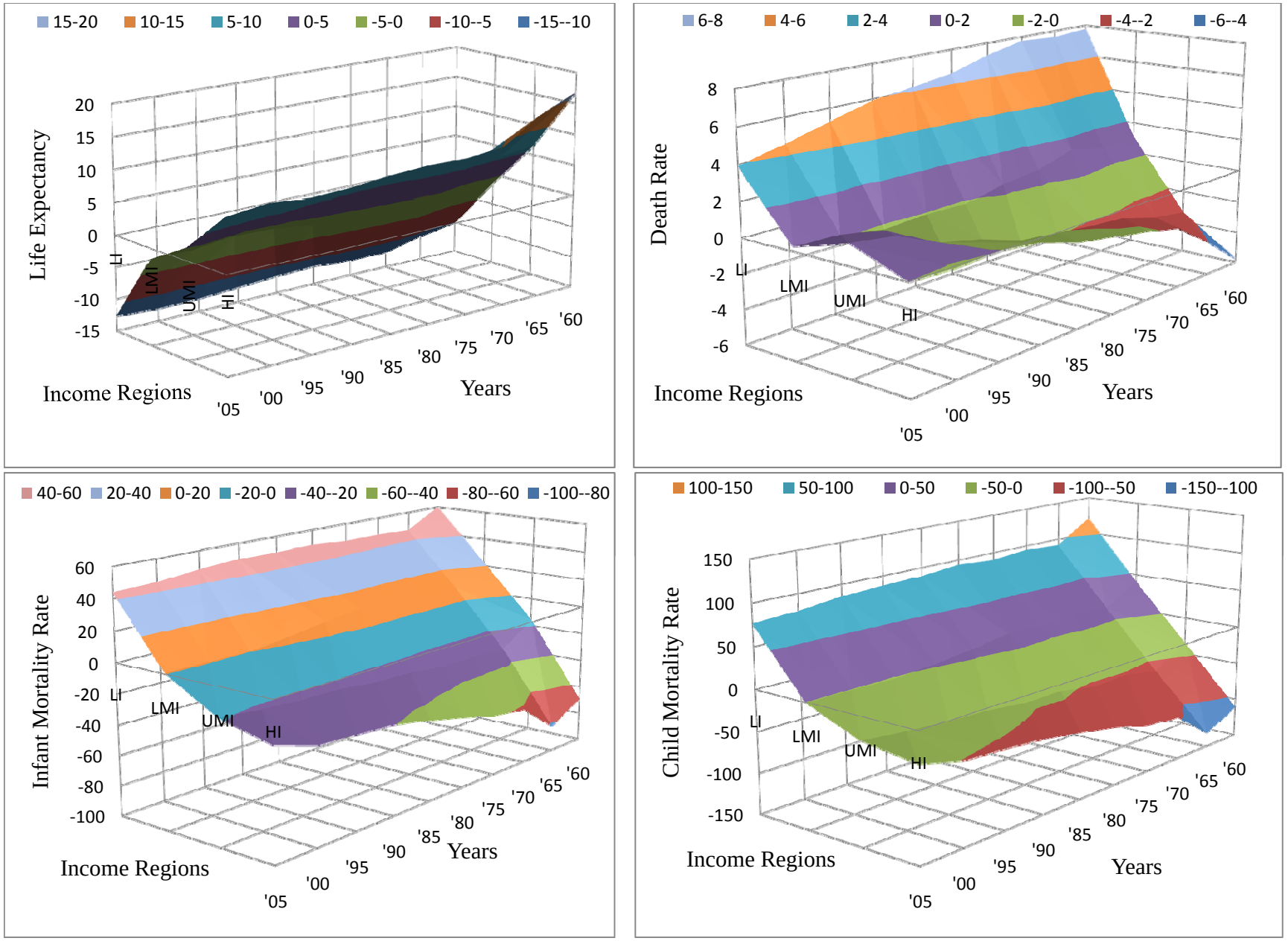
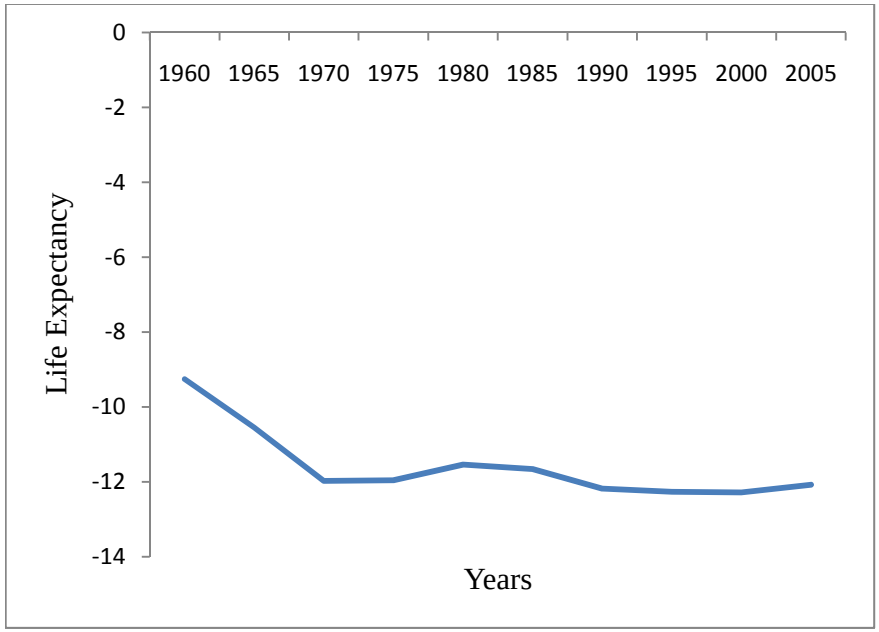
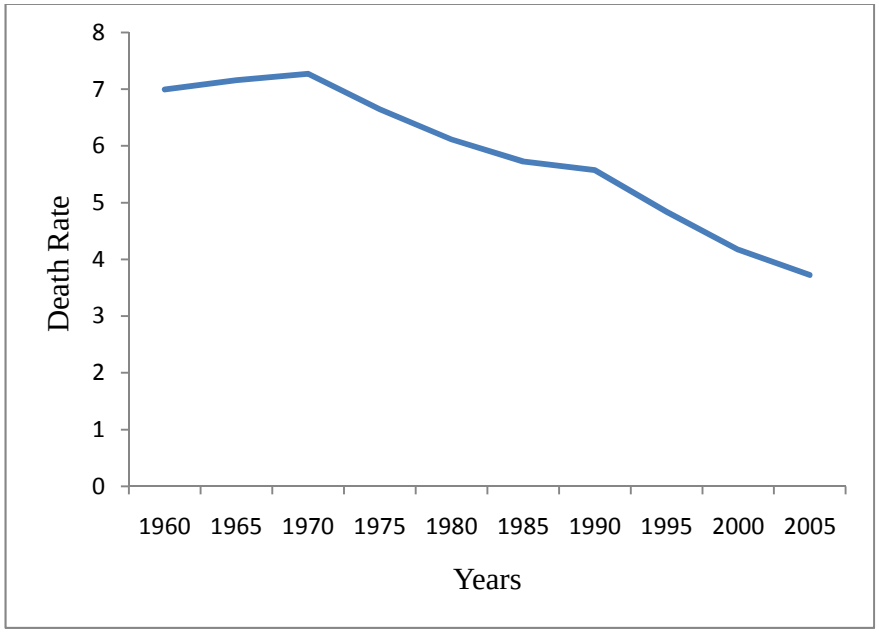


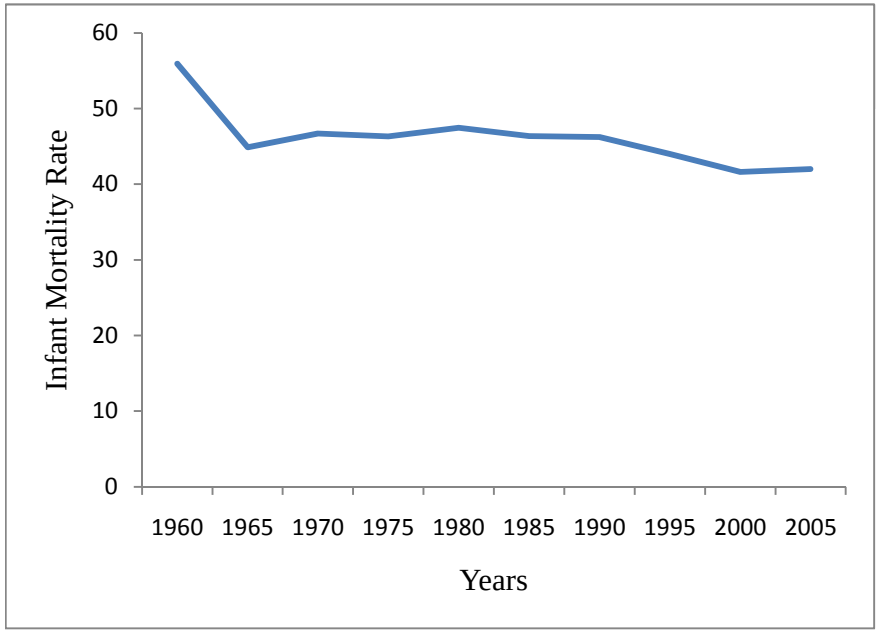
Figure 3

Health & Income, 1960 - 2009

Notes: Income regions are High Income (HI), Upper Middle Income (UMI), Lower Middle Income (LMI), Low Income (LI). Years are 5-year periods, e.g. '60 denotes 1960-1964, '65 denotes 1965-1969, etc. Health indicators are explained in the paper in detail, are all demeaned by period and are color-







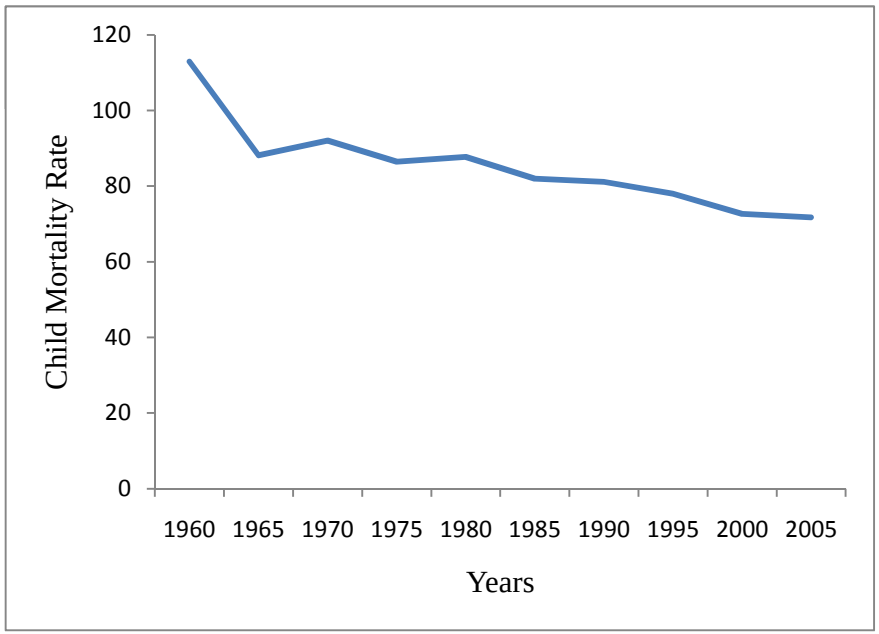


Figure 4

Health, 1960 - 2009 for LDC and HIPC countries

Notes: Countries are Least Developed (LDC) and/or Highly-Indebted Poor Countries (HIPC). Years are 5-year periods, e.g. '60 denotes 1960-1964, '65 denotes 1965-1969, etc. Health indicators are explained in the paper in detail, are all demeaned by period.

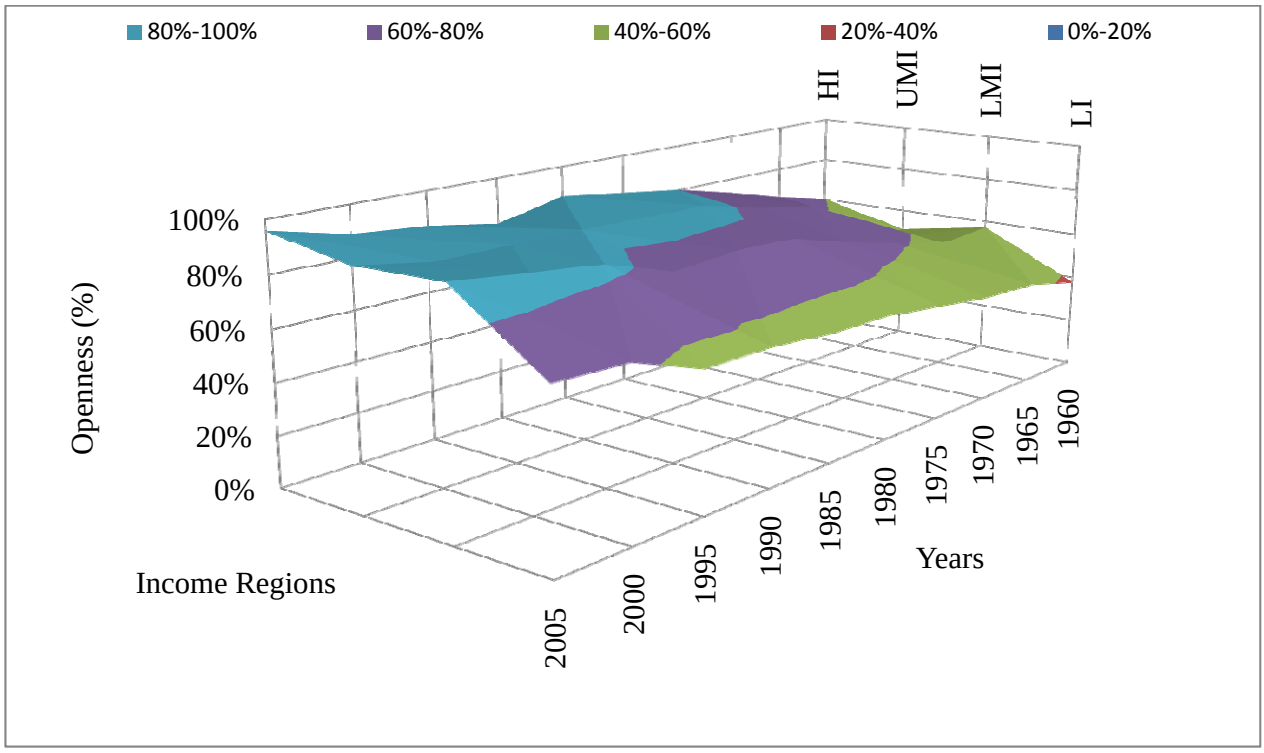


Figure 5
Openness & Income, 1960-2009

Notes: Openness is the average by year and by income region and is color-coded; income regions are High Income (HI), Upper Middle Income (UMI), Lower Middle Income (LMI), Low Income (LI). Years are 5-year periods, e.g. 1960 denotes 1960-1964, 1965 denotes 1965-1969, etc.

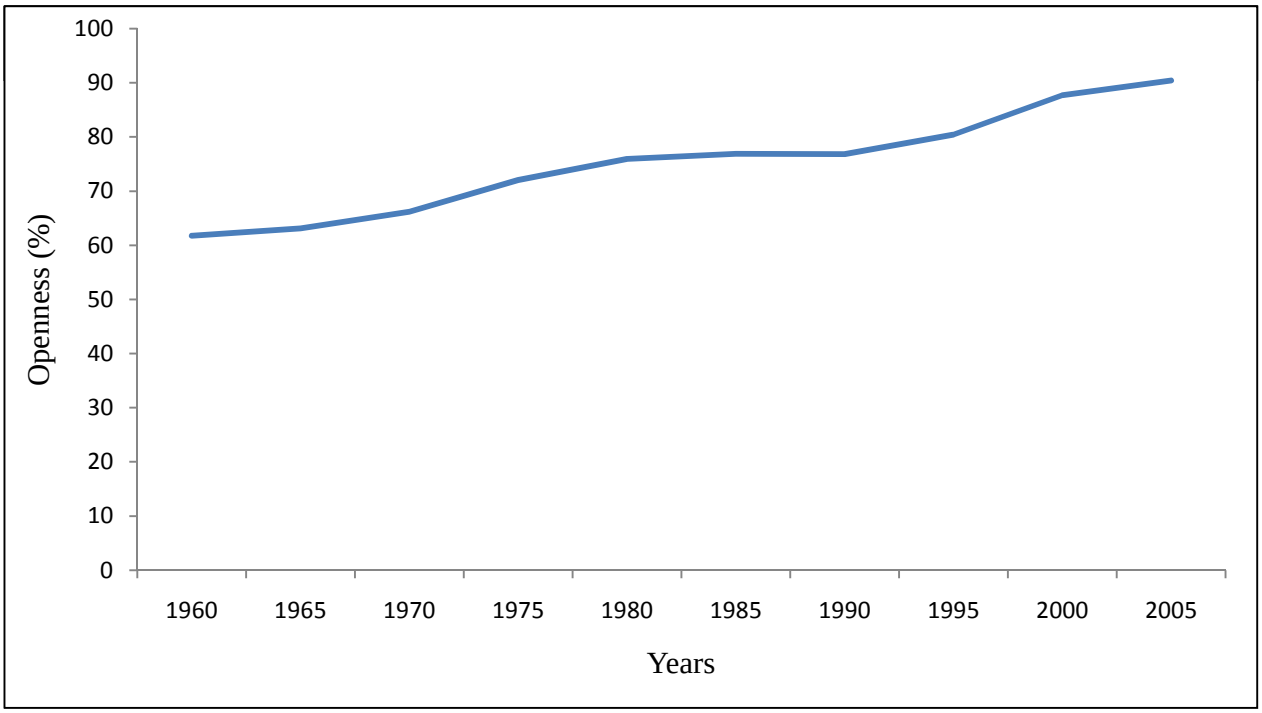


Figure 6
Openness, 1960-2009 for LDC and HIPC countries

Notes: Openness is average by year for Least Developed (LDC) and Highly-Indebted Poor Countries (HIPC). Years are 5-year periods, e.g. 1960 denotes 1960-1964, 1965 denotes 1965-1969, etc.

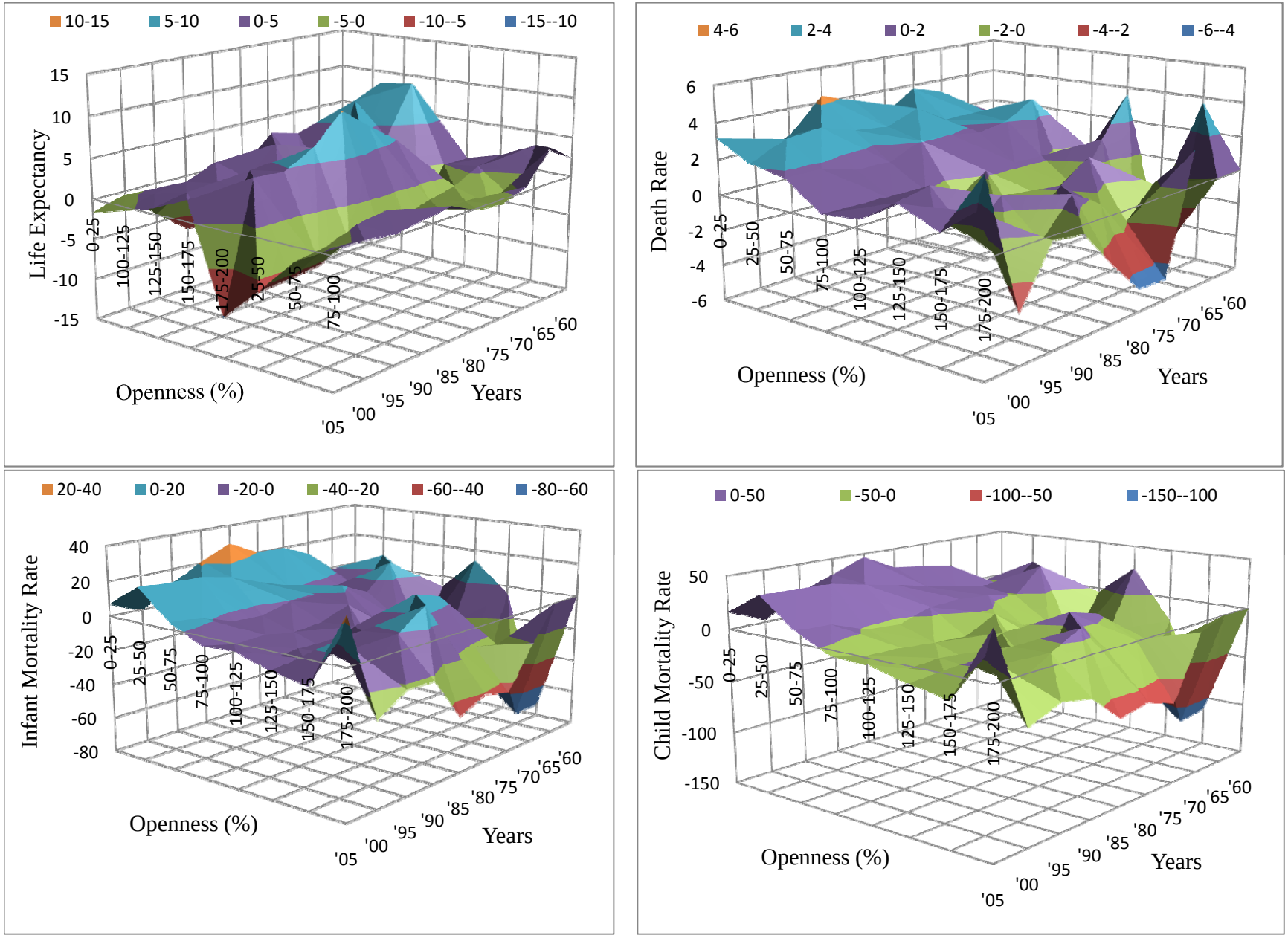


Figure 7

Health & Openness, 1960 - 2009

Notes: Countries are grouped by openness. Years are 5-year periods, e.g. '60 denotes 1960-1964, '65 denotes 1965-1969, etc. Health indicators are explained in the paper and are all demeaned by period.

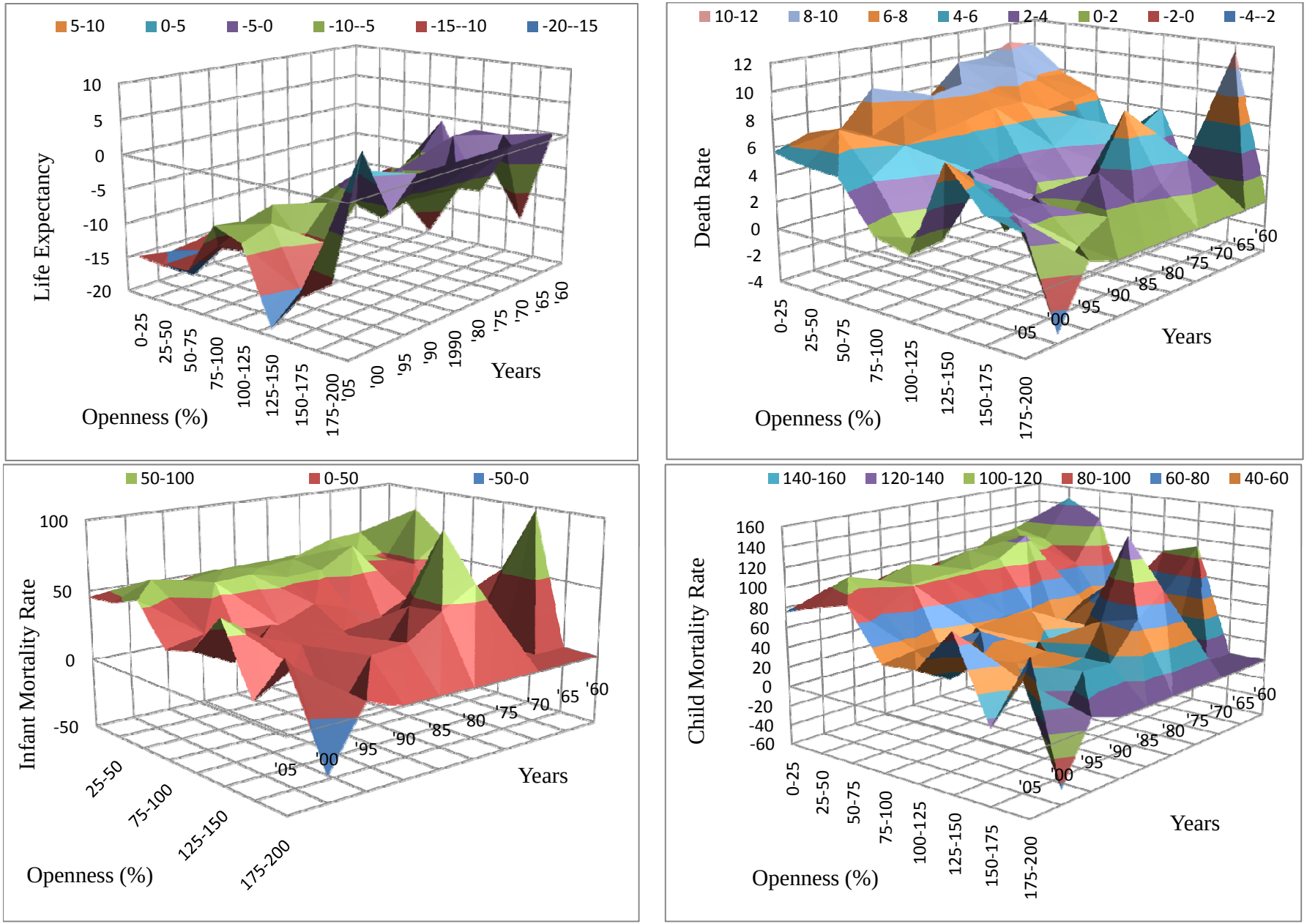


Figure 8

Health & Openness, 1960 - 2009 for LDC and HIPC countries

Notes: Countries are grouped by openness for Least Developed (LDC) and Highly-Indebted Poor Countries (HIPC). Years are 5-year periods, e.g. '60 denotes 1960-1964, '65 denotes 1965-1969, etc. Health indicators are explained in the paper in detail, are all demeaned by period and are color-coded.

Table A1

Region: Lower-Income Countries (LI)			
Afghanistan	Kyrgyzstan	Malaysia	Sierra Leone
Bangladesh	Ethiopia	Mali	Solomon Islands
Benin	Gambia, The	Mauritania	Somalia
Burkina Faso	Ghana	Mozambique	Tajikistan
Burundi	Guinea	Nepal	Tanzania
Cambodia	Guinea-Bissau	Niger	Togo
Central African Rep.	Haiti	Nigeria	Uganda
Chad	Kenya	Pakistan	Uzbekistan
Comoros	Laos	Papua New Guinea	Vietnam
Congo, Dem. Rep.	Liberia	Rwanda	Yemen
Cote d'Ivoire	Madagascar	Sao Tome & Principe	Zambia
Eritrea	Malawi	Senegal	Zimbabwe

Region: Lower-Middle-Income Countries (LMI)			
Albania	Dominican Republic	Lesotho	Samoa
Algeria	Ecuador	Macao	Sri Lanka
Angola	Egypt, Arab Rep.	Macedonia, FYR	Sudan
Armenia	El Salvador	Maldives	Swaziland
Azerbaijan	Georgia	Marshall Islands	Syrian Arab Republic
Bhutan	Guatemala	Micronesia, Fed. States	Taiwan
Bolivia	Guyana	Moldova	Thailand
Bosnia & Herzegovina	Honduras	Mongolia	Timor-Leste
Cameroon	India	Morocco	Tonga
Cape Verde	Indonesia	Namibia	Tunisia
China	Iran, Islamic Rep.	Nicaragua	Turkmenistan
Colombia	Iraq	Paraguay	Ukraine
Congo, Republic of	Jordan	Peru	Vanuatu
Djibouti	Kiribati	Philippines	

Region: Upper-Middle-Income Countries (UMI)			
Argentina	Dominica	Mauritius	South Africa
Belarus	Fiji	Mexico	St. Kitts & Nevis
Belize	Gabon	Montenegro	St. Lucia
Botswana	Grenada	Palau	St. Vincent & the Grenadines
Brazil	Jamaica	Panama	Suriname
Bulgaria	Kazakhstan	Poland	Turkey
Chile	Latvia	Romania	Uruguay
Costa Rica	Lebanon	Russian Federation	Venezuela
Croatia	Libya	Serbia	
Cuba	Lithuania	Seychelles	

Region: High-Income (HI) OECD-member Countries			
Australia	Finland	Italy	Portugal
Austria	France	Japan	Slovak Republic
Barbados	Germany	Korea, Rep.	Spain
Belgium	Greece	Luxembourg	Sweden
Canada	Hungary	Netherlands	Switzerland
Czech Republic	Iceland	New Zealand	United Kingdom
Denmark	Ireland	Norway	United States

Table A1
(Continued)

Region: High Income (HI), non-OECD Countries			
Antigua & Barbuda	Cyprus	Kuwait	Saudi Arabia
Bahamas	Equatorial Guinea	Malta	Singapore
Bahrain	Estonia	Oman	Slovenia
Bermuda	Hong Kong, China	Puerto Rico	Trinidad & Tobago
Brunei Darussalam	Israel	Qatar	United Arab Emirates

Region: Least Developed Countries (LDC)			
Afghanistan	Djibouti	Malawi	Solomon Islands
Angola	Equatorial Guinea	Maldives	Somalia
Benin	Eritrea	Mali	Sudan
Bhutan	Ethiopia	Mauritania	Tanzania
Burkina Faso	Gambia, The	Mozambique	Timor-Leste
Burundi	Guinea-Bissau	Nepal	Togo
Cambodia	Haiti	Niger	Uganda
Central African Rep.	Kiribati	Rwanda	Vanuatu
Chad	Laos	Samoa	Yemen
Comoros	Lesotho	Sao Tome & Principe	Zambia
Congo, Dem. Rep.	Liberia	Senegal	
Congo, Republic of	Madagascar	Sierra Leone	

Region: Heavily Indebted Poor Countries (HIPC)			
Afghanistan	Cote d'Ivoire	Liberia	Sudan
Benin	Eritrea	Madagascar	Tanzania
Bolivia	Ethiopia	Malawi	Togo
Burkina Faso	Gambia, The	Malaysia	Uganda
Burundi	Ghana	Mauritania	Zambia
Cameroon	Guinea	Mozambique	Sao Tome & Principe
Central African Rep.	Guinea-Bissau	Nepal	Senegal
Chad	Guyana	Nicaragua	Sierra Leone
Comoros	Haiti	Niger	
Congo, Dem. Rep.	Honduras	Rwanda	
Congo, Republic of	Kyrgyzstan	Somalia	

Region: LDC & HIPC Countries (LDC/HIPC)			
Afghanistan	Cote d'Ivoire	Laos	Samoa
Angola	Djibouti	Lesotho	Sao Tome & Principe
Benin	Equatorial Guinea	Liberia	Senegal
Bhutan	Eritrea	Madagascar	Sierra Leone
Bolivia	Ethiopia	Malawi	Solomon Islands
Burkina Faso	Gambia, The	Malaysia	Somalia
Burundi	Ghana	Maldives	Sudan
Cambodia	Guinea	Mali	Tanzania
Cameroon	Guinea-Bissau	Mauritania	Timor-Leste
Central African Rep.	Guyana	Mozambique	Togo
Chad	Haiti	Nepal	Uganda
Comoros	Honduras	Nicaragua	Vanuatu
Congo, Dem. Rep.	Kiribati	Niger	Yemen
Congo, Republic of	Kyrgyzstan	Rwanda	Zambia

Table 1

Summary Statistics, 2005-2009

Variable	All Region		LDC		HIPC		LDC/HIPC		LI		LMI		UMI		HI/OECD		HI/non OECD	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Income per capita (´000 2000 US$)	14.2	15.7	2.5	2.9	2.3	2.9	2.9	3.4	2.2	2.7	7.3	7.4	12.8	4.8	35.3	13.2	36.1	18.0
Government Expenditure (% of GDP)	19.3	12.1	25.5	16.0	20.6	11.9	24.1	15.3	21.6	11.8	22.9	16.1	18.7	8.3	13.2	3.3	13.3	9.1
Foreign Aid (% of GDP)	5.4	7.6	13.3	10.0	11.2	8.8	11.6	9.4	11.1	10.0	4.3	5.1	1.0	1.6	n.a.	n.a.	0.1	0.3
Education Expenditure (% of GDP)	4.8	2.9	4.7	3.1	4.0	2.5	4.8	2.8	3.2	2.6	5.9	4.9	3.9	1.5	5.4	1.3	4.5	1.8
School enrollment, tertiary (% total)	33	26	4	3	7	10	6	8	7	9	25	17	46	24	65	18	29	16
Military Expenditure (% of GDP)	2.1	1.9	3.1	3.3	2.6	3.1	2.7	2.8	3.3	3.0	2.5	2.3	1.6	1.0	1.4	0.8	3.0	2.4
Public Health Expenditure (% of GDP)	3.7	2.4	1.9	1.6	1.5	0.9	2.0	1.5	1.4	1.2	2.6	1.6	3.2	1.9	6.6	1.0	3.2	2.1
Private Health Expentiture (% of total)	45	23	59	24	67	19	59	22	73	16	51	21	46	21	26	10	41	17
Death Rate (per 1,000 people)	9	4	12	4	12	4	11	4	11	4	8	4	9	4	9	2	6	4
Infant Mortality Rate (per 1,000 births)	37	35	82	31	80	32	77	32	79	31	37	23	18	11	4	2	16	28
Child Mortality Rate (per 1,000)	53	58	127	55	126	57	119	58	123	57	48	35	21	16	5	2	23	48
Life expectancy (Year)	68	10	56	8	56	8	57	8	57	8	67	8	71	6	79	2	76	7
Openness (% of GDP)	91	49	75	40	68	41	79	43	69	38	93	38	91	35	90	52	141	81
ToT Variability	0.06	0.05	0.07	0.06	0.07	0.07	0.07	0.06	0.07	0.06	0.05	0.03	0.06	0.07	0.03	0.02	0.08	0.05
Population (millions)	35	131	13	17	16	17	13	16	26	38	64	234	21	42	34	61	4	6
Population over 65 (% of total)	7.3	5.1	3.2	0.8	3.4	0.9	3.4	0.9	3.3	0.9	5.8	3.1	9.1	4.4	15.1	2.9	7.0	5.2
Polity2	3.8	6.3	1.5	5.0	2.2	4.8	2.0	4.9	1.5	5.0	3.1	6.1	5.6	5.9	9.8	0.5	-1.5	8.6

Notes: Means and standard deviations were calculated for the most current period in the dataset, 2005-2009. Data come from IMF's Government Financial Statistics and Interantional Financial Statistics, the World Development Indicators, Penn World Tables (release 6.3 PWT), Polity IV, and the United Nations. Income regions are High Income (HI) (OECD and not), Upper Middle Income (UMI), Lower Middle Income (LMI), Low Income (LI), Least Developed (LDC) and Highly-Indebted Poor Countries (HIPC).

Table 2

Openness and Government Expenditure: β^{OLS}

Dependent Variable: Government Expentiture (% of GDP)

	ALL REGIONS					LDC	HIPC	LDC/ HIPC	LI	LMI	UMI	HI/ OECD	HI/non OECD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Openness	0.008***	0.001	-0.016*	-0.016*	0.006**	1.567***	0.074**	0.116***	0.098***	0.073***	-0.086***	0.014	-0.050***
	[0.003]	[0.003]	[0.009]	[0.009]	[0.003]	[0.033]	[0.029]	[0.025]	[0.030]	[0.026]	[0.028]	[0.014]	[0.013]
Log Income		-0.006***	-0.022***	-0.023***	-0.004	1.567***	-0.061	-0.066***	-0.064***	-0.048***	-0.014	-0.039***	-0.042***
		[0.002]	[0.003]	[0.003]	[0.003]	[0.017]	[0.014]	[0.012]	[0.014]	[0.013]	[0.015]	[0.008]	[0.012]
Log Population		-0.018***	-0.017***	-0.017***	-0.010***	-0.006	-0.007***	-0.014**	-0.010	-0.013**	-0.022***	-0.008***	-0.003
		[0.001]	[0.002]	[0.002]	[0.002]	[0.008]	[0.008]	[0.006]	[0.006]	[0.005]	[0.005]	[0.003]	[0.009]
ToT Variability			-0.010	-0.007		0.008	0.011	0.005	0.006	-0.033	-0.027	0.082	-0.054
			[0.010]	[0.010]		[0.015]	[0.013]	[0.014]	[0.013]	[0.032]	[0.020]	[0.090]	[0.140]
Openness * ToT Var			0.023	0.022		-0.002	-0.013	0.001	-0.005	0.072	0.053*	-0.466*	0.034
			[0.015]	[0.015]		[0.023]	[0.022]	[0.020]	[0.020]	[0.048]	[0.029]	[0.267]	[0.150]
Polity					-0.001**								
					[0.000]								
Time Dummies				YES									
Countries	189	189	189	189	189	47	42	32	49	56	37	27	20
Observations	1711	1710	673	673	1396	170	179	219	193	188	118	126	48
R^2	0.005	0.092	0.177	0.183	0.034	0.151	0.131	0.210	0.188	0.255	0.197	0.263	0.531

Notes: Pooled OLS. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 3

Openness and Government Expenditure: β^{within}

Dependent Variable: Government Expentiture (% of GDP)

	ALL REGIONS					LDC	HIPC	LDC/ HIPC	LI	LMI	UMI	HI/ OECD	HI/non OECD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Openness	0.001	0.001	-0.019*	-0.016	0.002	-0.027	0.005	-0.009	0.030	-0.043**	-0.062**	-0.040***	0.047
	[0.002]	[0.002]	[0.011]	[0.011]	[0.002]	[0.026]	[0.023]	[0.021]	[0.025]	[0.020]	[0.028]	[0.014]	[0.036]
Log Income		0.002	-0.024***	-0.035***	0.005	-0.068***	-0.020	-0.061***	0.004	0.007	-0.027	-0.025***	-0.059**
		[0.003]	[0.005]	[0.008]	[0.003]	[0.016]	[0.018]	[0.015]	[0.019]	[0.010]	[0.017]	[0.006]	[0.024]
Log Population		0.016**	-0.011	-0.039**	0.003	0.035	-0.011	0.019	-0.015	-0.062***	-0.045	0.040	-0.062
		[0.008]	[0.012]	[0.019]	[0.009]	[0.022]	[0.019]	[0.019]	[0.022]	[0.021]	[0.044]	[0.037]	[0.090]
ToT Variability			-0.004	-0.003		-0.003	-0.009	-0.005	-0.003	-0.005	-0.003	-0.103***	0.204
			[0.005]	[0.005]		[0.007]	[0.006]	[0.007]	[0.007]	[0.012]	[0.010]	[0.036]	[0.128]
Openness *			0.010	0.008		0.008	0.025**	0.010	0.007	0.016	0.013	0.247**	-0.237*
ToT Var			[0.007]	[0.007]		[0.011]	[0.011]	[0.010]	[0.010]	[0.018]	[0.015]	[0.111]	[0.137]
Polity					0.000								
					[0.000]								
Time Dummies				YES									
Countries	189	189	139	139	160	35	33	44	38	38	27	23	13
Observations	1711	1710	673	673	1396	170	179	219	193	188	118	126	48
R^2	0.000	0.011	0.128	0.145	0.006	0.235	0.114	0.187	0.022	0.186	0.299	0.514	0.516
σ^2_ε	0.067	0.067	0.036	0.036	0.067	0.046	0.039	0.044	0.042	0.033	0.036	0.013	0.047
Hausman χ^2	2.3	35.79	1.01	7.36	12.87	16.13	1.71	20.55	8.99	10.16	2.65	3.34	6.14
d.o.f.	1	3	5	10	4	5	5	5	5	5	5	5	5
p-value	0.130	0.000	0.962	0.691	0.012	0.007	0.887	0.001	0.110	0.071	0.754	0.647	0.293

Notes: Fixed-Effects within estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 4

Openness and Government Expenditure: $\beta^{between}$

Dependent Variable: Government Expentiture (% of GDP)

	ALL REGIONS					LDC	HIPC	LDC/ HIPC	LI	LMI	UMI	HI/ OECD	HI/non OECD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Openness	0.016*	0.010	-0.020	-0.020	0.015	0.235**	0.163**	0.187***	0.178**	0.030	-0.212*	0.032	-0.063*
	[0.009]	[0.010]	[0.023]	[0.022]	[0.009]	[0.085]	[0.074]	[0.063]	[0.083]	[0.073]	[0.104]	[0.037]	[0.030]
Log Income		-0.021***	-0.028***	-0.026***	-0.015*	-0.046	-0.089**	-0.075**	-0.103***	-0.061*	0.008	-0.066**	-0.031
		[0.008]	[0.007]	[0.007]	[0.009]	[0.042]	[0.034]	[0.030]	[0.037]	[0.034]	[0.058]	[0.030]	[0.028]
Log Population		-0.020***	-0.019***	-0.018***	-0.014**	0.009	-0.007	-0.006	-0.007	-0.021	-0.032**	-0.011*	-0.009
		[0.004]	[0.005]	[0.005]	[0.006]	[0.018]	[0.018]	[0.014]	[0.014]	[0.012]	[0.015]	[0.006]	[0.016]
ToT Variability			-0.015	-0.001		0.091	0.097	0.063	0.060	-0.125	-0.203	0.371	-0.170
			[0.055]	[0.055]		[0.086]	[0.077]	[0.077]	[0.079]	[0.198]	[0.146]	[0.406]	[0.320]
Openness *			0.034	0.020		-0.098	-0.181	-0.060	-0.077	0.253	0.244	-1.889	0.122
ToT Var			[0.077]	[0.076]		[0.124]	[0.126]	[0.110]	[0.119]	[0.281]	[0.190]	[1.100]	[0.363]
Polity					-0.001								
					[0.002]								
Time Dummies				YES									
Countries	189	189	139	139	160	35	33	44	38	38	27	23	13
Observations	1711	1710	673	673	1396	170	179	219	193	188	118	126	48
R^2	0.015	0.142	0.207	0.261	0.083	0.274	0.290	0.302	0.297	0.313	0.295	0.375	0.538
σ^2_α	0.118	0.132	0.091	0.097	0.111	0.156	0.097	0.128	0.101	0.135	0.100	0.094	0.109
$\sigma^2_\varepsilon+T\,\sigma^2_\alpha$	2.618	3.316	1.148	1.306	1.962	0.854	0.309	0.723	0.392	0.693	0.274	0.205	0.158

Notes: Between Effects. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 5

Openness and Government Expenditure: β^{GLS}

Dependent Variable: Government Expentiture (% of GDP)

	ALL REGIONS					LDC	HIPC	LDC/ HIPC	LI	LMI	UMI	HI/ OECD	HI/non OECD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Openness	0.002	0.001	-0.018*	-0.018*	0.002	-0.009	0.019	0.009	0.042*	-0.037**	-0.075***	-0.035***	-0.021
	[0.002]	[0.002]	[0.010]	[0.010]	[0.002]	[0.026]	[0.022]	[0.020]	[0.024]	[0.019]	[0.026]	[0.013]	[0.020]
Log Income		0.008***	-0.024***	-0.031***	0.006***	-0.048***	-0.028**	-0.049***	-0.010	-0.006	-0.030***	-0.020***	-0.047***
		[0.002]	[0.004]	[0.005]	[0.002]	[0.013]	[0.014]	0.011*	[0.014]	[0.008]	[0.010]	[0.004]	[0.012]
Log Population		-0.010***	-0.018***	-0.020***	-0.008*	-0.015	-0.011	-0.018	-0.013	-0.033***	-0.024***	-0.009*	-0.013
		[0.004]	[0.004]	[0.004]	[0.005]	[0.011]	[0.012]	[0.009]	[0.011]	[0.008]	[0.007]	[0.005]	[0.016]
ToT Variability			-0.005	-0.003		-0.004	-0.008	-0.006	-0.004	-0.006	-0.004	-0.102***	0.111
			[0.005]	[0.005]		[0.008]	[0.006]	[0.007]	[0.007]	[0.012]	[0.010]	[0.037]	[0.117]
Openness *			0.010	0.009		0.007	0.023**	0.009	0.008	0.020	0.014	0.251**	-0.128
ToT Var			[0.007]	[0.007]		[0.011]	[0.011]	[0.010]	[0.010]	[0.018]	[0.015]	[0.112]	[0.124]
Polity					0.000								
					[0.000]								
Time Dummies				YES									
Countries	189	189	139	139	160	35	33	44	38	38	27	23	13
Observations	1711	1710	673	673	1396	170	179	219	193	188	118	126	48
R^2	0.005	0.054	0.175	0.178	0.011	0.021	0.095	0.120	0.120	0.138	0.178	0.146	0.467
estimate of θ	0.818	0.808	0.835	0.832	0.799	0.814	0.825	0.810	0.816	0.877	0.817	0.855	0.526

Notes: Random-Effects GLS estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 6

Health and Government Expenditure: β^{OLS}

Dependent Variable: Public Health Expentiture (% of GDP)

	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government	0.034***	0.034***	0.034***	0.023***	-0.009***	-0.101***	0.034***	
Expenditure (G)	[0.004]	[0.004]	[0.004]	[0.002]	[0.002]	[0.003]	[0.004]	
Health Index (e.g.,	0.011	0.011	0.011	0.001	0.001	0.004	0.024	0.005
Death Rate)	[0.019]	[0.019]	[0.020]	[0.010]	[0.008]	[0.004]	[0.031]	[0.009]
Private Health	-0.580*	-0.564	-0.575	-0.122	-0.193	0.096	-0.375	-0.163
Expenditure	[0.331]	[0.351]	[0.375]	[0.199]	[0.126]	[0.068]	[0.386]	[0.173]
Military	-0.112***	-0.111***	-0.110***	0.787***	-0.087***	0.267***	-0.109***	0.155***
Expenditure	[0.027]	[0.027]	[0.028]	[0.034]	[0.010]	[0.013]	[0.027]	[0.014]
Log Population		-0.007						
		[0.052]						
Polity2			0.007	-0.002				
			[0.015]	[0.008]				
Military * Polity2				0.127***				
				[0.004]				
Education					1.009***	2.220***		
Expenditure					[0.022]	[0.066]		
Tertiary Education						0.136**		
						[0.067]		
Tertiary * Education						-0.635***		
						[0.063]		
Population over 65							5.301	
							[5.890]	
Health Index * Pop.							-0.309	
over 65							[0.532]	
G & Foreign Aid								-0.003*
								[0.002]
Countries	189	189	189	189	189	189	189	189
Observations	355	355	334	334	330	276	353	253
R^2	0.552	0.552	0.552	0.876	0.942	0.991	0.554	0.873

Notes: Pooled OLS. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 6 (Continued)

Health and Government Expenditure: β^{OLS}

Dependent Variable: Public Health Expentiture (% of GDP)								
	LDC		HIPC		LDC/HIPC		LI	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Government	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.011
Expenditure (G)	[0.00]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.008]	[0.008]
Health Index (e.g.,	0.000	0.001**	0.000	0.001***	0.000	0.000*	0.000*	0.000**
Death Rate)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Private Health	-0.031***	-0.032***	-0.031***	-0.034***	-0.031***	-0.033***	-0.029***	-0.032***
Expenditure	[0.008]	[0.007]	[0.006]	[0.005]	[0.005]	[0.005]	[0.006]	[0.006]
Military	0.120**	-0.049	0.063	-0.100*	0.113**	-0.024	0.036	0.028
Expenditure	[0.057]	[0.063]	[0.056]	[0.059]	[0.048]	[0.053]	[0.054]	[0.060]
Log Population	-0.004		-0.003***		-0.004***		-0.002*	
	[0.001]		[0.001]		[0.001]		[0.001]	
Polity2		0.000		0.000		0.000		0.000
		[0.000]		[0.000]		[0.000]		[0.000]
Military * Polity2		0.025*		0.030**		0.018		-0.002
		[0.014]		[0.013]		[0.012]		[0.014]
Education Expenditure								
Tertiary Education								
Tertiary * Education								
Population over 65								
Health Index * Pop. over 65								
G & Foreign Aid								
Countries	47	47	42	42	32	32	49	49
Observations	58	54	65	65	78	74	73	73
R^2	0.577	0.490	0.470	0.579				

Notes: Pooled OLS. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least two ob*servations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 6 (Continued)

Health and Government Expenditure: β^{OLS}

Dependent Variable: Public Health Expentiture (% of GDP)								
	LMI		UMI		HI/ OECD		HI/non OECD	
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Government	0.003	0.000*	-0.041	-0.030	0.036	0.022	0.119***	0.113***
Expenditure (G)	[0.001]	[0.000]	[0.039]	[0.041]	[0.024]	[0.024]	[0.002]	[0.003]
Health Index (e.g.,	0.013	-0.001	0.001	0.000	-0.003***	-0.003**	0.001	0.002*
Death Rate)	[0.016]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Private Health	0.557**	-0.035	-0.057***	-0.058***	-0.057***	-0.056***	-0.008	-0.009
Expenditure	[0.244]	[0.022]	[0.015]	[0.015]	[0.012]	[0.012]	[0.010]	[0.010]
Military	0.110***	0.879***	0.843	0.121	0.512**	6.586*	-0.076	-0.010
Expenditure	[0.010]	[0.007]	0.002***	[0.225]	[0.209]	[3.858]	[0.088]	[0.077]
Log Population	-0.025		-0.001		0.000		0.006*	
	[0.030]		[0.002]		[0.001]		[0.003]	
Polity2		-0.001*		-0.002*		0.012		-0.001
		[0.001]		[0.001]		[0.009]		[0.001]
Military * Polity2		0.115***		0.144***		-0.615		0.016*
		[0.001]		[0.045]		[0.389]		[0.008]
Education Expenditure								
Tertiary Education								
Tertiary * Education								
Population over 65								
Health Index * Pop. over 65								
G & Foreign Aid								
Countries	56	56	37	37	27	27	20	20
Observations	101	93	76	70	78	73	27	25
R^2	0.970	1.000	1.000	1.000	0.305	0.345	1.000	1.000

Notes: Pooled OLS. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least two ob*servations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 7

Health and Government Expenditure: β^{within}

Dependent Variable: Public Health Expentiture (% of GDP)

	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government	0.081***	0.081***	0.081***	0.064***	-0.100***	-0.097***	0.083***	
Expenditure (G)	[0.006]	[0.006]	[0.006]	[0.002]	[0.000]	[0.000]	[0.006]	
Health Index (e.g.,	-0.048	-0.046	-0.054	0.005	0.003	0.001	0.102	-0.011
Death Rate)	[0.068]	[0.076]	[0.072]	[0.024]	[0.002]	[0.001]	[0.106]	[0.024]
Private Health	-0.909	-0.911	-0.878	0.210	0.007	-0.012	-1.200*	-0.393
Expenditure	[0.702]	[0.705]	[0.740]	[0.244]	[0.024]	[0.013]	[0.716]	[0.250]
Military	-0.449***	-0.449***	-0.451***	0.393***	0.429***	0.444***	-0.458***	0.503***
Expenditure	[0.050]	[0.050]	[0.052]	[0.027]	[0.003]	[0.001]	[0.051]	[0.028]
Log Population		0.047						
		[1.122]						
Polity2			-0.058	0.003				
			[0.051]	[0.017]				
Military * Polity2				0.118***				
				[0.003]				
Education					1.647***	1.504***		
Expenditure					[0.004]	[0.006]		
Tertiary Education						0.007		
						[0.017]		
Tertiary *						0.144***		
Education						[0.006]		
Population over 65							26.930	
							[24.216]	
Health Index *							-2.999*	
Pop. over 65							[1.703]	
G & Foreign Aid								-0.043***
								[0.004]
Countries	133	133	125	125	129	115	132	105
Observations	355	355	334	334	330	276	353	253
R^2	0.6595	0.6595	0.6618	0.9639	0.9997	1.0000	0.6657	0.9425
σ^2_ε	1.2410	1.2438	1.2785	0.4191	0.0414	0.0176	1.2383	0.3930
Hausman χ^2	112.4	111.7	108.1	2723.3	167.9	38.1	69.7	2371.0
d.o.f.	4	5	5	6	5	7	5	4
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Fixed-Effects within estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 7 (Continued)

Health and Government Expenditure: β^{within}

Dependent Variable: Public Health Expentiture (% of GDP)

	LDC		HIPC		LDC/HIPC		LI	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Government	0.000	0.000	-0.001	0.000	-0.001	0.000	-0.003	-0.005
Expenditure (G)	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.005]	[0.006]
Health Index (e.g.,	0.000	0.000	0.000	0.000	0.000	0.000	0.001***	0.000
Death Rate)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Private Health	-0.013*	-0.007	-0.018***	-0.017***	-0.021***	-0.017***	-0.006	-0.001
Expenditure	[0.006]	[0.005]	[0.003]	[0.004]	[0.004]	[0.004]	[0.005]	[0.006]
Military	0.161**	0.104	0.246***	0.116	0.238***	0.114	0.192***	0.194**
Expenditure	[0.075]	[0.061]	[0.046]	[0.089]	[0.057]	[0.079]	[0.050]	[0.080]
Log Population	0.021***		0.014***		0.021***		0.022***	
	[0.007]		[0.005]		[0.006]		[0.005]	
Polity2		0.000		0.000		0.000		0.000
		[0.000]		[0.000]		[0.000]		[0.000]
Military * Polity2		0.013		0.022		0.022*		-0.006
		[0.012]		[0.014]		[0.013]		[0.014]
Education Expenditure Tertiary Education								
Tertiary * Education Population over 65								
Health Index * Pop. over 65 G & Foreign Aid								
Countries	25	24	26	26	32	31	32	32
Observations	58	54	65	65	78	74	73	73
R^2	0.3896	0.4333	0.6371	0.5847	0.5710	0.5783	0.4823	0.2278
σ^2_ε	0.0044	0.0025	0.0032	0.0035	0.0041	0.0034	0.0030	0.0038
Hausman χ^2	22.1	27.3	5.7	17.3	36.0	17.2	3.1	12.3
d.o.f.	5	6	5	6	5	6	5	6
p-value	0.001	0.000	0.332	0.008	0.000	0.000	0.690	0.056

Notes: Fixed-Effects within estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for w*hich at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 7 (Continued)

Health and Government Expenditure: β^{within}

Dependent Variable: Public Health Expentiture (% of GDP)

	LMI		UMI		HI/OECD		HI/nonOECD	
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Government	-0.002***	-0.002***	-0.001	-0.052	-0.012	0.034	0.106***	0.131***
Expenditure (G)	[0.000]	[0.000]	[0.062]	[0.052]	[0.057]	[0.064]	[0.009]	[0.012]
Health Index (e.g.,	0.000	0.000	0.008***	0.004*	0.005	0.002	0.004	0.002
Death Rate)	[0.001]	[0.001]	[0.002]	[0.002]	[0.005]	[0.005]	[0.004]	[0.002]
Private Health	-0.022***	-0.017**	-0.014	-0.004	-0.030	-0.036	-0.003	-0.010*
Expenditure	[0.007]	[0.007]	[0.026]	[0.019]	[0.021]	[0.022]	[0.010]	[0.005]
Military	0.180***	0.253***	0.844***	-0.911***	0.719	7.837*	0.387	-0.234
Expenditure	[0.001]	[0.037]	[0.002]	[0.320]	[0.591]	[4.299]	[0.343]	[0.208]
Log Population	0.016**		-0.044		0.054		0.028	
	[0.011]		[0.059]		[0.063]		[0.025]	
Polity2		0.000		-0.012***		0.014		0.002
		[0.001]		[0.003]		[0.011]		[0.001]
Military * Polity2		0.012		0.351***		-0.793*		-0.026
		[0.006]		[0.064]		[0.467]		[0.024]
Education Expenditure Tertiary Education								
Tertiary * Education Population over 65								
Health Index * Pop. over 65 G & Foreign Aid								
Countries	38	35	26	24	26	24	11	10
Observations	101	93	76	70	78	73	27	25
R^2	1.0000	1.0000	0.9998	0.9999	0.1564	0.2133	1.0000	1.0000
σ^2_ε	0.0076	0.0073	0.0197	0.0154	0.0108	0.0109	0.0048	0.0023
Hausman χ^2	67.36	290.63	9.88	25.42	6.42	3.12	1.55	6.30
d.o.f.	5	6	5	6	5	6	4	5
p-value	0.000	0.000	0.079	0.000	0.268	0.793	0.818	0.278

Notes: Fixed-Effects within estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for w*hich at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 8

Health and Government Expenditure: $\beta^{between}$

Dependent Variable: Public Health Expentiture (% of GDP)								
	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government	0.006**	0.006**	0.006**	0.003**	0.000	-0.096***	0.006**	
Expenditure (G)	[0.003]	[0.003]	[0.003]	[0.001]	[0.001]	[0.003]	[0.003]	
Health Index (e.g.,	0.006	0.006	0.005	-0.002	0.003	0.002	0.015	0.002
Death Rate)	[0.017]	[0.017]	[0.018]	[0.009]	[0.004]	[0.002]	[0.029]	[0.006]
Private Health	-0.708**	-0.693*	-0.715*	-0.159	-0.126	-0.029	-0.530	-0.237*
Expenditure	[0.357]	[0.391]	[0.407]	[0.209]	[0.086]	[0.033]	[0.415]	[0.141]
Military	0.071***	0.072***	0.073***	1.158***	-0.140***	0.354***	0.072***	0.119***
Expenditure	[0.020]	[0.021]	[0.022]	[0.060]	[0.007]	[0.083]	[0.021]	[0.007]
Log Population		-0.005						
		[0.050]						
Polity2			0.008	-0.002				
			[0.014]	[0.007]				
Military * Polity2				0.161***				
				[0.009]				
Education					0.972***	1.616***		
Expenditure					[0.021]	[0.357]		
Tertiary Education						0.026		
						[0.035]		
Tertiary *						0.022		
Education						[0.416]		
Population over 65							3.836	
							[5.909]	
Health Index *							-0.206	
Pop. over 65							[0.549]	
G & Foreign Aid								-0.001
								[0.001]
Countries	133	133	125	125	129	115	132	105
Observations	355	355	334	334	330	276	353	253
R^2	0.583	0.584	0.586	0.894	0.977	0.998	0.588	0.933
σ^2_α	1.241	1.244	1.279	0.419	0.041	0.018	1.238	0.393
$\sigma^2_\varepsilon + T\,\sigma^2_\alpha$	698.201	697.388	706.576	447.631	1019.329	32.189	739.149	268.749

Notes: Between Effects. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 8 (Continued)

Health and Government Expenditure: $\beta^{between}$

Dependent Variable: Public Health Expentiture (% of GDP)								
	LDC		HIPC		LDC/HIPC		LI	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Government	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.005
Expenditure	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.013]	[0.013]
Health Index (e.g.,	0.000	0.000	0.000	0.001**	0.000	0.000	0.000	0.000
Death Rate)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Private Health	-0.048***	-0.046***	-0.051***	-0.047***	-0.044***	-0.042***	-0.037***	-0.039***
Expenditure	[0.014]	[0.013]	[0.013]	[0.011]	[0.011]	[0.010]	[0.009]	[0.009]
Military	0.079	0.013	-0.026	-0.093	0.072	0.012	0.007	0.042
Expenditure	[0.084]	[0.090]	[0.089]	[0.089]	[0.073]	[0.073]	[0.075]	[0.078]
Log Population	-0.003*		-0.001		-0.003**		-0.001	
	[0.001]		[0.002]		[0.001]		[0.001]	
Polity		0.001		0.001		0.001**		0.001
		[0.001]		[0.001]		[0.001]		[0.001]
Military * Polity		-0.009		0.005		-0.015		-0.031
		[0.023]		[0.022]		[0.020]		[0.022]
Education Expenditure Tertiary Education								
Tertiary * Education Population over 65								
Health Index * Pop. over 65 G & Foreign Aid								
Countries	25	24	26	26	32	31	32	32
Observations	58	54	65	65	78	74	73	73
R^2	0.621	0.621	0.574	0.711	0.596	0.635	0.562	0.589
σ^2_α	0.004	0.003	0.003	0.004	0.004	0.003	0.003	0.004
$\sigma^2_\varepsilon + T\,\sigma^2_\alpha$	0.027	0.002	0.010	0.002	0.030	0.002	0.031	0.004

Notes: Between Effects. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least t*wo observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 8 (Continued)

Health and Government Expenditure: $\beta^{between}$

Dependent Variable: Public Health Expentiture (% of GDP)

	LMI		UMI		HI/ OECD		HI/non OECD	
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Government	0.000	0.000	0.002	-0.017	0.062*	0.036	0.117***	0.109***
Expenditure	[0.000]	[0.000]	[0.063]	[0.073]	[0.034]	[0.036]	[0.006]	[0.006]
Health Index (e.g.,	0.000	0.000	0.000	-0.001	-0.005***	-0.004*	0.001	0.003
Death Rate)	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]
Private Health	-0.052***	-0.055***	-0.059**	-0.073***	-0.072***	-0.071***	0.006	0.022
Expenditure	[0.012]	[0.010]	[0.021]	[0.021]	[0.016]	[0.017]	[0.036]	[0.030]
Military	0.113***	0.170**	0.842***	0.787	0.649**	7.340	0.015	0.148
Expenditure	[0.000]	[0.066]	[0.006]	[0.483]	[0.286]	[16.606]	[0.227]	[0.148]
Log Population	-0.001		0.001		0.000		0.004	
	[0.001]		[0.002]		[0.002]		[0.008]	
Polity		0.001		0.000		0.015		-0.002
		[0.000]		[0.002]		[0.035]		[0.001]
Military * Polity		0.009		0.011		-0.672		0.017
		[0.010]		[0.097]		[1.662]		[0.016]
Education Expenditure Tertiary Education								
Tertiary * Education Population over 65								
Health Index * Pop. over 65 G & Foreign Aid								
Countries	38	35	26	24	26	24	11	10
Observations	101	93	76	70	78	73	27	25
R^2	1.000	1.000	0.999	0.999	0.570	0.579	1.000	1.000
σ^2_α	0.008	0.007	0.020	0.015	0.011	0.011	0.005	0.002
$\sigma^2_\varepsilon + T\,\sigma^2_\alpha$	27.817	22.934	0.183	0.042	0.202	0.003	0.009	0.005

Notes: Between Effects. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least t*wo observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 9

Health and Government Expenditure: β^{GLS}

Dependent Variable: Public Health Expentiture (% of GDP)

	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government	0.034***	0.034***	0.034***	0.027***	-0.066***	-0.098***	0.034***	
Expenditure	[0.004]	[0.004]	[0.004]	[0.002]	[0.003]	[0.001]	[0.004]	
Health Index (e.g.,	0.011	0.011	0.011	0.005	-0.012	0.005	0.025	0.005
Death Rate)	[0.019]	[0.019]	[0.020]	[0.014]	[0.015]	[0.004]	[0.032]	[0.009]
Private Health	-0.569*	-0.552	-0.565	-0.004	-0.166	0.067	-0.364	-0.153
Expenditure	[0.341]	[0.361]	[0.385]	[0.246]	[0.166]	[0.058]	[0.396]	[0.179]
Military	-0.110***	-0.110***	-0.109***	0.737***	0.242***	0.421***	-0.108***	0.158***
Expenditure	[0.027]	[0.027]	[0.029]	[0.033]	[0.015]	[0.006]	[0.028]	[0.014]
Log Population		-0.008						
		[0.054]						
Polity			0.007	-0.003				
			[0.015]	[0.010]				
Military * Polity				0.125***				
				[0.004]				
Education					1.405***	1.609***		
Expenditure					[0.023]	[0.031]		
Tertiary Education						0.072		
						[0.074]		
Tertiary *						0.032		
Education						[0.030]		
Population over 65							5.551	
							[6.119]	
Health Index *							-0.328	
Pop. over 65							[0.554]	
G & Foreign Aid								-0.003*
								[0.002]
Countries	133	133	125	125	129	115	132	105
Observations	355	355	334	334	330	276	353	253
R^2	0.552	0.552	0.552	0.873	0.791	0.971	0.554	0.873
estimate of θ	0.053	0.055	0.055	0.432	0.881	0.844	0.064	0.061

Notes: Random-Effects GLS estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for which at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 9 (Continued)

Health and Government Expenditure: β^{GLS}

Dependent Variable: Public Health Expentiture (% of GDP)

	LDC		HIPC		LDC/HIPC		LI	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Government	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	0.002
Expenditure	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.006]	[0.006]
Health Index (e.g.,	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Death Rate)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Private Health	-0.018***	-0.012**	-0.019***	-0.023***	-0.022***	-0.021***	-0.010*	-0.016***
Expenditure	[0.007]	[0.005]	[0.004]	[0.004]	[0.005]	[0.004]	[0.005]	[0.006]
Military	0.105	0.033	0.152***	-0.033	0.133***	0.032	0.116**	0.068
Expenditure	[0.065]	[0.054]	[0.048]	[0.068]	[0.052]	[0.056]	[0.052]	[0.063]
Log Population	-0.003**		-0.002		-0.003**		-0.003*	
	[0.001]		[0.002]		[0.001]		[0.001]	
Polity		0.000		0.000		0.000**		0.000
		[0.000]		[0.000]		[0.000]		[0.000]
Military * Polity		0.023**		0.032***		0.025		0.008
		[0.011]		[0.012]		[0.010]		[0.012]
Education Expenditure Tertiary Education								
Tertiary * Education Population over 65								
Health Index * Pop. over 65 G & Foreign Aid								
Countries	25	24	26	26	32	31	32	32
Observations	58	54	65	65	78	74	73	73
R^2	0.536	0.295	0.373	0.536	0.561	0.496	0.319	0.336
estimate of θ	0.574	0.735	0.660	0.563	0.582	0.614	0.696	0.619

Notes: Random-Effects GLS estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for whi*ch at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 9 (Continued)

Health and Government Expenditure: β^{GLS}

Dependent Variable: Public Health Expentiture (% of GDP)

	LMI		UMI		HI/ OECD		HI/non OECD	
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Government	0.003**	-0.001***	-0.045	-0.041	0.030	0.018	0.117***	0.115***
Expenditure	[0.001]	[0.000]	[0.040]	[0.041]	[0.027]	[0.026]	[0.003]	[0.005]
Health Index (e.g.,	0.024	-0.001	0.002	0.001	-0.003	-0.002	0.001	0.001
Death Rate)	[0.022]	[0.003]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Private Health	0.476**	-0.002	-0.050***	-0.044***	-0.053***	-0.053***	-0.008	-0.012***
Expenditure	[0.226]	[0.027]	[0.016]	[0.016]	[0.013]	[0.012]	[0.007]	[0.004]
Military	0.128***	0.880***	0.843***	-0.036	0.492**	6.740	0.020	0.027
Expenditure	[0.011]	[0.009]	[0.002]	[0.213]	[0.236]	[3.636]	[0.102]	[0.094]
Log Population	-0.015		-0.001		0.000		[0.005]	
	[0.043]		[0.002]		[0.001]		[0.004]	
Polity		-0.001		-0.003**		0.012		0.000
		[0.001]		[0.001]		[0.008]		[0.001]
Military * Polity		0.115***		0.176***		-0.634		0.005
		[0.001]		[0.043]		[0.368]		[0.011]
Education Expenditure Tertiary Education								
Tertiary * Education Population over 65								
Health Index * Pop. over 65 G & Foreign Aid								
Countries	38	35	26	24	26	24	11	10
Observations	101	93	76	70	78	73	27	25
R^2	0.970	1.000	1.000	1.000	0.304	0.344	1.000	1.000
estimate of θ	0.578	0.551	0.291	0.443	0.240	0.214	0.776	0.883

Notes: Random-Effects GLS estimates. All variables are computed as five-year averages from 1960-1964 to 2005-2009. The health index and private health expenditure are lagged one period. The number of countries reported in the table refers to those for whi*ch at least two observations are available over the period of analysis. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.*

Table 10

Openness and Government Expenditure: $\beta^{\text{cross-section}}$

Dependent Variable: Government Expentiture (% of GDP)

	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Openness	-0.177	-0.007	-0.008	0.014	0.018	-0.002	0.006	0.020
	[0.018]	[0.018]	[0.025]	[0.020]	[0.019]	[0.019]	[0.026]	[0.020]
Log Income		-0.039***	-0.036***	-0.037***		-0.533***	-0.057***	-0.060***
		[0.007]	[0.006]	[0.007]		[0.014]	[0.016]	[0.015]
Log Population		-0.022***	-0.016***	-0.007		-0.022***	-0.015***	-0.007
		[0.004]	[0.004]	[0.006]		[0.004]	[0.004]	[0.006]
ToT Variability			-0.169				0.003	
			[0.391]				[0.405]	
Openness * ToT Var			-0.072				-0.202	
			[0.443]				[0.460]	
Polity				0.001				0.000
				[0.001]				[0.001]
Regional Dummies					YES	YES	YES	YES
Observations	189	189	139	157	189	189	139	157
R^2	0.000	0.251	0.253	0.187	0.103	0.285	0.276	0.224

Notes: Cross-sectional OLS estimates. All variable are computed as five-year averages for 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which the added variables can be tested in each specification out of a total of 189 countries. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 11

Health and Government Expenditure: $\beta^{\text{cross-section}}$

Dependent Variable: Public Health Expentiture (% of GDP)

	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government	0.134***	0.134***	0.134***	0.109***	0.094***	0.038***	0.134***	
Expenditure (G)	[0.000]	[0.000]	[0.000]	[0.002]	[0.007]	[0.010]	[0.000]	
Health Index (e.g.,	0.001*	0.001	0.001	0.000	0.001	0.000	0.002**	0.001
Death Rate)	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]
Private Health	-0.020**	-0.029***	-0.021**	-0.045***	-0.032***	-0.038***	-0.020*	-0.064***
Expenditure	[0.008]	[0.008]	[0.010]	[0.006]	[0.007]	[0.008]	[0.011]	[0.008]
Military	-0.627***	-0.627***	-0.627***	-0.175***	-0.461***	-0.166***	-0.627***	0.077
Expenditure	[0.001]	[0.001]	[0.001]	[0.042]	[0.027]	[0.056]	[0.001]	[0.064]
Log Population		0.004						
		[0.001]						
Polity2			0.000	0.000				
			[0.000]	[0.000]				
Military * Polity2				0.046***				
				[0.004]				
Education					0.289***	0.166*		
Expenditure					[0.047]	[0.092]		
Tertiary Education						-0.006		
						[0.009]		
Tertiary *						0.613***		
Education						[0.156]		
Population over 65							0.273**	
							[0.127]	
Health Index *							-0.025**	
Pop. over 65							[0.012]	
G & Foreign Aid								-0.001
								[0.012]
Observations	90	90	84	84	87	76	89	47
R^2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes: Cross-sectional OLS estimates. All variables are computed as five-year averages for 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which the added variables can be tested in each specification out of a total of 189 countries. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.

Table 12

Health and Government Expenditure: $\beta^{\text{cross-section}}$

Dependent Variable: *Log* Public Health Expentiture (% of GDP)

	ALL REGIONS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Government	0.877***	0.880***	0.757***	0.765***	0.551***	0.367***	0.765***	
Expenditure (G)	[0.100]	[0.103]	[0.104]	[0.091]	[0.103]	[0.092]	[0.100]	
Health Index (e.g.,	0.299**	0.295**	0.135	0.109	0.270**	0.270***	-0.299	0.096
Death Rate)	[0.134]	[0.136]	[0.132]	[0.116]	[0.113]	[0.095]	[0.213]	[0.202]
Private Health	-0.523***	-0.527***	-0.529***	-0.779***	-0.486***	-0.347***	-0.410***	-1.413***
Expenditure	[0.118]	[0.120]	[0.114]	[0.112]	[0.098]	[0.080]	[0.117]	[0.192]
Military	-0.124*	-0.127*	-0.007	0.075	-0.185***	-0.094*	-0.026	-0.053
Expenditure	[0.065]	[0.068]	[0.078]	[0.071]	[0.055]	[0.048]	[0.068]	[0.099]
Population		0.007						
		[0.039]						
Polity2			0.049***	0.035***				
			[0.012]	[0.011]				
Military * Polity2				0.008***				
				[0.002]				
Education					0.483***	0.247***		
Expenditure					[0.080]	[0.092]		
Tertiary Education						0.000		
						[0.000]		
Tertiary *						0.340***		
Education						[0.048]		
Population over 65							0.000	
							[0.000]	
Health Index *							0.396***	
Pop. over 65							[0.114]	
G & Foreign Aid								0.002
								[0.005]
Observations	90	90	84	84	87	75	89	47
R^2	0.802	0.802	0.838	0.876	0.873	0.929	0.828	0.790

Notes: Cross-sectional OLS estimates. All variables are computed as logs of five-year averages for 2005-2009. The openness ratio, terms of trade variability are lagged one period. The number of countries reported in the table refers to those for which the added variables can be tested in each specification out of a total of 189 countries. *, **, *** denote significance at the 10, 5, and 1% levels, respectively. All specifications include a constant term. Robust standard errors in parentheses. Data sources: PWT 6.3, GFS, IFS, WDI, Polity IV, UN.