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by Clovis Freire[1] and Nobuko Kajiura[2]

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Abstract

This paper analyses the effect of public and private health expenditures on the achievement of health-related MDGs. It finds that three quarters of the variation of health-related MDG indicators can be explained by public and private health expenditure per capita when controlling for levels of income and demographic factors such as age dependency ratio, urbanization and population density. In addition, the analysis finds that marginal gain in health performance is higher for countries with low per capita public health expenditures. The paper also estimates country's potential for increasing health expenditure and suggests that some of the countries that are behind in their progress towards the achievement of the MDGs have the potential to complement the shortfall through increasing their public health expenditure to levels that are compatible with their per capita income and demographic structure.

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[1] Clovis Freire, Macroeconomic Policy and Development Division, United Nations Economic and Social Commission for Asia and the Pacific, United Nations building, Rajadamnern Nok Avenue, Bangkok 10200, Thailand, email: freire@un.org

[2] Nobuko Kajiura, Macroeconomic Policy and Development Division, United Nations Economic and Social Commission for Asia and the Pacific, United Nations building, Rajadamnern Nok Avenue, Bangkok 10200, Thailand, email: kajiura.unescap@un.org

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I. INTRODUCTION

Asia-Pacific has made great progress towards achieving the Millennium Development Goals (MDGs) when considering the region as a whole,. However, for the progress at the national level, not a single country in the region is on-track to reach all the goals by 2015. Amongst the MDGs, the health-related targets are the ones that seem to be further out of reach - two out of three countries in Asia-Pacific are off-track to reach the child (under-5) mortality target and three out of four are off-track in the infant mortality indicator.

In many cases, Asia-Pacific countries can make good progress simply by pursuing existing policies and implementing ongoing health programmes more efficiently. In other cases, however, progress requires increasing investments, either private or public, to close the gaps on health-related MDGs across the Asia-Pacific region. ESCAP(2010) estimates, for example, that $33 billion are needed to close the gaps in the region in the progress towards child mortality. Financing such amount may not seem to be a daunting task, particularly after the billions of dollars spent in the bailouts of creditors of troubled US and European companies in the aftermath of the 2008 global financial crisis, but for some developing countries, especially the least developed countries, the required investment can be very large in terms of proportion of GDP.

Concerns about fiscal deficits may explain why government expenditures on the MDGs fall short in many countries. As discussed in ESCAP(2010), increasing fiscal conservatism has pushed countries towards larger surpluses or smaller deficits. The general rule of thumb that limits the fiscal deficit to around 3% of GDP, regardless of their economic conditions, rate of expansion, needs for public expenditure or coverage of social protection, may have contributed to the unnecessary suffering of millions of deprived people in the region.

Two questions motivate this paper. First, does an increase in public health expenditure improve the performance of countries in achieving the health-related MDGs? The answer to this question is important because it may justify higher public investment in health programmes. The alternative is to rely only on facilitating an increase in private investment, whenever feasible, or on improving the efficiency of the existing public spending. Second, is there a right level of public health expenditure? Or in other words, given a country's level of income and other social and economic factors, is there a level of public health expenditure that is both realistic and provide the most value in terms of health outcomes?

To try to answer these questions, this paper analyses the effect of public and private health expenditures on the achievement of health-related MDGs and estimates country's potential for increasing health expenditure given their levels of per capita income and demographic structure. It begins by providing a brief review of the literature on the association between public expenditure and health-related indicators and discussing some methodological and data issues. The paper then presents estimates of the elasticities of public and private health expenditure on health-related outcomes and discusses their relation with other socio and economic factors. It concludes by suggesting that some of the countries that are behind in their progress towards the achievement of the MDGs have the potential to complement the shortfall

through increasing their public health expenditure to levels that are compatible with their per capita income and demographic structure.

II. LITERATURE REVIEW

The literature exploring the effect of public expenditures on health outcomes is not conclusive. Filmer and Pritchett (1999), using 1990 cross-national data covering 100 countries, finds little correlation between public health care spending as a share of gross domestic product (GDP) and child (under-5) mortality. They found that socioeconomic variables such as GDP per capita, income inequality, and average years of female schooling explained about 95 per cent of the variance in infant and under-5 mortality. Similarly, Baldacci et al (2004) finds that fertility rate, female education - as proxy for education of mothers - and governance are statistically significant explanatory variables for under-5 child mortality. Filmer and Pritchett (1999) suggests that the weak link between the public health expenditure and health outcome reflects the weakness of three factors in the path between the public health expenditure and health outcome, i.e., *Health production function* in terms of improvement of health status in association with the consumption of health services; *Net public sector impact* in light of possible crowding out of services which will be consumed anyway; and *Public sector efficacy* for creating effective health services. For instance, while the births attended by trained personnel are found to be closely associated with the lower under-5 mortality, there is not necessarily clear association between public health expenditure and such service provision (McGuire 2006).

In contrast, some studies have found association between the higher public health care spending and lower infant mortality rates. Panda and Ganesh-Kumar (2007), in their examination of the impact of economic growth on MDG performance, study the various factors contributing to the performance of health-related MDG indicators. The study finds significant impact of the government consumption expenditure - as a proxy for health expenditure - in reducing maternal mortality, together with variables such as ownership of radios and television as facilitating information flow, and road network as a proxy for facilitating access to health facilities over longer distances. Per capita GDP, trade openness, and urbanization are also found significant factors influencing the maternal mortality. Gupta et al (2002) also find relationship, albeit weak, between healthcare spending and mortality rates in developing countries and transition economies, although the countries studies include only a handful of countries in Asia-Pacific region and admittedly exclude private spending on health due to data limitation.

These studies suffer limitation in availability and consistencies of data to capture possible links between public health expenditure and under-5 mortality (McGuire 2006). Availability of estimate of under-5 mortality alone has lags by several years (Murray et al 2007). For instance, as Zohir (2010) points out, figures on national government expenditure on health may be gross under-estimates due to non-recording of expenses incurred through local/regional governments.

McGuire (2006) observes that most of the analysis that suggests the association between health spending and health outcome drew their findings with certain conditions such as high-quality government institutions (Rajkumar and Swaroop2002), or observation among certain groups of countries such as developing countries (Bidani and Ravallion, 1997, Gupta, Verhoeven, and Tiongson, 2003). McGuire (2006) points out, however, that association with greater health spending per capita and lower mortality with cross country data fails to exclude the possibility that the independent variable is serving mainly as a proxy for overall affluence,

indicating the association of mortality level with affluence.

III. METHODOLOGY AND DATA

A main question of this paper is how much public and private health expenditures contribute to achieving some of the health-related MDG targets. In other words, we are interested in estimating the public and private expenditure elasticities for selected health-related MDG indicators, controlling for relevant factors. For each MDG indicator (Y), country i and year t, considered in the analysis, the following model was used to estimate the elasticities:

$$\ln Y_{it} = \beta_{0i} + \beta_1 \ln Pub_{it} + \beta_2 \ln Priv_{it} + \beta_3 \ln Z_{1it} + \cdots + \beta_{k+1} \ln Z_{kit} + \varepsilon_{it} \qquad (1)$$

Where, *Pub* is Public health expenditure per capita and *Priv* is Private health expenditure per capita - both in purchasing power parity (PPP) at constant 2005 international prices - $Z_1, \ldots, Z_k$ are a set of k relevant factors, and ε is the random disturbance term. The coefficient attached to each variable is the elasticity of Y with respect to that variable. In all models, the analysis includes all countries for which data is available, regardless of their geographic region. Analysis considering only the subset of Asia-Pacific countries were also conducted and the results were similar.

The definitions of the public and private expenditures on health are as follows (WHO, 2011):

- *Public expenditure on health*: The sum of outlays for health maintenance, restoration or enhancement paid for in cash or supplied in kind by government entities, such as the Ministry of Health, other ministries, parastatal organizations social security agencies, (without double-counting the government transfers to social security and to extra-budgetary funds). Includes transfer payments to households to offset medical care costs and extra-budgetary funds to finance health services and goods. The revenue base of these entities may comprise multiple sources, including external funds.

- *Private expenditure on health*: The sum of outlays for health by private entities, such as commercial or mutual health insurance, non profit institutions serving households, resident corporations and quasi-corporations not controlled by government with health services delivery or financing, and households.

The set of relevant factors considered ($Z_1, \ldots, Z_k$) are the same for the different health-related MDG indicators. The analysis uses the result of Panda and Ganesh-Kumar(2007) as the starting point for the consideration of several factors depending upon their likely relationship with the MDG indicators as pointed in the relevant literature and subject to availability of data.

For the MDG indicators studied here we construct panel data using available data within the period covering 1990 to 2009. Both Fixed Effects (F.E) and Random Effects (R.E) formulations have been attempted and *Hausman test* was used to select between these two. In

some cases, multicollinearity amongst the explanatory variables resulted in larger R-squared values and insignificant t-values. To handle this problem, a specification with fewer explanatory variables, which still included the variables related to public and private expenditures on health, was adopted.

The data used to estimate the above relationship come from two sources. First, the data on the MDG indicators are from the United Nations website on MDGs http://mdgs.un.org/unsd/mdg/ accessed on 15 July 2011. The second source of data concerning the explanatory variables is the World Bank's World Development Indicators data base accessed on 8 August 2011.

This paper also estimates the country's potential for increasing health expenditure given their levels of per capita income and demographic structure. This is done by modelling the level of public and private expenditure as a function of the income per capita and some demographic factors such as population size, urbanization, and age dependency ratio. We use cross-country data and the following models to produce the estimates:

$$\ln Pub_{it} = \beta_{0i} + \beta_2 \ln Priv_{it} + \beta_3 \ln Z_{1it} + \cdots + \beta_{k+1} \ln Z_{kit} + \beta_{k+2} \ln t + \varepsilon_{it} \qquad (2)$$

$$\ln Priv_{it} = \beta_{0i} + \beta_2 \ln Pub_{it} + \beta_3 \ln Z_{1it} + \cdots + \beta_{k+1} \ln Z_{kit} + \beta_{k+2} \ln t + \varepsilon_{it} \qquad (3)$$

Where, for country i and year t, *Pub* is Public health expenditure per capita and *Priv* is Private health expenditure per capita - both in purchasing power parity (PPP) at constant 2005 international prices - $Z_1, \ldots, Z_k$ are a set of k factors mentioned above, and ε is the random disturbance term.

IV. RESULTS AND DISCUSSION

Effect of health expenditure on the MDGs

As previously found in some of the studies listed above, higher levels of health expenditure are associated with better performance on the health-related MDG indicators. This is indicated in figure 1, which shows the relationship between health expenditure per capita and the rate of mortality of children under the age of five per one thousand live births using cross-country data for the year 2009. The dots in the graph represent countries and the labels indicate the countries in Asia-Pacific. The scale of each axis is in logarithm, meaning that each mark is ten times the value of the previous one. As the figure indicates, the higher the level of expenditure, the lower the rate of under-5 mortality.

Figure 1. Relationship between expenditure and under-5 mortality rate, per capita (2009)
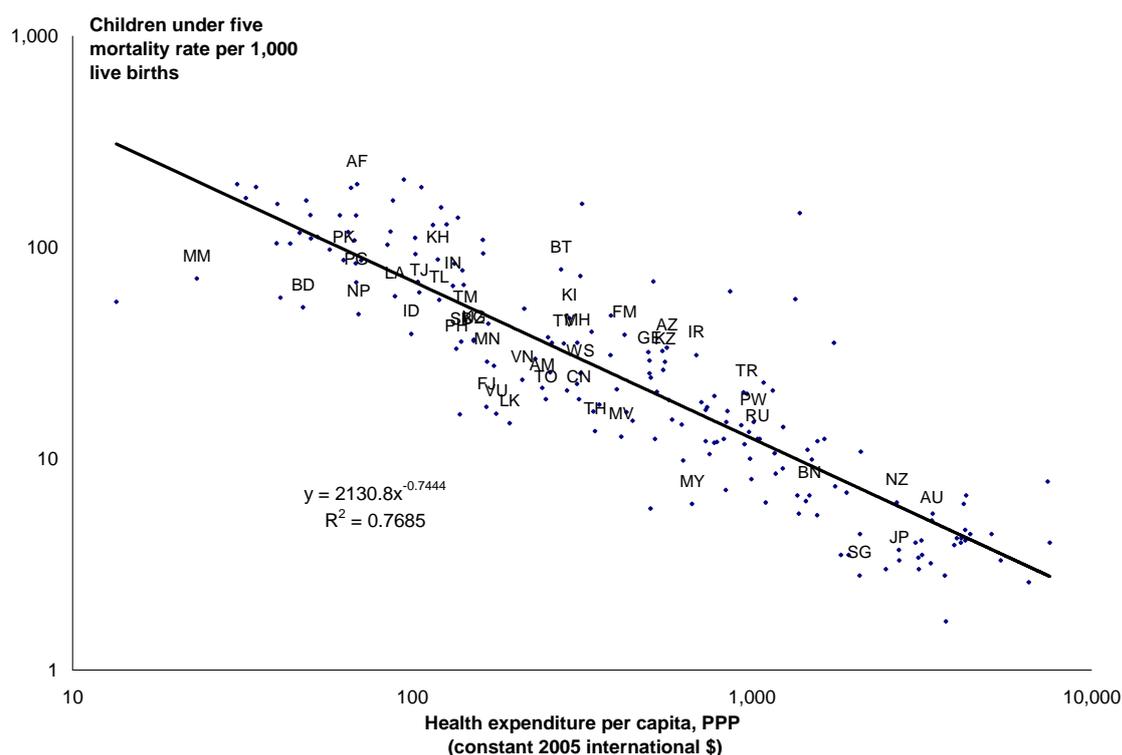
Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011) and the United Nations MDG Indicators (accessed 15 June 2011).

The caveat is that there is a big variation in the levels of attainment given a certain level of expenditure. To give an example, the rate of under-5 mortality in Cambodia (87.5) and Pakistan (87) were at about the same level in 2009 despite the 2 to 1 difference in the expenditure per capita, i.e., $119 in Cambodia compared to $63 in Pakistan. Health expenditure explains some but not all variation in the level of under-5 mortality rate, which is also affected by many other factors, particularly the many dimensions of inequality such as income poverty, malnutrition, access to clean water and sanitation, literacy, etc, as well as demographic and cultural factors.

This paper estimates the magnitude of the effect of some of these factors, and health expenditure in particular, on the achievement of health-related MDGs. The results are summarized in table 1 (detailed results of the panel data analysis are presented in tables A-1, A-2 and A-3 in Annex). Along with the various literatures described in section II, the following explanatory variables are included to examine the impact on (i) under-5 child mortality, (ii) infant mortality and (iii) maternal mortality:

- Health expenditures per capita – The expenditures are separated into two variables (public and private expenditure).

- GDP per capita – As various literatures suggest, this variable is considered to be negatively correlated with health status.

- Demographic factors (age dependency ratio, population density, and urban population) - These variables are used as proxies for proportion of population in child-bearing age, proximity to health services and availability of services in the neighbourhood.

Table 1. Health expenditure elasticity for MDG Indicators

Explanatory variables	Children under five mortality rate per 1,000 live births	Infant mortality rate (0-1 year) per 1,000 live births	Maternal mortality ratio per 100,000 live births
Public Health expenditure per capita, PPP (constant 2005 international $)	-.06	-.07	-
Private Health expenditure per capita, PPP (constant 2005 international $)	-.10	-.16	-
GDP per capita, PPP (constant 2005 international $)	-.07	-	-.27
Age dependency ratio, young (% of working-age population)	.86	.66	.70
Population density (people per sq. km)	-.30	-.21	-
Urban population (% of total)	-.09	.02	-.48

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011) and the United Nations MDG Indicators (accessed 15 June 2011).

Elasticity of health expenditure

In the case of under-5 mortality rate, the effect of health expenditure is not high. One percent increase in public health expenditure is associated with only 0.06% decrease in the rate. The elasticity of private health expenditure is slightly higher - one percent increase is associated with 0.1% decrease in the under-5 mortality rate. Similarly, the effects of increase in the average GDP per capita (-.07) and urbanization (-.09) are also low. Being close to other people has a higher effect; one percent increase in population density cuts the under-5 mortality rate by 0.3%. But the change in population demography is the factor that seems to bring the higher impact. One per cent decrease in the share of the youth population (0 to 14 years old) in the productive population (15 to 64 years old) reduces by 0.86% the under-5 mortality rate. This result suggests that a determinant factor is the shift of the population aging structure, which is often associated with the process of development.

Similar results were found in the analysis of the elasticity in terms of infant mortality rate. In the case of maternal mortality, health expenditure (Public and Private) had no significant effect on the mortality ratio, while the share of urban population was a more important factor than the population density, which reflects the urban-rural disparities in terms of infrastructure and health services to assist the pregnancy and child birth.

Despite the higher elasticity of age dependency when compared with health expenditure, the actual effect of each of these factors are somewhat similar because of the range of values that they assume. For example, considering the actual change in age dependency and public health expenditure in the past 20 years, the global average change in

age dependency of youth is -1.5% with standard deviation of 1.4%,[2] which would result in decrease in under-5 mortality rate ranging from 0.1 to 2.5%, when the estimated elasticity (0.86) in table 1 is applied. Changes in public health expenditure in the period from 1995 to 2009 were 7.99% on average with standard deviation of 20.1%.[3] Using the elasticity of -.06, the average change in under-5 mortality rate would range from -10.4% to 24.1%. These examples of the variation of age dependency of youth and public expenditure per capita show that the elasticity alone does not give the magnitude of the effect of these factors on the health-related MDGs, it is also crucial to consider what is possible in terms of variation of these variables. They also suggest that sizeable improvement in some of the health-related MDG indicators can be achieved by increasing the health expenditure.

Public expenditure per capita and the share of youth population

As discussed in the earlier section, the literature has pointed out socio-economic factors as significant explanatory variables for health status. Demographic transformations also explains the improvement in health-related MDG indicators in countries with lower levels of income and very low public health expenditure per capita. Figure 2 presents the evolution of public expenditure per capita and the age dependency ratio of youth for selected countries over the past 20 years. All the paths followed by the countries indicate move from the left to the right with time, with the initial observation year at the left end of the path. The contour indicates some milestones in terms of performance in the under-5 mortality indicator. The one close to the vertical axis at the right side of the graph, for example, indicate the under-5 mortality rate of 10 per 1,000 live births.[4]

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[2] The country that has experienced the biggest change in age dependency of youth (young population as a share of working-age population) was Qatar, with an yearly average change of -9.29% in the period from 2000 to 2004. The other top five economies in terms of yearly average change are all in Asia-Pacific: Macau, China (-8.37%, 2000-2005), Islamic Republic of Iran (-7.04%, 1996-2000), Maldives (-5.99%, 2001-2006), and Mongolia (-5.51%, 1999-2004).

[3] The biggest increases measured in terms of 5-years average were in Georgia (150.2%) and in Cambodia (143.3%) in the period from 1992 to 1996.

[4] The figure is for illustration purposes only. The reduction in under-5 mortality rate is associated with many other factors other than only age dependency ratio and public health expenditure per capita. The lines that indicate the milestones of performance in the indicator of under-5 mortality are an estimate taking into consideration an average country. Therefore, they do not mark precisely the location of that milestone in relation to all the selected countries shown in the figure. For more precision, it would require a individual graphic per country.

Figure 2. Change in public health expenditure and age dependency ratio, selected countries
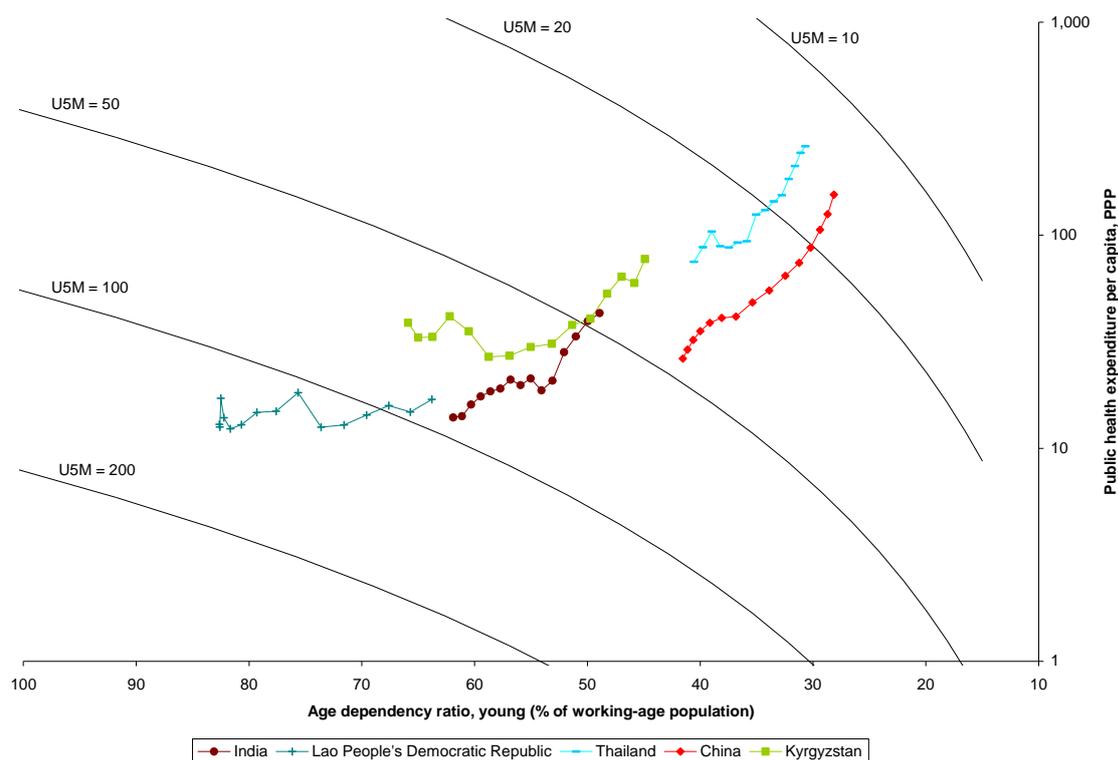
Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011) and the United Nations MDG Indicators (accessed 15 June 2011).

The line showing the path followed by Lao People's Democratic Republic indicate that it's public health expenditure per capita has changes from $13 in 1995 to $17 in 2009, which may seems not much in absolute terms but represents an increase of 30% in the period. During the same period, the age dependency ratio of youth has decreased from 83% to 64% in the same period, which is high in absolute terms and represents 23% reduction in the period. Given the higher elasticity of age dependency, the majority of the reduction of under-5 mortality rate is associated with that demographic shift. In figure 2, this is clearly seen as the move to the right of the line indicating the Laotian trajectory almost in parallel to the horizontal axis and passing through the mark of 100 under-5 mortality rate. The country reached the rate of 58.6 in 2009 down from 114.6 in 1995.

Other countries shown in figure 2 have experienced a similar shift in demographics with reduction of age dependency ratio, but they have increased their public health expenditure per capita much more. India still had in 2009 a low per capita public expenditure ($43.1) but that was an increase from $13.9 in 1995. In the same period China increased its per capita public health expenditure from $26.4 to 155.1, Thailand from $75.1 to $261.4 and Kyrgyzstan from $38.8 to $77.3. As shown in the figure 2, as the age dependency ratio decreases further reductions in the rate of under-5 mortality are associated with even higher levels of public health expenditure per capita.

Does that mean that governments should now only increase the public health expenditure per capita and that would assure the attainment of the health-related MDGs? For sure that is not the case. All these changes in demographics, population, and income are interlinked in the process of development. More money on health-related programmes and

activities should be matched by developments in many other areas such as education and sanitation to mention just two of the most pressing. But the realization that health expenditure does not occur in the void or disassociated of the broader process of development should not serve to easily dismiss its contribution by arguing that it just reflects the changes of income in the country and that is not the amount of expenditure that matters but how efficiently it is used.

Clearly the argument of efficiency seems reasonable. For example, the model presented, which includes as explanatory variables public and private expenditure per capita, average GDP per capita, age dependency ratio of youth, percentage of urban population and population density, only explains about three quarters of the variation in the health-related MDGs. The other quarter may be related to many other factors, including governance and efficiency or efficacy of health-related budget and implementation of health programmes to improve the health status.[5] Nevertheless, higher levels of health expenditure are still significantly associated with better performance in health-related MDG indicators when controlling for variables that are clearly associated with development such as the ones mentioned above. Better governance and efficiency would only make such association even stronger.

Pressed by many other priorities, governments may get stuck in low levels of public health expenditure even when the economy is growing. It may seem to be enough to increase public health expenditure in absolute terms by keeping it at the same percentage of the total GDP. Fast growing developing economies would see such expenditure grow by rates of 4% or more in a yearly basis. But countries may find that keeping the same level of public health expenditure as proportion of the GDP is not enough given the diminishing marginal returns in terms of health-outcomes.

Effect of marginal change in health expenditure on health-related outcomes

As illustrated in figure 3, higher levels of public expenditure per capita are associated with better performance on health-related MDGs, in this case under-5 mortality rate, but the higher the expenditure the lower the gain in absolute terms.

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[5] For instance, as discussed in the draft chapters of MDG report 2011/2012, allocation of resources for primary healthcare may be more effective to improve health status than curative care.

Figure 3. Estimated association between public health expenditure per capita and under-5 mortality rate
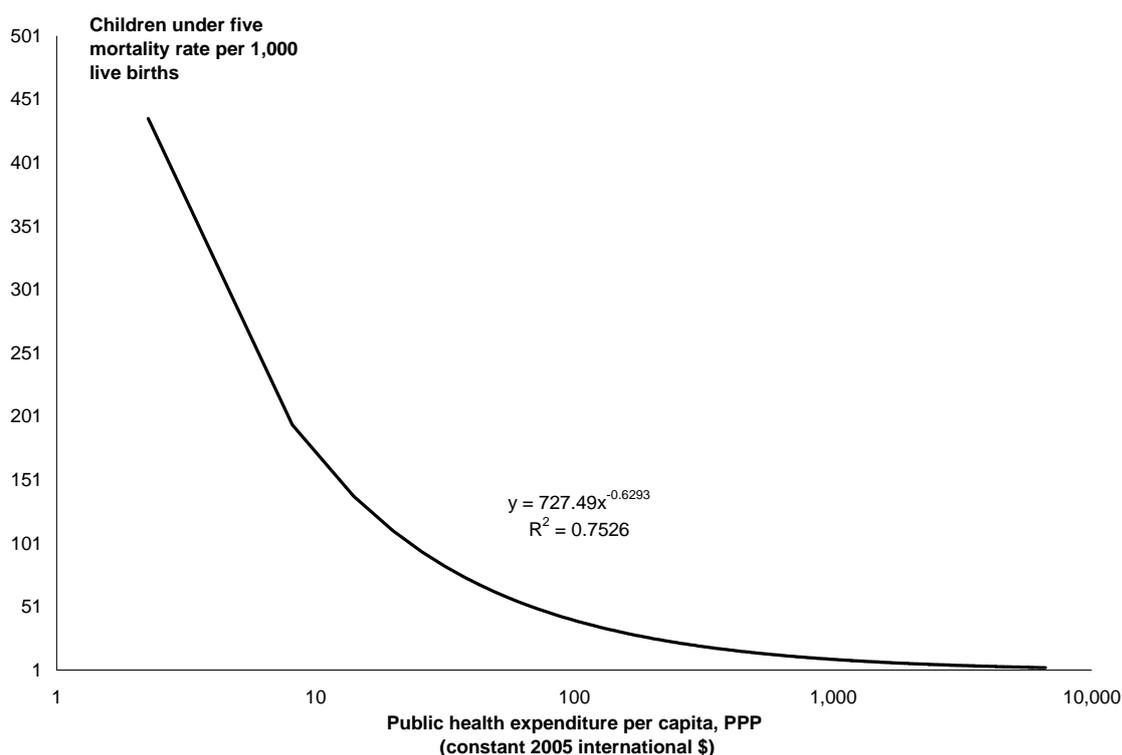
Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011) and the United Nations MDG Indicators (accessed 15 June 2011).

To give an example of the estimates, increasing the public health expenditure per capita from $10 to $100 is associated with a decrease in under-5 mortality rate from around 250 to 50. A five to one reduction by increasing $90. From that point on, things start to get harder. It may require an increase of $900 to drop the under-5 mortality rate to 10, a reduction by the factor of 5 to 1 again. Although in absolute terms these increases in public expenditure per capita are similar, in absolute terms there is a big difference. There are no more easy picks and it becomes more expensive to make health services reach those that are underserved. Maybe is the case that services have to be extended more broadly to rural areas, or more health professionals have to be engaged with associated higher costs in terms of labor, the point is that the reduction in under-5 mortality does not happen as fast as the increase in expenditure.[6]

Empirical analysis reveal that in fact higher income is associated with even higher levels of public health expenditure per capita, as illustrated in figure 4, which shows the association between per capita public health expenditure and average GDP. The axis of the graph scales by factors of ten and the line indicates the association between the two variables that better fit the data. The inclination of the line indicates that countries with higher income per capita usually have even higher public health expenditure per capita in percentage terms.

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[6] Note the value of the exponential (-0.6293) in the equation in the right side of the figure, which indicates that the under-5 mortality rate decreases at a rate proportional to its value but not as fast as the increase of public health expenditure per capita.
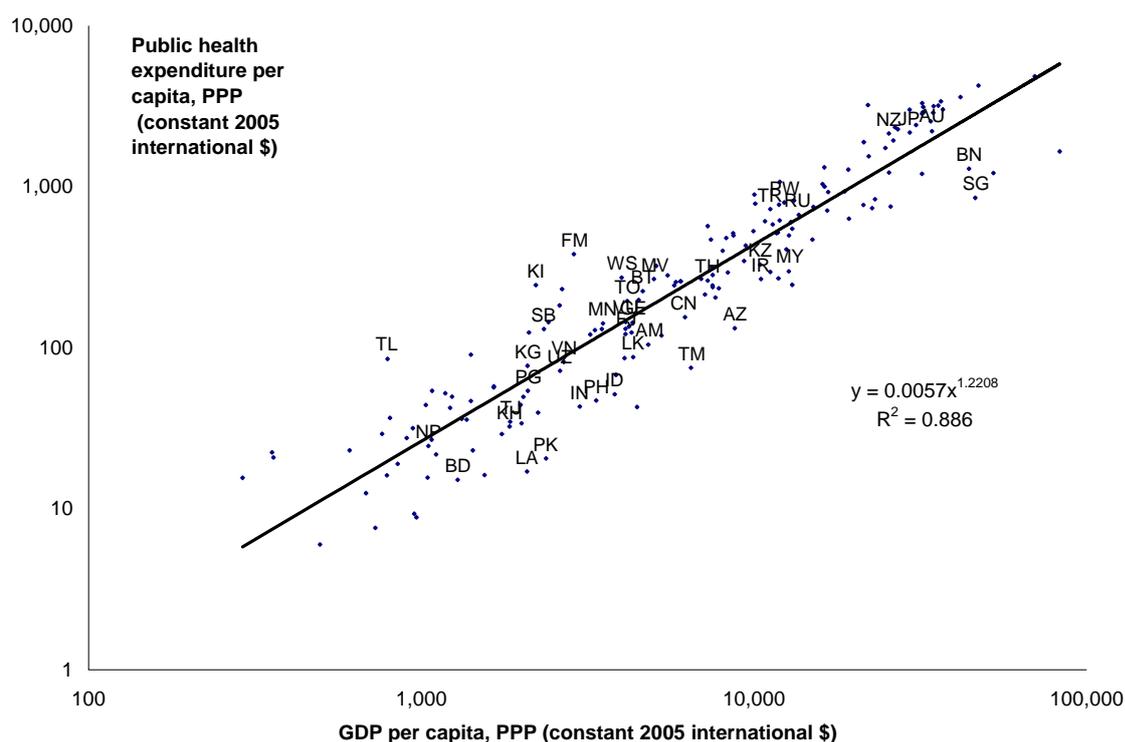
Figure 4. Association between public health expenditure per capita and per capita gdp, 2009

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

Figure 5 shows similar graph of the association between private health expenditure per capita and under-5 mortality, but in this case the opposite happens. Countries with higher income per capita are associated with higher (but not by the same factor) private health expenditure per capita. What these two figures suggest is that at lower levels of income per capita, private expenditure is higher and public expenditure is lower. As income increases, the relation changes and private expenditure start to get lower as a share of the GDP while public expenditure get higher.

That may be one reason of the apparent higher effectiveness of the private expenditure when compared with public expenditure as indicated by the higher elasticity presented in table 1. Since private expenditures are getting lower in proportional terms, it seems as if it is more efficient than public expenditures. There is actually no reason for such strong distinction in terms of effectiveness between private and public.[7] What the data suggest is that as countries develop, societies decide that they can afford to provide more health services as public goods.

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[7] Unless, of course, private and public health expenditure represent different costs and types of healthcare. For instance, private health expenditure may reflect certain types of medical care accessed only by those who can afford the treatments, although such detailed analysis is beyond the scope of this study, partly due to the limited availability of data.
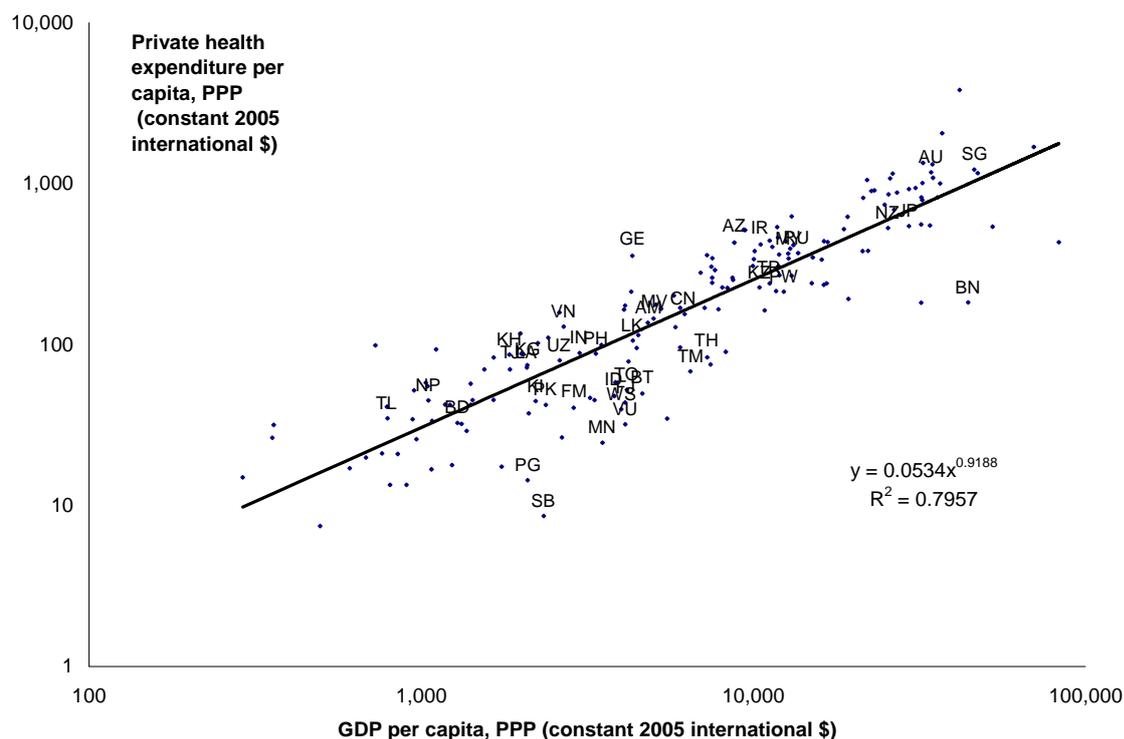
Figure 5. Association between private health expenditure per capita and per capita gdp, 2009

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

There is an important element of distributive policy underlining such choice. Given that development has also being accompanied by increased inequality in terms of income, one way to counter act such tendency is to make human capital more evenly distributed and allow the majority of the population to be able to benefit and to contribute to the development. Two of the straight ways to do it is investing in health and education. Therefore, should be no surprise that societies chose to increase public health expenditure per capita as proportion of GDP when the economy is in a condition to accommodate such increase.

Such increasing share of public health expenditure in total GDP is illustrated in figure 6 by the exponential line that indicates the estimated association between expenditure and GDP, based on the model presented in figure 4. The figure also presents the path followed by selected countries in the past 15 years in terms of these two variables. The figure is for illustration purposes since public health expenditure per capita is associated with many other factors other than GDP per capita and for more precision it would require an individual graphic per country. Nevertheless, the lines representing the paths followed by countries provide a summary description of how the level of public health expenditure per capita as percentage of GDP of these countries compare with the predicted level given their GDP per capita.

Figure 6. Association between public health expenditure and GDP, selected countries
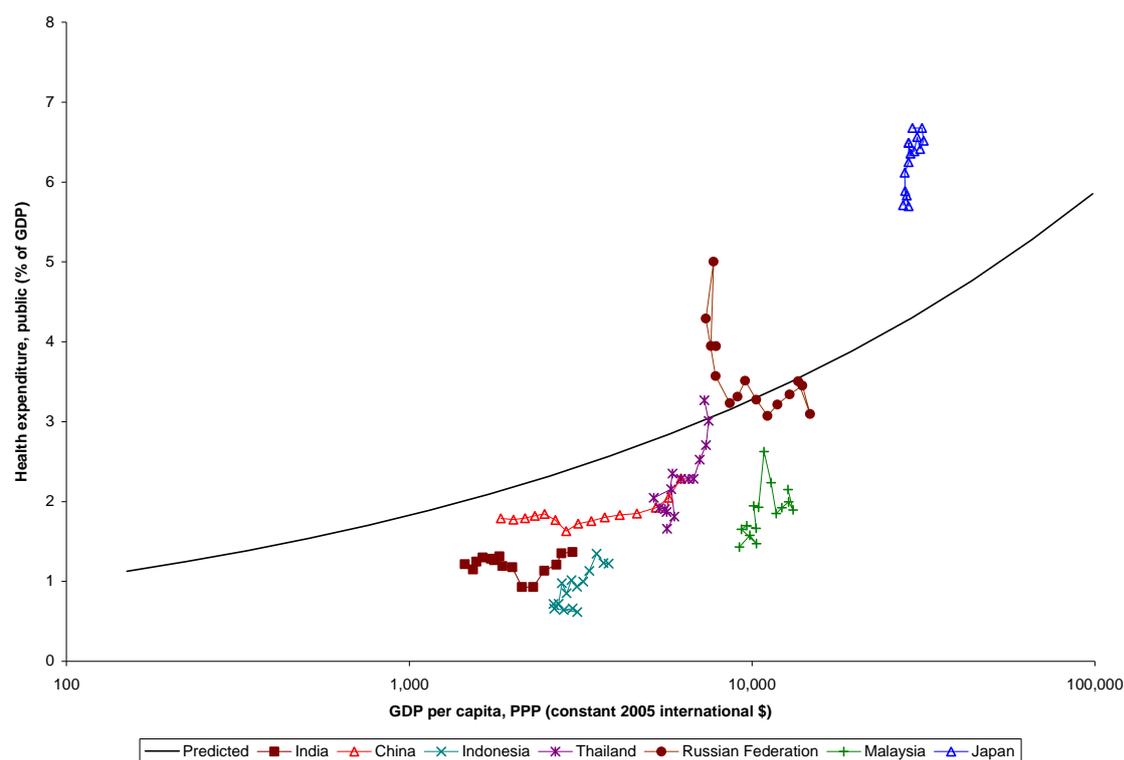
Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

For example, China (2.3%), India (1.4%), Indonesia (1.2%) and Malaysia (2.1%) had in 2009 levels of expenditure below of what would be expected, and these levels had been low for the past 15 years. The Russian Federation, after higher levels of expenditure in the late 1990s, has moved along the predicted line in the past 10 years. Thailand has had an upward trajectory doubling it public health expenditure per capita from 1.6% in 1995 to 3.2% of GDP in 2009. Japan, which in 1995 already had a higher level of expenditure (5.7%), has kept increasing it and reached 6.8% in 2009.

Figure 6 shows only part of the story since it does not include the private health expenditures. In some cases, higher private health expenditure per capita makes up for the gap in public expenditure. In other cases, is the government that bears a much larger share of the health expenditure while private expenditure is low. These differences reflect the choices, and in many case the lack of choices, that are available to countries. This paper models the public and the private expenditures based on some of the factors that are expected to be associated with them. The detailed results of the analysis are presented in tables A-4 and A-5.

In the case of public health expenditure per capita, the model suggests, as mentioned before and illustrated in figure 6, that higher levels of expenditure are associated with higher levels of GDP per capita, and the former grows faster than the latter. Higher public health expenditure per capita is also associated with higher private health expenditure per capita, even when controlling for the level of income of the country, size of population, population density, age dependency ratio, and urbanization. That is somewhat unexpected since one could balance the other, increasing public expenditure when private expenditure is low and vice versa. The association of public health expenditure with the other factors show expected results: lower expenditure is associated with more people, more urbanized and more densely

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populated countries. This result suggests the economy of scale in the provision of health services in cities and more densely populated areas. This also explains the high levels of public health expenditure per capita in small economies such as some island states in the Pacific.[8] Lower public health expenditure is also associated with higher age dependency ratio, which reflects a lower base for taxation.

The analysis of private health expenditure per capita, considering the same factors discussed above and controlling for public health expenditure, gives similar results for the association with the level of income and the age dependency ratio, but the opposite result for the other factors. Private health expenditure is lower in less populated, less urbanized and less densely populated countries, when controlling for income and public health expenditure. That suggests a supply side constrain in the provision of private health services in these countries.

Estimation of public and private health expenditure gaps

We can estimate the gap between the predicted and the actual level of public and private health expenditure per capita using the models described above. The result is shown in figures 7 and 8. Positive gap indicates that the level of public (private) expenditures (as percentage of GDP) of the respective country is lower than the prediction drawn from cross-country observation. The top five in terms of the gap in public health expenditure measured as percentage of GDP are Singapore (3.3%), Azerbaijan (2.9%), Georgia (2.6%), Turkmenistan (2.5%), and Armenia (2.4%). The case of Singapore may be somewhat particular of an island state with a very high level of income per capita and a large share of the population comprised of non-citizens (36%), thus health expenditure is much smaller portion of their GDP given its level of income per capita and demographic factors. It is striking to note, however, that the other top five are all North and Central Asian countries. That might suggest that, in terms of health expenditure, these countries have overshot in cutting down government role when they moved to the market economy. The majority of the countries included in the analysis also have a level of public health expenditure that is less than expected (positive values in the horizontal scale in figure 7), including China (0.7%) and India (0.6%). Detail is given in Annex Table A-6.

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[8] In the case of Pacific islands, however, it should take account of various factors. In particular for smaller islands; (i) public spending as a share of GDP is significantly high (ii) public health expenditures is disproportionately high in total expenditure, suggesting limited availability of data and/or services of private healthcare and (iii) total health expenditures as % of GDP are much higher than the rest of countries in Asia-Pacific, in particular for smaller islands (i.e., except PNG, Solomon, Samoa, Fiji and Vanuatu) where the health expenditures account over 10% of GDP, according to the WHO data on national health account.

Figure 7. Public health expenditure gap, 2009
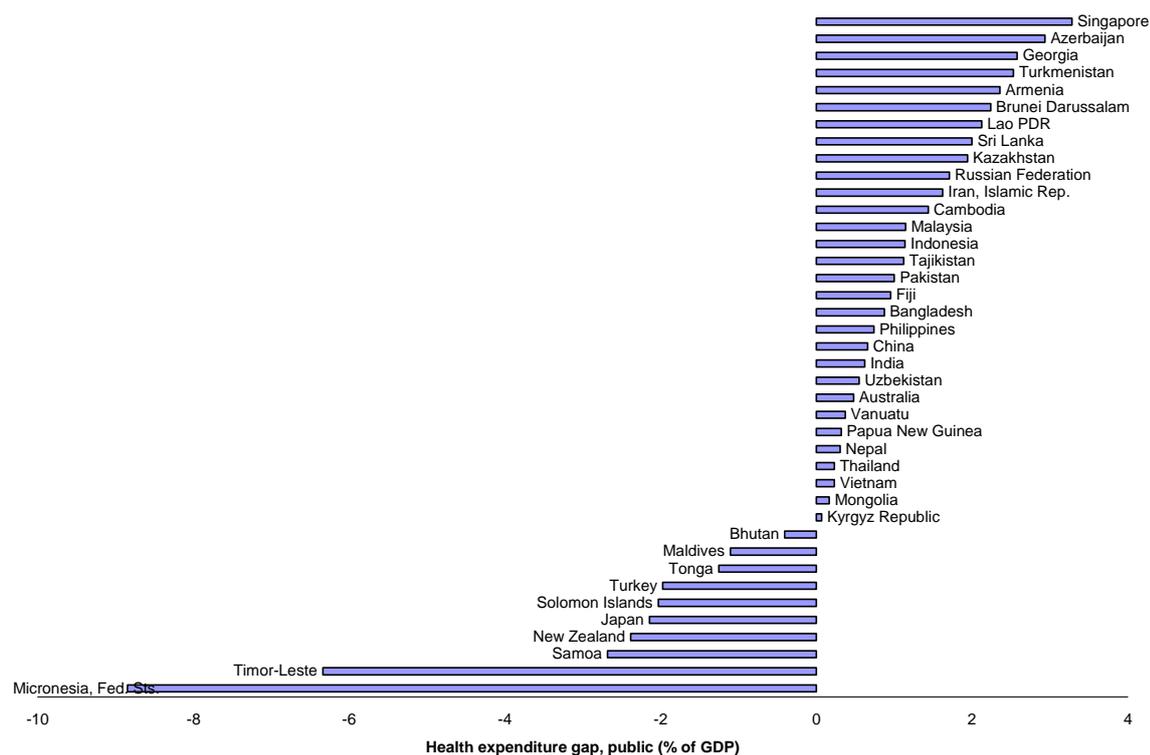
Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

In terms of the gap in the expected private health expenditure, the top five countries are Bangladesh (2.4%), Indonesia (2.4%), Thailand (1.8%), Japan (1.6%) and Pakistan (1.6%). Many Pacific island states are also in the same situation as well as the most populated countries of the region, China (1.4%) and India (1.0%).

We can combine the public and private gap estimates to analyze how the lack of one may be compensating the existence of the other. This is shown in figure 9, which presents for selected countries in Asia-Pacific the public health expenditure gap in the horizontal axis and the private health expenditure gap in the vertical axis.

Figure 8. Private health expenditure gap, 2009
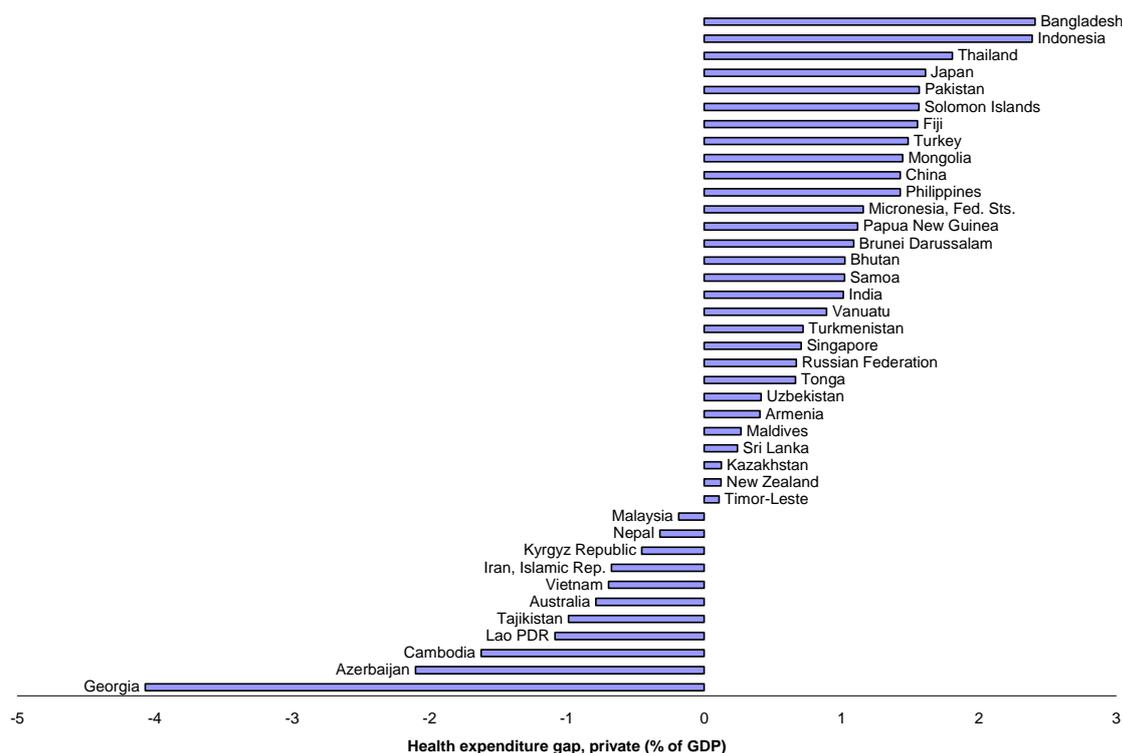
Health expenditure gap, private (% of GDP)

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

The diagonal line that cuts the graph indicates the combination of public and private gaps that result in zero total gap from the prediction drawn from cross-country analysis described above. Countries below that line have excess in one of the expenditures compensating the gap in the other. Countries above that line have a positive gap caused the public gap, the private gap or both. These three possible scenarios are divided by the square and the two triangles. The only country in the top triangle is Bhutan, meaning that the country has a private health expenditure gap that is higher than the excess in public health expenditure. To move to more balanced public/private expenditure the country has to reduce the private health expenditure gap. Azerbaijan, Islamic Republic of Iran, Lao People's Democratic Republic and Malaysia are in the triangle at the bottom, meaning that these countries have a public health expenditure gap that is higher than the excess in private health expenditure. Increasing the former is a way to move to a more balanced position. The majority of the countries is in the square at the top right side of the figure. These are the countries with gaps in both public and private health expenditure.

Figure 9. Public and Private health expenditure gaps

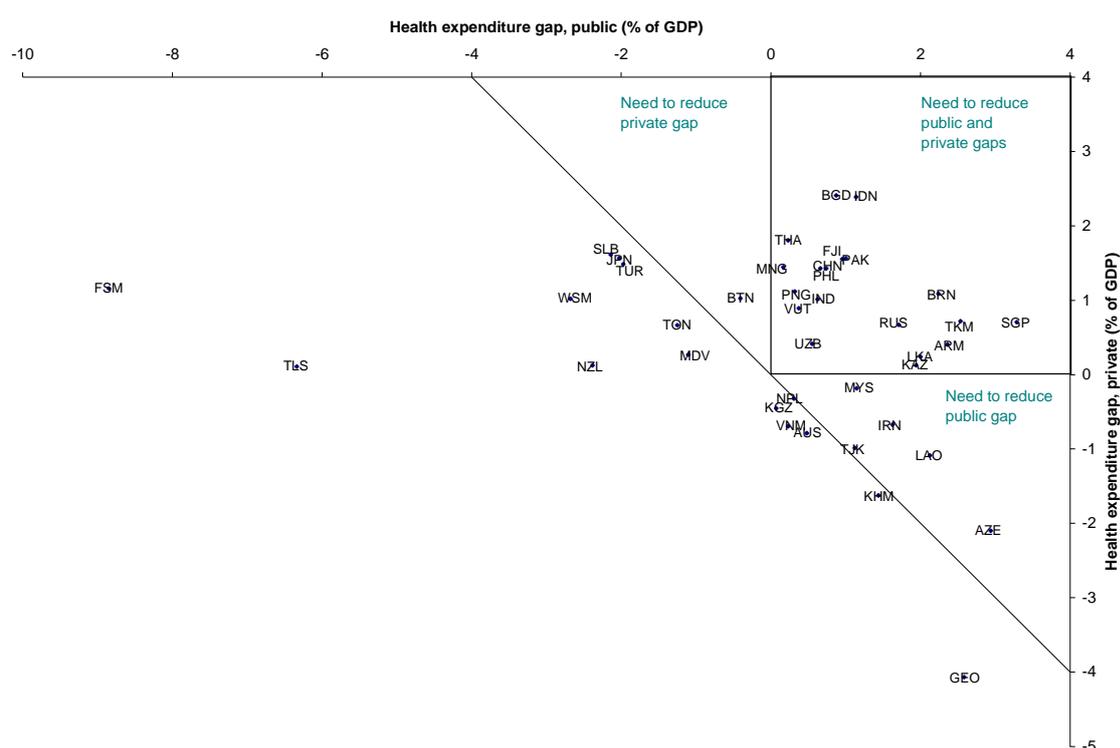Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

Estimated financial requirements to achieve health related MDGs

ESCAP (2010) estimates additional spending requirement to achieve health related MDG target. According the study, while for the region as a whole the costs of meeting the targets may not appear unduly high, for some countries, including many of the LDCs, additional spending required for achieving health goals for some countries is daunting, in particular LDCs (figure 10).

Analysis of public and health expenditure gaps above, however, shed an interesting light on public spending and health relationship. While the expenditure gaps shown above simply indicate the deviation of the public and private spending of countries from the estimated trends in cross-country analysis, it suggests potential capacity of the countries to expand health expenditures, since other countries with similar socio-economic conditions are spending more on health, either through public expenditure or private expenditure. For instance, investment required to meet Goal 4 (Under-5 mortality) in Cambodia is estimated to be around 0.8% of GDP (figure 10), a sizable requirement for an LDC like Cambodia. However, it is noteworthy that, while Cambodia's total health expenditure is more or less in line with our prediction drawn from the cross-country observation above, its public health expenditure as a share of GDP could have been 1.4% higher if it was in line with the predicted trend. That indicates that the country has potential to achieve higher health status if it increases the public health expenditure in accordance with its level of income and demographic structure. (see Annex Table A-6 for detailed account).

Figure 10. Estimated investment requirements to close the gap – MDG 4
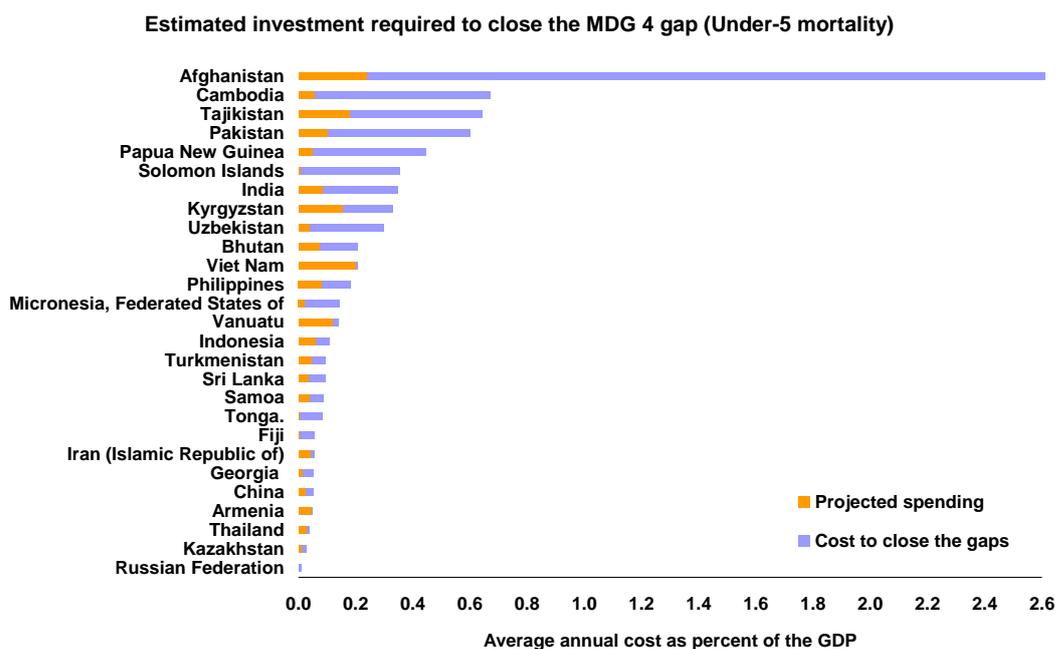
Estimated investment required to close the MDG 4 gap (Under-5 mortality)

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011) and the United Nations MDG Indicators (accessed 15 June 2011) and using the methodology presented in ESCAP(2010, pg89-91).

V. POLICY OPTIONS

The first option for countries to increase their public health expenditure to levels that are consistent with the predicted trend is to fully explore their fiscal space. As discussed in ESCAP(2010), under the prevailing orthodoxy reminiscent of the "Washington Consensus", the rule of the thumb in terms of fiscal deficit is to limit it to around 3% of the GDP for all countries, regardless of their needs and growth prospects. As illustrated in table 2, which presents the government operating balance as percentage of the GDP – calculated as revenues (excluding grants) less expenditures – from 2007 to 2009, the majority of the developing countries in the Asia-Pacific for which data is available have ran surpluses or small deficits. That is true even for 2009, when many countries were implementing fiscal stimulus policies.

Given the uncertainties regarding the economic recovery of developed economies and the ability of emerging economies of Asia-Pacific in sustain a prolonged and slow recovery, and considering the rising inflation in many countries of the region pushed by high oil and food prices, it may be advisable that countries refrain to increase fiscal deficits to much higher levels at this moment. It is clear, however, that given the fiscal position of these countries, as illustrated in table 2, there is scope for these countries to expand their fiscal space even under the cap of 3% of deficit as a share of GDP.

Table 2. Government budget net operating balance (percentage of GDP)

Country	2007	2008	2009
Afghanistan	-17.24896	-36.62549	-28.90781
Armenia	4.342552	1.683855	-1.596529
Bangladesh	0.1721764	0.0968771	-0.2620649
Bhutan	2.004782	-0.0121078	-0.3364906
Georgia	1.147478	-3.429123	-5.772043
Hong Kong, China	6.510117	0.8354244	
Indonesia	0.4662571	1.031116	-0.3736706
India	-0.8032207	-4.149232	-4.319256
Iran, Islamic Rep.	14.23018	9.980085	7.219154
Kazakhstan	-0.1704521	-1.27052	-7.66449
Kyrgyz Republic	2.635302	3.37373	-0.0248623
Cambodia	2.986646	3.959403	0.0629082
Korea, Rep.	4.06531	3.428122	1.205681
Lao PDR	2.903196	2.727096	2.589869
Sri Lanka	-4.272598	-4.355606	
Macao SAR, China	18.73616	18.99547	15.71796
Maldives	-0.514225	-3.508774	-13.77752
Mongolia	15.49279	5.726255	0.4055786
Malaysia	3.01123	1.232256	0.6111431
Pakistan	-1.851826	-5.20682	-2.777382
Philippines	-1.469071	-1.25452	-3.938029
Russian Federation	8.321825	12.10469	4.593016
Singapore	7.268981	5.918756	2.930425
Thailand	1.822725	1.881992	-1.037487
Turkey	1.291578	-0.2679462	-5.446724

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).

Another option for increasing public health expenditure is to reorient resources from other government expenditures. As discussed in ESCAP(2011), the Asia-Pacific developing economies are projected to grow in 2011 at 7.3% and such growth is expected to be broad-based, meaning that growth is expected to remain high in all subregions. Economies that are growing fast should be able to reorient resources from other government expenditures more easily because different areas of government intervention scale at different rates with growth. For example, investment in defence, public order and safety do not need to increase in per capita terms at the same rate as public health expenditure. Governments can maintain the same level of expenditure in these areas in per capita terms while decreasing the level of expenditure in proportional terms, if the economy is growing. Growing economies also present better prospects for higher participation by the private sector in some areas of government intervention. Even in the health sector, as shown in the previous section, the private sector may increase its participation ion per capita terms when the economy is expanding.

Exploiting the fiscal space and reorienting government expenditure are two areas of policy intervention that can be considered as easy picks of low-hanging fruits, but by no means are they the only options. ESCAP(2010) makes a comprehensive analysis of other options, including the reduction of administrative expenditures, reduction of servicing the public debt, phase out subsidies of fossil fuel, increase of government revenue through better tax administration, and the strengthening of the global partnership for accelerating the achievement of the MDGs. It suggests that the MDGs are at reach given sufficient

determination and financial resources, which can be made available if priorities are changed at national, regional and international levels.

VI. CONCLUSIONS

The paper shows that public health expenditure does explain the improvement of health status, together with other socio-economic variables, in line with various literatures studying link between these variables. The analysis finds that about three quarters of variation of health related MDGs can be explained by public and private health expenditure per capita, GDP per capita, age dependency ratio of youth, urban population and population density. Nonetheless residual quarter of variation may reflect other socio-economic factors and efficiency/efficacy of health services available. The paper also suggests that per capita public health expenditure increases along with a reduction in age dependency ratio, and reduction of child mortality rate decreases along with that shift. In addition, the analysis finds that marginal gain in health performance is higher for countries with low per capita public health expenditures.

Comparing the public and private health expenditure with income level, the study finds that, at lower levels of income per capita, private expenditure is higher and public expenditure is lower. As income increases, the relation changes and private expenditure start to get lower as a share of the GDP while public expenditure gets higher. Cross-country analysis shows that both public and private health expenditure increases along the economic growth, and public health expenditures grow faster than the level of GDP. Higher public expenditure per capita is also associated with higher private expenditure per capita, even when controlling for the level of income of the country, size of population, population density, age dependency ratio, and urbanization. That is somewhat counter-intuitive since it suggests that public and private health expenditures are not necessarily complementary.

The paper also highlights the contrasting pattern of private and public health expenditure with development. On one hand, lower public health expenditure is associated with more people, more urbanized and more densely populated countries. On the other, private health expenditure is lower in less populated, less urbanized and less densely populated countries, when controlling for income and public health expenditure, which may imply a supply side constraint in the provision of private health services in these countries.

Analysis of public and health expenditure gaps in this study sheds an interesting light on public spending and health relationship. The expenditure gaps are calculated as deviation from the estimated public and private spending with cross-country data. While the gaps simply indicate the deviation of the spending of countries from the estimated trends in cross-country analysis, it suggests potential capacity of the countries to expand health expenditures, since their peers with similar socio-economic conditions are spending more on health, either through public expenditure or private expenditure.

Earlier study by ESCAP estimated the financial requirements to attain MDGs. Although it may appear daunting, this paper suggests that some of the countries that are behind in their progress towards the achievement of the MDGs have the potential to complement the shortfall through increasing their public health expenditure to levels that are compatible with their per capita income and demographic structure. This paper suggests potential sources of funding to match such increase, including exploiting the fiscal space and reorienting government expenditure.

REFERENCES

Baldacci, Clements,Gupta, and Cui (2004). Social Spending, Human Capital, and Growth in Developing Countries: Implications for Achieving the MDGs.

Bidani, B., & Ravallion, M. (1997). Decomposing social indicators using distributional data. *Journal of Econometrics*, vol. 77, No. 1, pp. 125–139.

ESCAP (2010). *Financing an inclusive and green future: A supportive financial system and green growth for achieving the millennium development goals in Asia and the Pacific.* Sales No. E.10.II.F.4.

_____ (2011). *Economic and Social Survey of Asia and the Pacific 2011: Sustaining Dynamism and Inclusive Development: Connectivity in the Region and Productive Capacity in Least Developed Countries*. Sales No. E.11.II.F.2.

Filmer, D., & Pritchett, L. (1999). The impact of public spending on health: Does money matter? *Social Science and Medicine*, vol. 49, No. 10, pp. 1309–1323.

Granado, Gupta,and Hajdenberg (2010). Is Social Spending Procyclical?. IMF Working Paper WP/10/234.

Gupta, S., Verhoeven, M., & Tiongson, E. R. (2003). Public spending on health care and the poor. *Health Economics,* vol. 12, No. 8, pp. 685–696.

Gupta, Verhoeven, Tiongson (2002). The effectiveness of government spending on education and health care in developing and transition economies. *European Journal of Political Economy*, vol. 18 (2002), pp. 717–737.

McGuire, J. W. (2006). Basic health care provision and under-5 mortality: a cross-national study of developing countries. *World Development*, vol. 34, No. 3, pp. 405–425.

Murray, Laakso, Shibuya, Hill, and Lopez (2007). Can we achieve Millennium Devepment Goal 4? - New analysis of country trends and forecasts of under-5 mortality to 2015. *The Lancet*, vol.370 (September). Available from www.thelancet.com.

Panda, Manoj and A. Ganesh-Kumar, (2007). Impact of Economic Growth on Achieving MDGs. Background technical paper prepared for the ESCAP/ADB/UNDP RMDG-2008 report.

Rajkumar, A. S., & Swaroop, V. (2002). Public spending and outcomes: Does governance matter? World Bank Policy Research Working Paper No. 2840 (May). Washington, D.C.: World Bank.

Sajjad Zohir (2010). A framework for integrating MDGs in national development strategies: review of regional experiences and lessons for accelerated MDG implementation, Paper prepared for Partnership dialogue on developing and implementing MDG-based national development strategies in Asia-Pacific countries, ESCAP.

WHO (2011). Glossary of terms and financing flows. Accessed on 8 August 2011. Available from www.who.int/nha/glossary/glossary_english.pdf.

ANNEX

Table A-1. Result of panel data analysis - Children under five mortality rate per 1,000 live births

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Public Health expenditure per capita, PPP (constant 2005 international $)	-.3023751 (-42.64)***		-.1584216 (-16.85)***	-.1417846 (-14.66)***	-.0867916 (-10.13)***	-.0583565 (-6.60)***	-.0562987 (-6.31)***	-.0998443 (-7.33)***
Private Health expenditure per capita, PPP (constant 2005 international $)		-.3499776 (-45.54)***	-.2234988 (-21.35)***	-.1866269 (-16.81)***	-.101654 (-9.76)***	-.1000235 (-9.81)***	-.1010185 (-9.89)***	
GDP per capita, PPP (constant 2005 international $)				-.234915 (-10.81)***	-.0503039 (-2.52)**	-.0719199 (-3.65)***	-.0704369 (-3.57)***	-.1278536 (-4.24)***
Age dependency ratio, young (% of working-age population)					.9715549 (29.39)***	.8693974 (25.64)***	.863199 (25.33)***	.6226154 (14.09)***
Population density (people per sq. km)						-.3284081 (-10.15)***	-.2955914 (-7.87)***	-.5457014 (-11.36)***
Urban population (% of total)							-.0894997 (-1.72)*	.3235654 (4.71)***
Private health household's out-of-pocket payments per capita, PPP (constant 2005 international $)								-.0391376 (-3.08)***
Private health expenditure of prepaid and risk-pooling plans, per capita, PPP (constant 2005 international $)								-.0340384 (-6.58)***
Private Health expenditure of non-profit institutions serving households, per capita, PPP (constant 2005 international $)								-.0032549 (-1.21)
Constant	4.889744 (138.41)***	5.001876 (140.67)***	5.205098 (145.14)***	6.996726 (47.40)***	.9773784 (4.06)***	2.739461 (9.36)***	2.956972 (9.28)***	5.099684 (10.27)***
Number of observations	2804	2798	2798	2661	2571	2571	2571	1699
Number of countries	188	188	188	180	174	174	174	134
R-squared								
within	0.4101	0.4429	0.4976	0.5827	0.6919	0.7046	0.7050	0.7079
between	0.7615	0.5451	0.7143	0.8157	0.8650	0.6825	0.7245	0.4951
overall	0.7421	0.5463	0.7031	0.8069	0.8569	0.6823	0.7233	0.4753
Hausman test (Prob>chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: i) All variables are in natural logarithms.

ii) T-values are reported in brackets below each coefficient. * / ** / *** indicate significance at 10%, 5% and 1%, respectively.

iii) (Prob>chi2) < 0.05 then fixed effects was used, otherwise random effects.

Table A-2. Result of panel data analysis - Infant mortality rate (0-1 year) per 1,000 live births

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Public Health expenditure per capita, PPP (constant 2005 international $)	-.3309038 (-21.33)***		-.1584311 (-7.76)***	-.1316821 (-6.51)***	-.0832197 (-4.37)***	-.0655988 (-3.32)***	-.0661768 (-3.30)***	-.1393338 (-4.40)***
Private Health expenditure per capita, PPP (constant 2005 international $)		-.3811391 (-23.99)***	-.2557848 (-11.57)***	-.2323504 (-9.90)***	-.1675404 (-7.19)***	-.1641183 (-7.09)***	-.1639548 (-7.07)***	
GDP per capita, PPP (constant 2005 international $)				-.1324714 (-2.98)***	-.0131463 (-0.31)	-.0274703 (-0.65)	-.0276956 (-0.65)	-.0531151 (-0.76)
Age dependency ratio, young (% of working-age population)					.7177596 (10.51)	.6577722 (9.33)***	.6585643 (9.31)***	.4836818 (5.03)***
Population density (people per sq. km)						-.2013446 (-3.06)***	-.2080315 (-2.73)***	-.3455429 (-3.38)***
Urban population (% of total)							.0180961 (0.17)***	.3337383 (2.34)**
Private health household's out-of-pocket payments per capita, PPP (constant 2005 international $)								-.0627807 (-2.08)**
Private health expenditure of prepaid and risk-pooling plans, per capita, PPP (constant 2005 international $)								-.0483159 (3.63)***
Private Health expenditure of non-profit institutions serving households, per capita, PPP (constant 2005 international $)								.0036004 (0.54)
Constant	4.787042 (61.85)***	4.896279 (66.74)***	5.106937 (68.22)***	6.039553 (20.59)***	1.689947 (3.47)***	2.756821 (4.63)***	2.715197 (4.23)***	2.89339 (3.08)***
Number of observations	747	747	747	709	685	685	685	458
Number of countries	188	188	188	180	174	174	174	132
R-squared								
within	0.4491	0.5078	0.5558	0.6202	0.6875	0.6932	0.6932	0.6791
between	0.7519	0.5430	0.6991	0.8169	0.8618	0.7636	0.7548	0.5998
overall	0.7335	0.5357	0.6874	0.8060	0.8501	0.7595	0.7511	0.5914
Hausman test (Prob>chi2)	0.0000	0.0000	0.0000	undefined	0.0000	0.0000	0.0000	0.0000

Notes:
i) All variables are in natural logarithms.
ii) T-values are reported in brackets below each coefficient. * / ** / *** indicate significance at 10%, 5% and 1%, respectively.
iii) (Prob>chi2) < 0.05 then fixed effects was used, otherwise random effects. When undefined, fixed effects was used.

Table A-3. Result of panel data analysis - Maternal mortality ratio per 100,000 live births

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Public Health expenditure per capita, PPP (constant 2005 international $)	-.2755411 (-12.97)***		-.1509291 (-5.08)***	-.0907287 (-2.82)***	-.0369127 (-1.17)	-.0103548 (-0.32)	.0055769 (0.17)	.0612295 (1.19)
Private Health expenditure per capita, PPP (constant 2005 international $)		-.3123323 (-13.36)***	-.191648 (-5.82)***	-.0844958 (-2.14)**	-.0074257 (-0.19)	-.0005035 (-0.01)	-.003826 (-0.10)	
GDP per capita, PPP (constant 2005 international $)				-.3692805 (-5.00)***	-.2399622 (-3.31)***	-.2670349 (-3.67)***	-.2661463 (-3.69)***	-.3749434 (-3.02)***
Age dependency ratio, young (% of working-age population)					.8223265 (7.20)***	.7277009 (6.14)***	.698418 (5.91)***	.3611855 (2.31)**
Population density (people per sq. km)						-.3001069 (-2.75)***	-.1271402 (-1.02)	-.5434358 (-3.32)***
Urban population (% of total)							-.47863 (-2.79)**	-.2610396 (-1.14)
Private health household's out-of-pocket payments per capita, PPP (constant 2005 international $)								.0476957 (0.98)
Private health expenditure of prepaid and risk-pooling plans, per capita, PPP (constant 2005 international $)								-.0327024 (-1.53)
Private Health expenditure of non-profit institutions serving households, per capita, PPP (constant 2005 international $)								-.0072677 (-0.68)
Constant	5.715299 (54.59)***	5.819349 (53.18)***	5.997534 (53.35)***	8.354935 (17.28)***	3.432361 (4.16)***	5.069953 (5.01)***	6.271528 (5.74)***	8.970162 (5.54)***
Number of observations	671	671	671	655	655	655	655	446
Number of countries	169	169	169	166	166	166	166	129
R-squared								
within	0.2514	0.2627	0.2989	0.3326	0.3970	0.4063	0.4078	0.3764
between	0.7790	0.6597	0.7720	0.7882	0.8771	0.7027	0.8045	0.5178
overall	0.7493	0.6279	0.7426	0.7715	0.8584	0.6913	0.7907	0.5205
Hausman test (Prob>chi2)	0.0000	undefined	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:
i) All variables are in natural logarithms.
ii) T-values are reported in brackets below each coefficient. * / ** / *** indicate significance at 10%, 5% and 1%, respectively.
iv) (Prob>chi2) < 0.05 then fixed effects was used, otherwise random effects. When undefined, fixed effects was used.

Table A-4. Result of regression analysis – Public Health expenditure per capita, PPP (constant 2005 international $)

Explanatory variables	
GDP per capita, PPP (constant 2005 international $)	1.029701 (51.31)***
Private Health expenditure per capita, PPP (constant 2005 international $)	.1024595 (5.81)***
Population, total	-.0795844 (-14.10)***
Age dependency ratio, young (% of working-age population)	-.5806616 (.0379495)***
Urban population (% of total)	-.1421543 (-5.07)***
Population density (people per sq. km)	-.0599879 (-7.77)***
year	51.18593 (10.67)***
Constant	-389.1434 (-10.65)***
Number of observations	2571
Number of countries	171
R-squared	0.9146

Notes: i)   All variables are in natural logarithms.
          ii)   T-values are reported in brackets below each coefficient. * / ** / *** indicate significance at 10%, 5% and 1%, respectively.

Table A-5. Result of regression analysis – Private Health expenditure per capita, PPP (constant 2005 international $)

Explanatory variables	
GDP per capita, PPP (constant 2005 international $)	.5892333 (19.91)***
Public Health expenditure per capita, PPP (constant 2005 international $)	.1268684 (5.81)***
Population, total	.0543788 (8.46)***
Age dependency ratio, young (% of working-age population)	-.1570469 (.044006)***
Urban population (% of total)	.3060243 (9.94)***
Population density (people per sq. km)	.1058344 (12.55)***
year	53.94714 (10.08)***
Constant	-412.9386 (-10.14)***
Number of observations	2571
Number of countries	171
R-squared	0.8194

Notes: i) All variables are in natural logarithms.

ii) T-values are reported in brackets below each coefficient. * / ** / *** indicate significance at 10%, 5% and 1%, respectively.

Table A-6. Health expenditure gap

	Public	Private	Total
Micronesia, Fed. Sts.	-8.85	1.16	-7.69
Timor-Leste	-6.34	0.11	-6.23
New Zealand	-2.38	0.12	-2.26
Samoa	-2.68	1.02	-1.66
Georgia	2.58	-4.07	-1.49
Maldives	-1.10	0.27	-0.83
Tonga	-1.25	0.67	-0.59
Japan	-2.14	1.61	-0.53
Turkey	-1.97	1.49	-0.49
Solomon Islands	-2.03	1.56	-0.47
Vietnam	0.23	-0.70	-0.47
Kyrgyz Republic	0.07	-0.45	-0.38
Australia	0.48	-0.79	-0.31
Cambodia	1.44	-1.62	-0.19
Nepal	0.31	-0.32	-0.02
Tajikistan	1.12	-0.99	0.14
Bhutan	-0.41	1.02	0.62
Azerbaijan	2.94	-2.10	0.84
Iran, Islamic Rep.	1.62	-0.67	0.95
Malaysia	1.15	-0.18	0.96
Uzbekistan	0.55	0.42	0.97
Lao PDR	2.12	-1.09	1.04
Vanuatu	0.37	0.89	1.26
Papua New Guinea	0.32	1.12	1.44
Mongolia	0.16	1.45	1.61
India	0.62	1.01	1.64
Thailand	0.23	1.81	2.04
Kazakhstan	1.94	0.13	2.07
China	0.66	1.43	2.09
Philippines	0.74	1.43	2.17
Sri Lanka	2.00	0.24	2.24
Russian Federation	1.71	0.67	2.38
Fiji	0.95	1.55	2.51
Pakistan	1.00	1.56	2.57
Armenia	2.36	0.41	2.76
Turkmenistan	2.53	0.72	3.25
Bangladesh	0.87	2.41	3.28
Brunei Darussalam	2.24	1.09	3.33
Indonesia	1.14	2.39	3.53
Singapore	3.28	0.71	3.99

Source: Authors based on data from the World Bank Development Indicators (accessed on 8 August 2011).