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Health Financing: Does Governance Quality Matter?

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Abstract

This paper contributes to the existing literature by examining the determinants of health financing in 177 developed and developing countries. The study introduces the variables of government effectiveness and control of corruption to capture the impact of governance quality on different mechanisms of health financing. Utilizing panel data analysis, namely system-GMM estimators, to obtain unbiased estimates, the results indicate that public and private health financing do not follow the same pattern. In addition, the GDP per capita and total government expenditure is crucial factors that affect health financing in both developed and developing countries. External aid tends to reduce public health financing, especially when it is received by a country with low governance quality. Interestingly, a high level of government effectiveness and control of corruption are found to be very influential in stimulating public health financing and helping to reduce private health financing in developed countries. However, the low amounts of health financing in developing countries are attributable to the low quality of governance, which increases out-of-pocket health financing.

Keywords: Health Care, Health Financing, Governance Quality, System-GMM.
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1. Introduction

The health care systems in high-income countries are characterized by large amounts of funds devoted to public health financing, except in the US and few other countries, where the private financing surpasses

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public financing. On the other hand, the majority of developing countries suffer from a lack of financial resources in general and resources allocated to health in particular. Some middle-income countries such Thailand and Chile have very efficient and well-financed health systems.[1] However, health financing in all countries is concerned with raising enough money for health, eliminating the financial barriers to give access to care, reducing the financial risks of disease, and making better use of the available resources (WHO, 2010). It is becoming increasingly difficult to ignore the effect of different components of health financing on health risks and equity (Clemente et al., 2004). The importance of the role of health financing emerges from the idea that health is essential for human welfare and economic development. Sustainable health financing, mostly through the payment of taxes or compulsory social health insurance contributions, aims to reduce the risks and ensure coverage[2]. Health care expenditure has been a focus of research since the 1970s; Newhouse (1977) emphasized the role of income as a main determinant of the variation in health expenditure, besides arguing that health is a luxury good since the income elasticity was greater than one, as confirmed later by Gerdtham et al. (1992). As shown by previous literature, private health financing may follow a different pattern from public source of financing (Clemente et al., 2004; Xu et al., 2011). In addition, improved public health financing is important as it leads to improved health care quality. Besstremyannaya (2009) explained that the ineffectiveness of public health financing was probably due to a lack of incentives for both medical staff and institutions to provide effective health care, in addition to the high degree of institutional bureaucracy. Recently, investigators have examined the effects of corruption and the quality of bureaucracy on public health expenditure. For example, Rajkumar & Swaroop (2008) indicated that public health spending tends to be more efficient in reducing health risks in countries with a high quality of governance. Previous studies of health financing, such as the one by Besstremyannaya (2009), have also shown the importance of

1. See The World Health Report (2010).
2. See "sustainable health financing, universal coverage and social health insurance In: *Fifty-eighth World Health Assembly".*

shortcomings in the government standard operating procedure, or in short, government effectiveness, and control of corruption as major determinants of health financing, which may have an impact on the health outcome. This leads us to recognize the significant role of legislative and executive institutions to improve and sustain health financing in order to achieve universal health coverage. However, researchers have consistently neglected these factors when estimating the health financing function. Therefore, the current paper contributes to the literature by providing evidence on the relevance of governance quality on improved and well-financed health systems. In particular, higher government effectiveness and control of corruption improve public health financing and reduce catastrophic out-of-pocket health expenditure. In addition, good governance helps to effectively allocate the external aid for health in developing countries.

This study examines the determinants of different components of health financing in developed and developing countries. It basically tries to assess the important determinants of sustainable health financing mechanisms. More importantly, the paper contributes to the existing literature by addressing the roles played by government effectiveness and control of corruption in influencing different components of health financing. The generalized method of moments system-GMM estimator is used to obtain efficient estimates. The paper is organized as follows. Section 2 summarizes the theoretical and empirical literature on health financing. Section 3 discusses the estimation method, data sources, and description of the variables, followed by Section 4, which presents the empirical findings of our study. The last section of this paper concludes the study and some policy implications are drawn.

2. Literature Review

2.1 Empirical Literature

Recent empirical literature has addressed the changes in health expenditure are mainly determined by the changes in GDP, the cost of medical care, the demographic and epidemiological changes and the health financing systems reforms. The issues of heterogeneity in the health expenditure function and whether or not there is a long-run relationship between health expenditure and it's determinants, such as

GDP, were addressed by Clemente et al. (2004). They examined cointegration between the government expenditure and private expenditure on health and the GDP for OECD countries. They revealed that cointegration does not exist among the variables, possibly due to differences in the health systems (general taxation or social health insurance), which cause variations in the aggregate functions. Additionally, the results of the government and private expenditure functions showed that they behave in different ways, meaning that they have different determinants. Finally, they discussed whether health is a luxury good or not and suggested that it can be explained in different ways by proposing a theoretical model that shows how income elasticity is influenced by political decisions. Getzen (2000) argued that since income elasticity differs between private and public health expenditure, health care is both a necessity in the case of public health expenditure and a luxury good in the case of private health expenditure.

The above studies greatly emphasized the GDP as one of the crucial determinants of health care financing, as pointed out by Hartwig (2008). The hypothesis of Baumol's model of unbalanced growth – "nominal wage growth in excess of productivity growth as the main determinant of health care financing growth"–was tested by Hartwig (2008) using panel data for 19 OECD countries. The findings indicated that the difference between wage and productivity growth has positive influences on health care expenditure. The outcomes of his study also showed that the model of unbalanced growth can lay a theoretical foundation for studies on the determinants of health expenditure.

Another study, conducted by Besstremyannaya (2009), aimed to explore the relationship between public financing and health outcomes in Russia. The author emphasized that public financing can be inefficient due to the lack of incentives for both individuals and institutions in the health care sector. Therefore, the author argued that improving public financing is necessary to improve health care's effectiveness and quality. The findings of the panel data analysis showed that raising public health financing helps to reduce mortality and morbidity of the working age population. Meanwhile, a lack of public funds can lead to an increase in out-of-pocket payments by

patients. Other empirical studies that attempted to examine other determinants of health financing, Lu et al. (2010), for example, estimated public health financing in developing countries as a function of the GDP and other factors, such as the total government expenditure, HIV prevalence, and debt relief. The results showed that all the variables are important determinants of public spending on health except debt relief, which was found to be insignificant.

Leiter & Theurl (2012) tested the possibility of the convergence of health care financing in 22 OECD countries from 1970 to 2005. They focused on the convergence of public financing as a ratio of the GDP as well as per capita health financing. More importantly, they estimated the conditional β-convergence to examine public health financing and found evidence of convergence of health financing. They argued that understanding the relationship between public and private mechanisms of financing is important to identify the determinants of convergence in health financing. The relationship between public and private health financing can be one of the following: first, private financing is an alternative to public financing; second, co-payment, whereby health is partially covered by public financing and the rest is covered by private financing; third, group-based, in which some people are entitled to public coverage, while others depend on private options; fourth, some health care sectors are financed by public funds, such as inpatient care, while the cost of pharmaceuticals sector relies on private financing; finally, different structures of financing, in which public health is financed on a tax basis or social health insurance basis on one hand and private health is financed either by voluntary health insurance or by out-of-pocket payment on the other hand. However, the literature mentioned earlier, except Lu et al. (2010), has failed to address the endogeneity problem due to the inclusion of the lagged dependent variable on the right-hand side of the equation as well as the possibility of reverse causality between GDP and health expenditure. These could be the methodological weaknesses that led to biasedness and inconsistent estimates of the parameters.

Baltagi & Moscone (2010) continued the argument about the nature of health care and whether it is a necessity or a luxury good. The long-run relationship between income and health expenditure was estimated

for 20 OECD countries from 1971 to 2004. They used the panel cointegration framework and the cross-sectional dependence common correlated effect estimation technique, and their results suggested that health care is a necessity good with income elasticity less than one. In addition, the population aged 65 years and above as a percentage of the total population was found to be an important non-income determinant of health care expenditure. Although their estimation method was very robust, the independent variable that they used was per capita health expenditure, which would not express public and private health expenditure behaviors.

Similarly, Xu et al. (2011) examined the health care expenditure function in 143 developed and developing countries. They basically started their study with the simple questions: what are the main variables that determine different types of the health expenditure function and do the public expenditure and out-of-pocket expenditure functions follow the same pattern or not? They estimated the static as well as the dynamic panel data model to identify the determinants of public, out-of-pocket, and total health expenditure. Their results confirmed that the GDP is an essential factor that determines health care expenditure in all countries, irrespective of income differences. In addition, they included other variables, such as the population aged over 60 as a percentage of the total population, to capture the demographic structure, which was found to be an important element. The prevalence of tuberculosis (TB) was also used to examine the impact of diseases on the amount of health care financing, but TB was found to be insignificant in the case of public financing. Furthermore, they introduced different components of health expenditure to test for the substitution effect, besides measuring the impact of government fiscal capacity by using total government expenditure as a share of the GDP. They concluded that government finances and direct or out-of-pocket health financing follow different paths since the variables included tend to give different results for different income groups and depending on whether it is a public or out-of-pocket function. Finally, the structure of the health care system, on a tax basis or social health insurance basis, was found to be insignificant in explaining the health expenditure, especially for high-income countries.

Some other studies tried to relate the size of public health financing

to some political and institutional setups. By using dynamic panel data analysis for 18 OECD countries, Potrafke (2010) examined whether government ideology and electoral motives affected public health expenditure over the period between 1971-2004. He found that politicians act opportunistically and improve public health expenditure during election years, whereas government ideology does not influence public health expenditure. Furthermore, Liang & Mirelman (2014) examined the impact of socio-political factors, such as democratic accountability and corruption, and external aid on public health financing in 120 developed and developing countries from 1995 to 2010, using fixed-effects and two-stage least squares. The findings of their study showed the importance of good governance in determining the size of public health spending. Additionally, external aids tend to reduce public expenditure on health, especially in countries that have low governance quality. Finally, Farag et al. (2013) examined the effect of health financing on health outcomes with respect to the level of government effectiveness in low and middle-income countries using a fixed-effects model. They found that health spending is significantly related to child mortality reduction, and government effectiveness enhances the effect of public health spending on health outcomes. It is suggested that an increase in public health expenditure leads to better health outcomes if effective institutions and policies accompany it. In view of all that has been mentioned so far, one may suppose that governance can play a very decisive role in the way in which resources are distributed within a particular country. Therefore, this study will attempt to examine the extent to which the baseline model is robust after the introduction of government effectiveness and control of corruption.

2.2 Theoretical Framework

Grossman (1972) showed that the demand for health care is a derived demand and health is a capital good to increase the number of healthy days. The model predicted that income is positively correlated with the demand for health and medical care. Furthermore, it is anticipated that the rate of depreciation increases when humans grow older and thus the expenditure on health and medical care increases for elderly people. In his major study, Galama (2011) also developed a demand

for health model using the human capital framework for health. The model predicted a negative relationship between health status and demand for health care and showed that a healthier population demands less medical care and fewer services than a less healthy population. The empirical model of this study is based on the extension of the demand for health theory.

3. Data and Empirical Methodology

3.1 Model Specification

This study attempts to estimate the influencing factors of different health financing mechanisms, which can be written as:

$$lnHF_{it} = \delta HF_{it-1} + \beta_1 lnGDP_{it} + \beta_2 lnHFM_{it} + \beta_3 lnEXF_{it} + \beta_4 lnGGE_{it} + \beta_5 lnTB_{it} + \beta_5 lnPOP_{it} + \mu_i + \lambda_t + \upsilon_{it} \quad (1)$$

where μ_i, λ_t, and υ_{it} refer to the country-specific effect, time effect, and error term, respectively, i refers to the country, t is time, HF is the dependent variables such as public PHF, private PRHF, or total health financing THF as a percentage of the GDP or out-of-pocket OOP as share of total health expenditure, GDP is the GDP per capita at the 2005 US$ constant price, HFM is the health financing mechanisms to test the substitution effect between different components of health financing[1], EXF is external resources for health (development assistance for health) as share of total health expenditure, which is only included in developing countries estimation, GGE is the general government expenditure as a ratio of the GDP, TB is the incidence of tuberculosis to capture the impact of disease patterns on different types of financing, and POP is the population aged over 65 years as a share of the total population.

The main concern of this paper is to address the role of governance quality in determining health financing. The above model is estimated including government effectiveness first, followed by the control of corruption in the other model:

1. The substitution effect here refers to the substitution of between different health financing mechanisms. For example, if public health financing was high that help to cover large proportion of population and thus, individuals will spend low amount as Out-Of-Pocket.

$$lnHF_{it} = \gamma HF_{it-1} + \alpha_1 lnGDP_{it} + \alpha_2 lnHFM_{it} + \alpha_3 lnGGE_{it} + \alpha_4 lnEXF_{it} + \alpha_5 lnTB_{it} + \alpha_6 lnPOP_{it} + \alpha_7 lnGEF_{it} + \alpha_8 EXF * GEF_{it} + \mu_i + \lambda_t + \upsilon_{it} \quad (2)$$

$$lnHF_{it} = \varnothing HF_{it-1} + \theta_1 lnGDP_{it} + \theta_2 lnHFM_{it} + \theta_3 lnGGE_{it} + \theta_4 lnEXF_{it} + \theta_5 lnTB_{it} + \theta_6 lnPOP_{it} + \theta_7 lnCOR_{it} + \theta_8 EXF * COR_{it} + \mu_i + \lambda_t + \upsilon_{it} \quad (3)$$

where GEF in equation (2) and COR in equation (3) are government effectiveness and control of corruption, respectively, as a proxy for institutional or governance quality, which is estimated separately as models (2) and (3). In addition, EXF*GEF and EXF*COR are the interaction terms between external resources for health, government effectiveness, and control of corruption, respectively, in developing countries. The main reason that we take the interaction is to test the findings of Lu et al. (2010), who argued that for every case of external aid, the government tends to reduce the budget allocated to health from a domestic source rather than sustain or increase its health financing. In our analysis, we consider health financing and GDP as endogenous variables for the possibility of reverse causality from the GDP to the health expenditure and between health financing mechanisms. All the variables are expressed in log form to take care of outliers in the data, as suggested by the normality test since our data follow a normal distribution after taking the natural logarithm.

This study employs two panel samples of a total of 205 developed and developing countries according to the World Bank 2013 income classifications over the period 2002–2012. We only consider countries with a complete data set for all variables needed according to our model specification; thus, we take into account 51 developed or high-income countries in the first group and 126 developing or non-high-income countries in the second group.

3.2 Method of Estimation

One of the advantages of using panel data is that it provides a better understanding of dynamic relationships, which are characterized by the lagged dependent as the explanatory variable, i.e.

$$y_{it} = \alpha\, y_{i,t-1} + \beta\, x'_{it} + \varepsilon_{it} \quad i = 1, \ldots, N \quad t = 1, \ldots, T \qquad (4)$$

where β is *K x 1* and x'_{it} is *1 x K*, assuming that ε_{it} follows the two-way error model

$$\varepsilon_{it} = \mu_i + \lambda_t + \upsilon_{it} \quad (5)$$

where μ_i ~IID(0, σ_μ^2), λ_t ~IID(0, σ_λ^2), and υ_{it} ~IID(0, σ_υ^2) are independent of each other and between themselves. The correlation between the error term and $y_{i,t-1}$ in equation (4) makes the OLS and random-effects (RE) estimators biased and inconsistent even if the error terms are not serially correlated. In addition, the fixed-effects (FE) model eliminates the country-specific effect; however, the endogeneity still exists due to the correlation between $y_{i,t-1}$ and $\bar{\mu}_i$ as in equation (4) (see, Baltagi, 2008). One reason that the simple FE method is not used is that the empirical models of this study are characterized by the dynamic term. In addition, the potential simultaneity or reverse causation bias between health expenditure and GDP, see the discussion by Sirag et al. (2016). In order to overcome this problem, Arellano & Bond (1991) recommended a generalized method of moments (GMM) or difference-GMM estimator. Furthermore, the GMM procedure eliminates country-specific effects by differencing equation (4) and uses instrumental variables to solve the problem of the existing correlation between the lagged dependent variable and the error term. Specifically, Arellano & Bond (1991) suggested the use of lags in levels of the differenced lagged dependent variables as well as exogenous variables as instruments. The one-step estimator assumes homoscedastic and independent error terms across times and individuals. On the other hand, the second-step estimator uses the estimated residuals to build a consistent variance–covariance matrix when the error terms are not independent and homoscedastic.

The two-step GMM estimator suffers from a downward-biased standard error, especially in the case of a small sample size. Moreover, too many instruments can lead to biased estimates and weaken the over-identification test, since the number of moment conditions increases according to the number of exogenous variables and time. More importantly, Blundell & Bond (1998) indicated that the level variables are weak instruments first-differenced in the case of high persistence of the lagged dependent variable. Consequently, Arellano & Bover (1995) proposed an estimator that performs better than the

first-difference GMM, especially when the autoregressive process is persistent, as pointed out by Blundell & Bond (1998). The system-GMM estimator combines the moment conditions for the level variables with those for the differenced variables. It was decided that the two-step system GMM is the best method to be adopted for this study. It is worth mentioning that the GMM estimators are not appropriate to capture the long run effect among the variables. In addition, the efficiency of GMM relies on the quality of the instruments that increase with time and the endogenous variables. The same estimation technique was adopted by Xu et al. (2011) to estimate different type of health expenditure function, such as total, public and OOP.[1]

To ensure that the estimated system-GMM results are consistent and reliable, serial correlation and Sargan tests are performed. The presence of the first-order autocorrelation is allowed, but the rejection of the null hypothesis of no second-order autocorrelation is necessary. Additionally, the number of moments in the dynamic panel GMM estimation rises with time. As a result, the Sargan test is implemented to test for the over-identification of the restrictions (Baltagi, 2008).

3.3 Description of the Variables

3.3.1 Dependent Variables

The dependent variables in this study refer to public, private, and total health financing, respectively, as a share of the GDP. Basically, public, private, and total health financing as a percentage of the GDP are the amount of resources pooled and spent on health care and services during certain periods of time. The main sources of public financing are mostly either tax revenues or compulsory social health insurance contributions. Additionally, in developing countries, there is another source of public financing known as external resources for health or development assistance for health, but this source is considered less sustainable and mostly has political agendas (Lu et al., 2010). Moreover, there are two main sources of private health financing: what is known as out-of-pocket expenditure, which in

1. Normally, health expenditures (total, public, and private) are measured as percentage of GDP, whereas OOP are measured as share of total health expenditure. The different health expenditure functions are not estimated simultaneously.

general is expressed as a percentage of the total health expenditure, and private health insurance; however, the out-of-pocket health financing is very large and usually represents private health financing in developing countries. The total health financing as a share of the GDP contains the total resources spent on health from different sources, such as public and private sources of financing.

3.3.2 Independent Variables

As the theoretical and empirical literature agreed on the importance of income as a positive determinant of the demand for health care, especially in developing countries, we use the GDP per capita to capture the impact of income. The size of the government is also included as the general government expenditure as a share of GDP. Further, population structure, measured by population aged 65 years and above is assumed to be influential in explaining the demand for health care; for that, we use the population aged 65 years and above as a share of the total population. Likewise, the incidence of TB out of 100,000 members of the population is used; other diseases, such as HIV, are important but data were unavailable. Governments should react by increasing the amount of public resources devoted to controlling such diseases. However, since many people cannot afford to pay for the expenses of TB treatment, especially in developing countries, the increased resources may be due to external assistance through development assistance for health. In order to determine the substitution effect between various types of health financing in the relevant equations, the study includes public and private (out-of-pocket) health financing, besides external resources. External resources for health exist predominantly in developing countries; therefore, they are only included in the developing countries' analysis. Additionally, we expect that when external aid is received by a country that has a low level of government effectiveness and a low level of control of corruption, it may reduce the level of public health financing. Finally, our paper aims to examine how the quality of governance, represented by government effectiveness and control of corruption, affects different functions of health care financing and how that can act as a robustness check for our baseline models. Government effectiveness captures the quality of public and civil

services and the degree of their independence from political pressures, and the credibility of the government's commitment to such policies. While control of corruption captures the extent to which public power is exercised for private gain, by elites and private interests.[1] We expect the quality of governance to play a positive role in influencing public health financing, especially in developed countries. Nonetheless, the control of corruption and effective public services may have ambiguous results regarding how much individuals pay out of their own pockets.

3.4 The Data

The study uses the National Health Account (NHA) from the World Health Organization as a source of data on total health financing (THF), public health financing (PHF), private health financing (PRHF), external resources for health as source of health financing (EXF), and out-of-pocket health financing (OOP). The GDP per capita at the 2005 US$ constant price, incidence of tuberculosis out of 100,000 members of the population (TB), and the population aged 65 and above as a percentage of the total population are collected from the World Development Indicator of the World Bank. Moreover, the total government expenditure as a ratio of the GDP is gathered from the IMF and the NHA. Finally, the World Governance Indicator (WGI) offers a wide range of institutional data, such as government effectiveness (GEF), control of corruption, and others. According to WGI (2015), "the aggregate indicators combine the views of a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. They are based on over 30 individual data sources produced by a variety of survey institutes, think tanks, non-governmental organisations, international organisations, and private sector firms". In this paper, we use the percentile rank of government effectiveness and control of corruption.

4. Empirical Findings

Table 1 shows the descriptive statistics of the variables used in the analysis for developed and developing countries.

1. The definitions of government effectiveness and control of corruption are according to WGI (2015). http://info.worldbank.org/governance/wgi/index.aspx#doc

Table 2 presents the findings of the public health financing model for developed countries, first without including institutional variables, second including government effectiveness, and third including control of corruption. The reported diagnostic tests show the validity of the system-GMM results. The instruments used are valid since the Sargan's test p-value is greater than 0.05 for the three estimated models. Furthermore, the serial correlation test rejects the null hypothesis of no first-order serial correlation, while it fails to reject the null of no second-order serial correlation in our three cases. Additionally, the included time dummies are valid since the chi-square p-value is always less than 0.05, indicating the importance of the time effects in these models.

The estimated results reported in Table 2 show that the dynamic assumption is valid since the lagged dependent variable in the three models is significant. In addition, the GDP was found to be positive and significant at the 1% level in explaining public health expenditure. The impact of GDP per capita found to be positive and significant in the baseline model and with the inclusion of institutional variables in the other two models. Furthermore, the general government expenditure results are significant and positive, demonstrating that the greater the government expenditure as a percentage of the GDP, the greater the public health financing, with similar coefficients in the three cases. Moreover, private health financing as a percentage of the GDP plays a positive role in influencing public financing with relatively the same impact in the three models. Interestingly, the disease pattern measured by the incidence of tuberculosis (TB) is found to be statistically insignificant. On the other hand, the population structure were population aged 65 years and above is found to be positively associated with public sources of health finance, contrary to Xu et al. (2011). The findings reveal that the government effectiveness indicator is insignificantly related to public health financing. However, control of corruption is positively associated with the dependent variable. This indicates that countries with a higher level of willingness to control corruption tend to have higher public health spending. In other words, greater control of corruption or low corruption leads to an increase in public health spending.

Table 1: Descriptive Statistics

(a) Descriptive statistics "developed countries"

Variable	Observation	Mean	Std. Dev.	Min	Max
THF	550	7.376	2.809	1.698	17.86
PHF	550	5.176	2.169	.9466	10.27
PRHF	550	2.194	1.346	.3002	9.653
GDP	672	30639.3	21861.7	4298.4	158802.5
GGE	525	32.35	10.22	10.29	73.75
TB	740	26.73	35.55	0	234
POP	671	11.98	5.184	.3349	24.40
GEF	693	80.95	16.37	1	100
COR	690	79.98	18.17	0	100

(b) Descriptive statistics "developing countries"

Variable	Observation	Mean	Std. Dev.	Min	Max
THF	1457	6.217	2.601	1.374	21.59
PHF	1457	3.353	2.337	.0345	21.57
OOP	1457	38.27	19.92	.0636	97.49
EXF	1415	13.08	16.58	0	98.16
GDP	1437	2390.3	2336.02	119.4	14387.1
GGE	1451	31.25	14.89	3.517	127.9
TB	1502	190.7	218.8	3.3	1826
POP	1475	5.361	3.260	1.878	18.92
GEF	1493	34.99	20.76	.4739	86.89
COR	1499	35.38	21.21	.4739	85.85

Note: THF, PHF, PRHF and EXF are total, public, private and financing as share of GDP, respectively. EXF and OOP are external health financing and out-of-pocket expenditure as share of total health expenditure, respectively. GDP is GDP per capita 2005 US$, GGE is general government expenditure as percentage of GDP, TB is incidence of tuberculosis, POP is population above 65 years, and GEF, COR are government effectiveness and control of corruption respectively.

Table 2: Public Health Financing (Developed Countries)

	Baseline model	With government effectiveness	With control of corruption
$lnPHF_{t-1}$	.7423*** (.0278)	.7072***(.0248)	.7274***(.0253)
lnGDP	.0517***(.0167)	.0657***(.0167)	.0302**(.0137)
lnGGE	.2928***(.0149)	.2982***(.0126)	.2667***(.0173)
lnPRHF	.1805***(.0224)	.1876***(.0242)	.1825***(.0166)
lnTB	-.0054(.0067)	-.0043(.0087)	.0030(.0084)
lnPOP	.0442***(.0046)	.0575***(.0041)	.0394***(.0058)
lnGEF	-	-.0050(.0065)	-
lnCOR	-	-	.0243***(.0057)
Sargan test: p-value	[0.0892]	[0.0937]	[0.0812]
AR(1): p-value	[0.0039]	[0.0040]	[0.0036]
AR(2): p-value	[0.2804]	[0.2865]	[0.2450]
Chai-square: p-value	[0.0000]	[0.0000]	[0.0000]

Note: *** and ** indicates significant at 1% and 5% respectively, in parentheses are standard errors. Between [ ] are the p-values of Sargan test, AR(1), AR(2), Chai-square p-value, respectively.

Table 3 provides the findings of the private health financing model for developed countries; the baseline model is reported first, next the government effectiveness is estimated with the model, and in the third model the control of corruption is estimated. The described diagnostic tests present the strength of the system-GMM outcomes. The Sargan over-identification test confirms that the instruments are valid, and then fails to reject the null hypothesis in the three models. Moreover, the serial correlation test fails to reject the null hypothesis of no second-order autocorrelation in the three models. Furthermore, including time dummies to capture time effects is important in explaining the dynamic of health financing since the p-value is less than 0.05.

The outcomes shown in Table 3 reveal that private health expenditure is highly persistent since the lagged dependent variable is close to one. The most striking result to emerge from the analysis is that the GDP is positively correlated with private health financing, with elasticity less than one, which indicates that health care is not a luxury good, in agreement with Baltagi & Moscone (2010) and Xu et al. (2011). Further analysis shows that government expenditure is negative and significantly

related to the dependent variable in the second and the third model, respectively. A clear benefit of general government expenditure in preventing private health spending can be identified in the analysis of developed countries. There is a significant positive correlation between public health spending and private health spending, suggesting a complementary relationship since many health care systems adopt co-payment for providers by partial public subsidies and private spending (Leiter & Theurl, 2012). However, the second and third models show that TB is an insignificant factor influencing private health spending in high-income countries, contrary to the baseline model, since it appears to be significant at the 5% level. Following the increase in the population aged 65 years and above as a percentage of the total, a significant increase in private health financing is recorded. On the other hand, the institutional variables government effectiveness and control of corruption are negative and significant determinants of health financing from private sources. This indicates that the quality of governance, as expressed in this study by government effectiveness and control of corruption, also helps to reduce private health expenditure.

Table 3: Private Health Financing (Developed Countries)

	Baseline model	**With government effectiveness**	**With control of corruption**
$lnPRHF_{t-1}$	.9008***(.0098)	.9003***(.0136)	.8918***(.0107)
lnGDP	.4752***(.0631)	.4396***(.0608)	.7026***(.0711)
lnGGE	-.0060(.0107)	-.0529***(.0177)	-.0393**(.0179)
lnPHF	.1330***(.0096)	.1464***(.0111)	.1375***(.0116)
lnTB	.0158**(.0065)	.0002(.0055)	.0014(.0051)
lnPOP	.0380***(.0047)	.0542***(.0064)	.0375***(.0056)
lnGEF	-	-.0507***(.0065)	-
lnCOR	-	-	-.0198***(.0072)
Sargan test: p-value	[0.2379]	[0.2468]	[0.2437]
AR(1): p-value	[0.0048]	[0.0050]	[0.0047]
AR(2): p-value	[0.0523]	[0.0601]	[0.0722]
Chai-square: p-value	[0.0000]	[0.0000]	[0.0000]

Note: *** and ** indicates significant at 1% and 5% respectively, in parentheses are standard errors. Between [ ] are the p-values of Sargan test, AR(1), AR(2), Chai-square p-value, respectively.

Table 4 reveals the results of the total health financing model. The baseline model, government effectiveness model, and control of corruption model are estimated. The over-identification test ensures that the instruments used in these models are valid; thus, we fail to reject the null hypothesis of the Sargan test. Besides, there is no second-order serial correlation and we are not able to reject the null hypothesis in the three models. Additionally, the inclusion of time effects is significant as the p-value is less than 0.05.

Table 4 contains the findings of the total health financing model for developed countries. The baseline results and the results with government effectiveness and control of corruption show that the GDP positively influences the total health expenditure with relatively small coefficients. There is a significant positive relationship between the total government expenditure and the total resources allocated to health. The private health funds largely tend to contribute to the total amounts of health financing in the baseline model as well as the other models with mostly the same size of coefficients. Interestingly, TB is

Table 4: Total Health Financing (Developed countries)

	Baseline model	With government effectiveness	With control of corruption
$lnTHF_{t-1}$	.3893***(.0147)	.3281***(.0125)	.3564***(.0203)
lnGDP	.0810***(.0069)	.0447***(.0073)	.0366***(.0079)
lnGGE	.2342***(.0128)	.2528***(.0133)	.2377***(.0118)
lnOOP	.3888***(.0112)	.4288***(.0143)	.4095***(.0174)
lnTB	-.0441***(.0031)	-.0350***(.0044)	-.0265***(.0044)
lnPOP	.0704***(.0035)	.0487***(.0036)	.0510***(.0038)
lnGEF	-	.0630***(.0046)	-
lnCOR	-	-	.0559***(.0038)
Sargan test: p-value	[0.1383]	[0.1788]	[0.2040]
AR(1): p-value	[0.0148]	[0.0256]	[0.0230]
AR(2): p-value	[0.7329]	[0.6203]	[0.6356]
Chai-square: p-value	[0.0000]	[0.0000]	[0.0000]

Note: *** and ** indicates significant at 1% and 5% respectively, in parentheses are standard errors. Between [ ] are the p-values of Sargan test, AR(1), AR(2), Chai-square p-value, respectively.

observed to be negative and statistically significant at the 1% level in the baseline model, in the government effectiveness model, and in the last model including control of corruption. This can be associated with the large expenditure on preventive health care since developed countries tend to have lower disease prevalence than developing countries. Finally, a high degree of government effectiveness and control of corruption can lead to a high allocation of resources to the health sector. The quality of governance, represented by a low level of corruption and effective government services in the developed world, makes a large contribution to the total resources allocated to health care.

Table 5 reports the findings of the public health financing model in developing countries. The baseline model is estimated without including governance indicators, government effectiveness is estimated in the second model A, and the interaction term between government effectiveness and external financing is estimated in the second model B. The control of corruption is estimated in the third model A, and the interaction term between corruption and external financing is estimated in model B. The Sargan test result reveals the validity of the instruments used in these models. Besides, all the models pass serial correlation in the second order since we fail to reject the null hypothesis. Additionally, time effects are a relevant factor in explaining the increasing demand for health care; the chi-square p-value is less than 0.05.

The results of Table 5 indicate a positive correlation between income and public financing of health care in all the estimated models, with similar coefficients. This shows the importance of income as the main factor that influences the demand for public health care in developing countries. Interestingly, general government expenditure is observed to be positively associated with the public source of health financing in developing countries, as shown in all the models. The correlation between public health financing and general government expenditure is interesting because it reflects the amount of resources that a government allocates to health services compared with the total resources in the country. The more surprising correlation of public financing is with the private out-of-pocket source of financing and the external source of financing, respectively. The outcomes show a

negative and significant relationship between out-of-pocket financing, external aid, and public health spending. A possible explanation for this might be that due to the inability of governments in developing countries to sustain their public expenditures, many people end up paying for health services privately. The second issue of the negative correlation between external aid for health and public health financing provides confirmation of the findings of (Lu et al., 2010), indicating that whenever governments in developing countries receive foreign aid, they tend to reduce their budget allocated to health rather than

Table 5: Public Health Financing (Developing Countries)

	Baseline model	**With government effectiveness**		**With control of corruption**	
		A	**B**	**A**	**B**
$lnPHF_{t-1}$	.3816*** (.0141)	.3748*** (.0131)	.3911*** (.0134)	.3830*** (.0141)	.3901*** (.0143)
lnGDP	.1335*** (.0222)	.1214*** (.0229)	.1204*** (.0223)	.1250*** (.0224)	.1291*** (.0225)
lnGGE	.2704*** (.0150)	.2887*** (.0149)	.2990*** (.0146)	.2756*** (.0153)	.2729*** (.0151)
lnOOP	-.3672*** (.0209)	-.3628*** (.0214)	-.3558*** (.0222)	-.3635*** (.0217)	-.3614*** (.0221)
lnEXF	-.0094*** (.0032)	-.0105*** (.0033)	-.0596*** (.0051)	-.0096*** (.0032)	-.0286*** (.0055)
lnTB	.0184 (.0144)	.0132 (.0148)	.0196 (.0146)	.0200 (.0151)	.0228 (.0153)
lnPOP	-.0285 (.0448)	-.0362 (.0453)	-.0486 (.0461)	-.0484 (.0436)	-.0381 (.0441)
lnGEF	-	.0190*** (.0030)	-	-	
GEF*EXF	-	-	.0135*** (.0012)	-	-
lnCOR	-	-		.0189*** (.0043)	-
COR*EXF					.0051*** (.0012)
Sargan test	[0.3401]	[0.3630]	[0.3473]	[0.3133]	[0.2967]
AR(1)	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
AR(2)	[0.8049]	[0.8249]	[0.8286]	[0.7875]	[0.8317]
Chai-square	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Note: *** indicates significant at 1%. In parentheses are standard errors. Between [ ] are the p-values of Sargan test, AR(1), AR(2) and Chai-square p-value, respectively.

improving it. Contrary to the expectations, but in agreement with Xu et al. (2011), the findings do not show a significant relation between TB, an ageing population, and public health financing. The most interesting finding in this analysis is that all the governance indicators reveal a positive and significant role played by government effectiveness as well as the corruption level in the developing world. In the second model's result, we observe that government effectiveness tends to improve public health financing. In addition, when the external aid for health interacts with a low level of government effectiveness, it tends to reduce health financing from public sources and vice versa. Interestingly, and similarly, corruption is shown to be an influencing factor that may affect the amount allocated to health from public sources. The interaction of external funds with a high level of corruption causes public spending on health to decline. These results may explain to some extent that the reduction of public financing from domestic sources when governments receive external assistance is attributable to the low quality of governance, such as the effectiveness of the government and corruption.

Table 6 presents the results of the private or out-of-pocket health financing model in developing countries. The instruments are tested for over-identification using the Sargan test, which reveals the validity of the instruments used in these models since the p-values are greater than 0.05. Moreover, the estimated models fail to reject the null hypothesis of second-order serial correlation, indicating that all the models are free of second-order autocorrelation. In addition, the time-specific effect is a significant factor in explaining the increasing private health financing in developing countries, since the chi-square p-value is less than 0.05.

The results reveal that private health spending as expressed by out-of-pocket spending is highly persistent, with estimated coefficients of the lagged dependent variable ranging from 0.825 to 0.853. This result may be explained by the fact that the cost of health is increasing sharply, besides the lack of public coverage of health services. Another important finding similar to our previous findings is that income plays an important role in how people pay for health care, even though the second model B shows insignificant parameters; however, all the other models show significance and correlation. This

finding of the current study is consistent with the majority of the previous literature such as Xu et al.(2011). It is interesting to note that the baseline model shows that the general government expenditure is negative and significant at the 1% level, and all the other models report consistent results but with statistical significance at the 10% level. The observed correlation between government expenditure and out-of-pocket financing might be explained as the increase in total expenditure increasing public health expenditure and therefore helping to reduce the amount spent on health by individuals.

More importantly, public financing and external financing are shown to be negative and statistically significant, indicating that both financing mechanisms represent an important way to reduce the burden of the private health financing. Surprisingly, the results reveal that both TB and an ageing population are significant and negatively related to private health financing. In the case of TB, this result seems to contradict the findings of Xu et al. (2011), which show an insignificant association between TB and out-of-pocket expenditure on health. However, the ageing population result tends to reduce out-of-pocket health financing, since it is shown by Xu et al. (2011) to be an insignificant factor in explaining the private demand for health. It seems possible that this result is due to the low burden of the ageing population in developing compared with developed countries. Another possible explanation for this is the inability of individuals over 65 years old to work and generate income, so they basically rely on government or external aid to obtain health care services. The most striking findings to emerge from this analysis are that government effectiveness and the degree of control of corruption also determine how much people pay privately to gain access to health care and services. The effectiveness of the government helps to reduce out-of-pocket spending, especially when external health assistance acts together with a high level of government effectiveness. The control of corruption reveals a positive and significant result; however, when external aid interacts with a low level of control of corruption, it tends to increase private health financing.

Table 6: Private (OOP) Health Financing (Developing Countries)

	Baseline model	With government effectiveness		With control of corruption	
		A	B	A	B
$lnOOP_{t-1}$	.8250*** (.0148)	.8534*** (.0166)	.8482*** (.0168)	.8313*** (.0157)	.8321*** (.0166)
lnGDP	.1201*** (.0239)	.0419* (.0238)	.0406 (.0254)	.1009*** (.0236)	.0895*** (.0236)
lnGGE	-.0276*** (.0133)	-.0237* (.0123)	-.0248** (.0120)	-.0262* (.0133)	-.0286* (.0156)
lnPHF	-.4082*** (.0116)	-.4099*** (.0118)	-.2522*** (.0240)	-.4123*** (.0115)	-.3031*** (.0150)
lnEXF	-.0123*** (.0035)	-.0115*** (.0036)	-.0106*** (.0036)	-.0119*** (.0035)	-.0111*** (.0034)
lnTB	-.1187*** (.0234)	-.1169*** (.0263)	-.1120*** (.0263)	-.1154*** (.0237)	-.1202*** (.0235)
lnPOP	-.1711*** (.0405)	-.1112*** (.0359)	-.1240*** (.0381)	-.1449*** (.0393)	-.1291*** (.0396)
lnGEF	-	.0504*** (.0056)	-.1054*** (.0127)	-	
GEF* EXF	-	-	-.0554*** (.0071)	-	-
lnCOR	-	-	-	.0130*** (.0045)	.0504*** (.0094)
COR*EXF	-	-	-	-	-.0391*** (.0055)
Sargan test	[0.1688]	[0.0781]	[0.1874]	[0.1536]	[0.2064]
AR(1)	[0.0006]	[0.0003]	[0.0002]	[0.0006]	[0.0005]
AR(2)	[0.3309]	[0.2748]	[0.2509]	[0.3473]	[0.3257]
Chai-square	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Note: ***, ** and * indicate significant at 1%, 5% and 10% respectively. In parentheses are standard errors. Between [ ] are the p-values of Sargan test, AR(1), AR(2) and Chai-square p-value, respectively.

Table 7 illustrates the findings for total health financing in developing countries. The over-identification Sargan test reveals that the instruments used in these models are not correlated with the error term. Likewise, the autocorrelation test shows that the models are free

of second-order serial correlation because we fail to reject the null hypothesis. In addition, the joint test shows that the time-specific effect is significant in explaining total health financing in developing countries, with a chi-square p-value less than 0.05.

In accordance with the expectations, the results show a positive and significant association between GDP per capita and total health financing in the three estimated models. These outcomes are consistent with those of other studies, for example, Xu et al. (2011), which suggest that the GDP per capita has an essential effect on total health financing. In this study, general government expenditure and private health expenditure are found to cause total health financing to increase. Additionally, the results show that any reduction in TB would lead to higher resource allocation to the health sector, in addition to more preventive health care spending. Nevertheless, external financing and an ageing population are found to be insignificant variables in the total health expenditure function in developing countries. Again, government effectiveness and control of

Table 7: Total Health Financing (Developing Countries)

	Baseline model	With government effectiveness	With control of corruption
$lnTHF_{t-1}$	.5655***(.0206)	.5599***(.0232)	.5612***(.0217)
lnGDP	.0409**(.0163)	.0383**(.0168)	.0417***(.0154)
lnGGE	.1894***(.0105)	.2008***(.0102)	.1959***(.0109)
lnPRHF	.4126***(.0128)	.4080***(.0119)	.4090***(.0123)
lnEXF	.0052*(.0030)	.0023(.0029)	.0034(.0029)
lnTB	-.0628***(.0141)	-.0574***(.0143)	-.0544***(.0137)
lnPOP	-.0447(.0301)	-.0547*(.0291)	-.0410(.0301)
lnGEF	-	.0155***(.0031)	-
lnCOR	-	-	.0108***(.0036)
Sargan test	[0.3396]	[0.3356]	[0.2074]
AR(1)	[0.0000]	[0.0000]	[0.0000]
AR(2)	[0.9759]	[0.9647]	[0.9997]
Chai-square	[0.0000]	[0.0000]	[0.0000]

Note: ***, ** and * indicate significant at 1%, 5% and 10% respectively. In parentheses are standard errors. Between [ ] are the p-values of Sargan test, AR(1), AR(2) and Chai-square p-value, respectively.

corruption are positively correlated with the total resources devoted to health care services. These findings suggest that the low-level governance quality expressed by government effectiveness and control of corruption in developing countries is one of the main reasons leading to the low level of health financing.

Finally, the main reason we rely on the system GMM is to control for the reverse causality between the three functions of health financing and GDP. In particular, paying no attention to potential endogeneity leads to biased and inconsistent estimates (Nickell, 1981; Phillips & Sul, 2007). It is worth mentioning that the results of fixed-effects (FE) (not reported) show a contradictory sign to the one obtained by system GMM, especially for the endogenous variables. This is in agreement with the argument provided by Phillips & Sul (2007) that the results obtained by the FE estimator are subject to bias estimates that lead to false conclusions. The use of the FE estimator seems to be inappropriate, especially when there are some endogenous explanatory variables. Therefore, the main findings of system GMM in this paper appear to be more consistent compared to the FE.[1]

5. Conclusion

The present study investigates the influencing factors that affect different types of health financing in developed and developing countries. The purpose of the current study is to determine whether the quality of institutions and governance is related to health financing or not. Specifically, government effectiveness and control of corruption are used as institutional indicators, besides income, fiscal capacity, disease pattern, population aged 65 years and above, and components of health spending as explanatory variables. We use dynamic panel data analysis, particularly Blundell & Bond's (1998) system-GMM estimator, to obtain unbiased and consistent estimates. The empirical findings of this study show that income influences health financing positively with elasticity of less than one, which indicates that health care is not a luxury good either in developed or in developing countries, contrary to Gerdtham et al. (1992), Getzen (2000), and

1. The results of fixed-effects are not included here to save space and it is available up on the request.

Newhouse (1977) and consistent with Baltagi & Moscone (2010) and Xu et al. (2011). The second major finding is that general government expenditure as a share of GDP plays an important role in improving public and total health financing; however, it is negative and significant in explaining private and out-of-pocket health financing, indicating that the greater the general government expenditure, the lower the private health financing. Likewise, components of health expenditure improve different types of health financing in developed countries.

On the other hand, for developing countries, we include the external resources for health to test the possibility of a negative relationship between these aids and public health financing, as suggested by Lu et al. (2010). We find in the case of developing countries that public health financing is reduced whenever external aid for health is received, which confirms the findings of Lu et al. (2010). Furthermore, the relevance of public health financing is clearly supported by the current findings, which show an immediate positive response by public and private financing to any increase in diseases in developed countries, in agreement with the theoretical prediction of Galama (2011). Nevertheless, this does not hold true in the case of developing countries, since TB is insignificantly related to public health financing, but any reduction in TB is associated with more out-of-pocket health expenditure. In addition, TB is negative and significant in explaining the total health financing in developing countries, which confirms the findings of Xu et al. (2011) for high-income countries. One of the more significant findings to emerge from this study is that the increasing trend of an ageing population causes public as well as private health financing in developed countries to increase, as shown by Grossman (1972). However, since an ageing population is not a particularly serious issue in developing countries, the findings show an insignificant response by public health financing.

Finally, government effectiveness and corruption control are very decisive institutional factors that can lead to high or low levels of health financing in developed and developing countries. Particularly, in developed countries, the quality of governance is quite high; therefore, the amounts of health financing are also high. On the other hand, developing countries have a very low level of governance

quality, which may explain why the resources allocated to health are very small. More importantly, the quality of governance shows a negative and significant correlation with private out-of-pocket health financing, which may indicate that a high governance quality not only increases public health financing but also helps individuals to reduce their financial risks of paying for health by themselves. Interestingly, the low level of government effectiveness and higher corruption in developing countries make external funds less effective and to some extent explain the reduction in public health financing.

Governance quality is a fundamental element to achieve sustainable health financing and ensure that health financing includes prepayments and risk sharing among individuals, and avoiding out-of-pocket and catastrophic health expenditure that may lead to the impoverishment of the population. In addition, the state institutions play very important role in managing the external funds for health in a way that contributes to sustainable health financing. These findings have important implications, especially for developing countries, since all countries make different decisions on health financing regarding how to collect, how to pool, and how to spend resources. These variations imply the interaction of institutions with funds dedicated to health in three stages: collection, pooling, and spending. Therefore, the degree of government effectiveness and the corruption level would justify whether the amounts of health financing are low or high.

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Appendix (A): List of Countries

(a) Countries (developed/ high income)			
Australia	Austria	Bahamas, The	Bahrain
Barbados	Belgium	Brunei Darussalam	Canada
Chile	Croatia	Cyprus	Czech Republic
Denmark	Equatorial Guinea	Estonia	Finland
France	Germany	Greece	Iceland
Ireland	Israel	Italy	Japan
Korea, Rep.	Kuwait	Latvia	Lithuania
Luxembourg	Malta	Netherlands	New Zealand
Norway	Oman	Poland	Portugal
Qatar	Russian Federation	Saudi Arabia	Singapore
Slovak Republic	Slovenia	Spain	St. Kitts and Nevis
Sweden	Switzerland	Trinidad and Tobago	United Arab Emirates
United Kingdom	United States	Uruguay	
(b) Countries (developing/non-high income)			
Afghanistan	Armenia	Bangladesh	Benin
Bhutan	Bolivia	Burkina Faso	Burundi
Cambodia	Cameroon	Cabo Verde	Central African Republic
Chad	Comoros	Congo, Dem. Rep.	Congo, Rep.
Cote d'Ivoire	Djibouti	Egypt, Arab Rep.	El Salvador
Eritrea	Ethiopia	Gambia, The	Georgia
Ghana	Guatemala	Guinea	Guinea-Bissau
Guyana	Haiti	Honduras	India
Indonesia	Kenya	Kiribati	Kyrgyz Republic
Lao PDR	Lesotho	Liberia	Madagascar
Malawi	Mali	Mauritania	Micronesia, Fed. Sts.
Moldova	Mongolia	Morocco	Mozambique

Appendix (A): List of Countries

Nepal	Nicaragua	Niger	Nigeria
Pakistan	Papua New Guinea	Paraguay	Philippines
Rwanda	Samoa	Sao Tome and Principe	Senegal
Sierra Leone	Solomon Islands	Sri Lanka	Sudan
Swaziland	Syria	Tajikistan	Tanzania
Timor-Leste	Togo	Uganda	Ukraine
Uzbekistan	Vanuatu	Vietnam	Yemen, Rep.
Zambia	Albania	Algeria	Angola
Argentina	Azerbaijan	Belarus	Belize
Bosnia and Herzegovina	Botswana	Brazil	Bulgaria
China	Colombia	Costa Rica	Cuba
Dominica	Dominican Republic	Ecuador	Fiji
Gabon	Grenada	Iran, Islamic Rep.	Iraq
Jamaica	Jordan	Kazakhstan	Lebanon
Libya	Malaysia	Maldives	Mauritius
Mexico	Montenegro	Namibia	Panama
Peru	Romania	Serbia	Seychelles
South Africa	ST. Lucia	Suriname	Thailand
Tonga	Tunisia	Turkey	Turkmenistan
Venezuela, RB	ST. Vincent and the Grenadines		