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Health Care Financing and Expenditure Dynamics in South Africa

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Abstract

The primary aim of this study was to explore primary health care financing mechanisms and estimate their relative impacts on overall health expenditure in South Africa over the sample period 2000 to 2015. Time-series data of health expenditure indicators were obtained from the World Health Organisation (WHO) Global Health Observatory online repository. Two health expenditure models were estimated using the Cochrane-Orcutt regression method. Estimates of the sources of funds for health expenditure model indicate that domestic general government health expenditure and domestic private health expenditure had statistically significant positive impacts on overall national health expenditure, while the impact external health expenditure was positive but insignificant. The health financing arrangements model estimates show that government financing arrangements and voluntary health insurance had significant positive impacts on overall health expenditure, while out-of-pocket payments had a significant negative impact on total health expenditure over the same sample period.

Keywords: health expenditure, health financing, government, private, out-of-pocket, voluntary

1. Introduction

In line with the indubitable empirical fact that improved health outcomes are an essential instrument for economic development (Ganyaupfu, 2014), financing of health care expenditure remains central to ensuring effective delivery of health care services. In South Africa, the two major health care financing mechanisms are general taxes and private medical schemes, while the rest of financing comes from individuals in form of direct out-of-pocket payments (Matsoso, Fryatt and Andrews, 2015). Nearly half of national health expenditure in South Africa comes from health care spending in the private health care sector (Econex, 2013). Private health expenditure principally consists medical schemes for which membership profiles are fundamentally characterised by high- and middle-income population segments (Ataguba and McIntyre, 2012). As a key contribution of this study, monitoring of primary health care financing trajectories and their relative impacts on overall health expenditure thus plays a crucial role in formulation and review of the health care financing policy.

The patterns of health expenditure trends remain critical in making progress towards the goal of universal health coverage. According to the World Health Organisation (WHO, 2017), there are three primary categories of health expenditure indicators; namely summary indicators, indicators of sources of funds, and indicators of financing arrangements. Summary indicators reflect overall health expenditure relative to gross domestic product (GDP), per capita levels in an equivalent currency and capital expenditures. Such indicators include current health expenditure-to-GDP ratio, capital investment into the health sector, current health expenditures per capita in similar currency and current health expenditures per capita in purchasing power parity (PPP) terms. Indicators of sources of funds for health care expenditure comprise three major components of funding, namely domestic public, domestic private and external funding. Domestic public sources consist taxes and mandatory contributions to health insurance; and domestic private sources include revenue and voluntary prepayments from households, private sector firms and non-profit institutions. External sources include official development aid, foreign direct transfers, and inflows into the health system from sources outside the country.

Financing arrangements indicators reflect mechanisms through which a nation pools funds and mandates payment contribution within health insurance schemes. Such arrangements include compulsory financing arrangements (CFA) and voluntary financing arrangements (VFA). The CFA include government financing arrangements (GFA) and compulsory health insurance (CHI), mainly in form of social health insurance (SHI). Voluntary financing arrangements include voluntary health insurance (VHI), and out-of-pocket payments (OOP).

2. The Economic Environment

Health expenditure preferences and decisions in the economy are made subject to both the amount and flow of resources allocated to meet health and non-health consumption expenditures.

2.1. Preferences and Endowments

In each given time period t, a representative agent in an economy is endowed with a bundle z_t units comprising two kinds of commodities, c and h_s. Commodity c is a composite consumption good, while commodity h_s is a set of varieties of health care consumption goods such that $s \in [0, \varpi(k_t)]$, where k_t denotes the state of medical technology at time t and $[0, \varpi(k_t)]$ denotes a set of varieties of available health care products.

Representing household preferences by a constant elasticity of substitution utility function, all varieties of health care products fit symmetrically into health aggregate utility function:

$$H_t = \left[\int_0^{\varpi(k_t)} h_{ts}^{\lambda}\, ds \right]^{\frac{1}{\lambda}} \quad (1)$$

where λ denotes the degree of substitution of health care varieties h_s. Given the budget constraint, the representative agent solves the maximization problem as:

$$\max_{c, h^*, h_s} \sum_{t=0}^{\infty} \varphi^t \left[\theta\, c_t^{\eta} + (1-\theta) \left\{ \varphi(k_t)^{\frac{1}{\eta}} \left[\int_0^{\varpi(k_t)} h_{t,s}^{\lambda}\, ds \right]^{\frac{1}{\lambda}} \right\}^{\eta} \right]^{\frac{1}{\eta}} \quad (2)$$

Subject to the conditions specified in equations (3), (4), and (5):

$$c_t + p_t h_t^* = z_t \int_0^{\varpi(k_t)} h_{t,s}\, ds_t = k_t h_t^* \quad (3)$$

$$\int_0^{\varpi(k_t)} h_{t,s}\, ds_t = k_t h_t^* \quad (4)$$

$$0 < \varphi < 1;\ 0 < \theta < 1;\ 0 < \lambda < 1;\ -\infty < \eta < 1 \quad (5)$$

where $p_t h_t^*$ is nominal health expenditure, p_t is the relative price of health care and h_t^* is real health expenditure. The parameter θ is the consumption share and η is the degree of substitution between the composite good c and total health care utility operator $H_t = \left[\int_0^{\varpi(k_t)} h_{ts}^{\lambda}\, ds \right]^{\frac{1}{\lambda}}$, where $\varphi(k_t)$ captures shifts in health expenditure due to changes in state of medical technology.

Following Romer (1990), Greenwood, Hercowitz and Krusell (1997), improvements in the state of medical technology (k_t) can lead to changes in the composition of health expenditure via three main channels; namely price-effect, productivity-effect, and expenditure-effect. The price-effect holds that an improvement in k_t results in a reduction in relative prices $\left(\frac{p_t}{k_t}\right)$ of health care varieties.

The productivity-effect holds that an improvement in k_t leads to higher productivity through expansion of a set of health care varieties $\left[0, \varpi(k_t)\right]$ to ensure efficiency in production of health care utility $H_t = \left[\int_0^{\varpi(k_t)} h_{ts}^{\lambda}\, ds\right]^{\frac{1}{\lambda}}$. The expenditure-effect holds that advancement in k_t leads to shifts in the share of expenditure in health care (Chernew and Newhouse, 2012; Chandara and Skinner, 2012).

2.2. The Optimality Condition

In an optimal scenario, the relative price (p_t) and state of medical technology (k_t) are exogenously determined, while consumption remains constant across health varieties, such that $h_{ts} = h_t \ \forall \ s$. Subject to first order conditions of a representative agent's optimisation problem, the optimal ratio of average consumption of health care varieties (h_t) comparative to the composite consumption of non-health care goods (c_t) is derived from the functional specification:

$$\frac{h_t}{c_t} = \left(\frac{1}{p_t}\right)^{\frac{1}{1-\eta}} \left(\frac{1-\theta}{\theta}\right)^{\frac{1}{1-\eta}} \left(k_t\, \varphi(k_t)\, \varpi(k_t)^{\frac{\eta-\lambda}{\lambda}}\right)^{\frac{1}{1-\eta}} \qquad (6)$$

Substituting equations (3) and (4) into equation (6) and multiply both terms by relative price (p_t), the proportion of healthcare expenditure relative to total expenditure on non-health care commodities can be derived based on the functional specification:

$$\frac{p_t h_t^*}{c_t} = \left(\frac{1}{p_t}\right)^{\frac{\eta}{1-\eta}} \underbrace{\left(\frac{1-\theta}{\theta}\right)^{\frac{1}{1-\eta}} k_t^{\frac{\eta}{1-\eta}}\, \varphi(k_t)^{\frac{1}{1-\eta}}\, \varpi(k_t)^{\frac{\eta(1-\lambda)}{\lambda(1-\eta)}}}_{K_t} \qquad (7)$$

Equation (7) expresses evolution of health care expenditures relative to composite consumption of non-health care commodities as a function of the relative price between the two respective goods, and the residual term K_t driven by the state of medical technology k_t.

2.3. The Decision Framework

The levels of spending on medical care in a nation are largely driven by incomes and interaction of decisions made by individuals (i) and government (G) captured by the functional matrix:

$$\begin{bmatrix} h \\ H \end{bmatrix} = f \begin{bmatrix} y, \psi \\ Y, \Psi \end{bmatrix} \qquad (8)$$

where h denotes individual health expenditure, y denotes individual income, ψ signifies individual decisions, H denotes national health expenditure, Y symbolizes national income, and Ψ represents politically determined national budgetary decisions by government.

Though individual consumers and government decisions on health care expenditure are usually made subject to the prevailing budget constraints, such decisions are also somehow a function of expected long-run permanent incomes specified by the functions:

$$y_{\varepsilon}\, f\left(y_t, y_{t-1}, y_{t-2}, \ldots, y_{t-n}, \omega\right) \qquad (9)$$

$$Y_{\varepsilon}\, f\left(Y_t, Y_{t-1}, Y_{t-2}, \ldots, Y_{t-n}, \Omega\right) \qquad (10)$$

The government budget allocation devoted to health care is a fraction of current total national income raised from tax revenues determined by the tax rate τ . Similarly, individual spending on health care is influenced by disposable income determined by the tax rate τ . Government and individual budgets therefore defined by equations (11) and (12); respectively:

$$\tau Y_t = \tau \sum y_{it} \tag{11}$$

$$(1-\tau) y_t \tag{12}$$

Since the current state of medical technology k_t influences the level of spending on health care, individual and government health expenditure levels are respectively defined by functions:

$$h_{it} = f\left(\psi_{it}, (1-\tau) y_t, k_t, y_\varepsilon, \omega\right) \tag{13}$$

$$H_{it} = f\left(\tau Y_t, \Psi_t, k_t, Y_\varepsilon, k_\varepsilon, \Omega\right) + \sum h_{it} \tag{14}$$

Equation (13) reflects that the level of individual health expenditure is determined by a set of individual decisions, current disposable income, current state of medical technology, expected income and other exogenous variables including the individual base level of health status $(\underline{h})$. Equation (14) explicates that the level of government expenditure on health care depends on government current and expected future incomes, current state of medical technology, expected effect of government decisions on future states of health technology, and the sum of individual health outlays. Since the state of health technology is neither observable nor quantifiable, while the impact of government decisions (Ψ_t) is realized at some future point in time, such variables are isolated from equation (14). Holding healthcare expenditure (h_t) and national income as observable and measurable variables in the model, the reduced form of equation (14) becomes:

$$H_t = f\left(Y_t, Y_{t-1}, \ldots, Y_{t-n}, \Omega\right) \tag{15}$$

Elimination of the parameter Ψ from the model is based on the logic that government decisions on policy shifts pertaining to re-engineering the state of the health care system are characterised with substantial lags in terms of formulation, implementation and realization of the impact.

3. Materials and Methods

3.1. Data

Time-series annual data on current health expenditure (CHE), domestic general government health expenditure (DGGHE), domestic private health expenditure (DPHE), external health expenditure (EXTHE), government financing arrangements (GFA), voluntary health insurance (VHI), and out-of-pocket (OOP) for the period 2000 to 2015 was obtained from World Health Organisation (WHO) National Health Accounts (NHA) online database (WHO 2018). The data series CHE was expressed as a ratio of GDP, while all the other remaining variables were expressed as ratios of CHE.

3.2. Stationarity Tests

Given the basis that the Augmented Dickey-Fuller method performs satisfactorily even when the sample size is fairly small (Dickey & Fuller, 1979), univariate unit root tests were done using the ADF criterion which considered the general AR (p) process given by the function:

$$X_t = \pi + \gamma_1 X_{t-1} + \gamma_2 X_{t-2} + \ldots + \gamma_p X_{t-p} + \varepsilon_t \tag{16}$$

The stationarity tests on an AR (p) process thus modelled the regression based on the function:

$$\Delta X_t = \pi + \beta X_{t-1} - \sum_{i=1}^{p-1} \alpha_i \Delta X_{t-i} + \varepsilon_t \tag{17}$$

where ε_t is a pure white noise error term, $\Delta X_{t-i} = X_{i-1} - X_{i-2}$ and p is the class of autoregression. Unit root tests were conducted at first differences using three models; namely no constant, trend in regression, and drift in regression at 1%, 5% and 10% significance levels.

3.3. VAR Optimal Lag Order Selection

The optimal lag length was chosen using the Likelihood Ratio (Lutkepohl, 1985), Akaike Information Criterion (Akaike, 1973), Schwarz Information Criterion (Schwarz, 1978), Hannan-Quinn Information Criterion (Hannan and Quinn, 1979) and Final Prediction Error (Akaike, 1969) methods.

3.4. Cointegration Test

The Johansen's procedure (Johansen, 1988) was applied to test for cointegration using the Maximum Eigenvalue and Trace likelihood ratio (LR) statistics techniques.

3.4.1. Maximum Eigenvalue Statistic

The maximum eigenvalue tested the null hypothesis (H_0) that the number of cointegrating vectors equals r_0 versus the alternative hypothesis (H_1) that the number of cointegrating vectors equals $r_0 + 1$, defined by the function $\lambda_{max}(r_0, r_0 + 1) = -T \ln(1 - \lambda_{r_0+1})$; where λ_{max} represents the maximum eigenvalue, T represents the sample size, and λ denotes the canonical correlation. The $\lambda_{max}(r_0, r_0 + 1)$ LR statistic tested the (H_0) that the rank $(\Pi) = r_0$ against (H_1) that the rank $(\Pi) = r_0 + 1$.

3.4.2. Trace Statistic

The Trace statistic tested the null hypothesis $H_0 : r_0 < \text{rank } (\Pi) \leq n$ versus the alternative hypothesis $H_1 : r_0 + 1 < \text{rank } (\Pi) \leq n$; where n denotes the number of cointegrating vectors. The Trace statistic was computed based on the function $\lambda_{trace} = -T \sum_{i=r_0+1}^{n} \ln(1 - \lambda)$; where T is the sample size, and λ represents the biggest canonical correlation.

3.4. Health Expenditure Models and Estimation Technique

Two health expenditure models were estimated based on grouping of health expenditure indicators using the Cochrane-Orcutt estimator (Cochrane and Orcutt, 1949). The first health expenditure model estimated elasticities of indicators of sources of funds for health expenditure given by the function:

$$y_t - \rho y_{t-1} = \beta_1 (x_{1t} - \rho x_{1t-1}) + \beta_2 (x_{2t} - \rho x_{2t-1}) + \beta_3 (x_{3t} - \rho x_{3t-1}) + \alpha(1 - \rho) + \varepsilon_t \qquad (18)$$

where y_t is the explained variable Current Health Expenditure (CHE), while x_{1t}, x_{2t} and x_{3t} represent the exogenous variables Domestic General Government Health Expenditure (DGGHE), Domestic Private Health Expenditure (DPHE) and External Health Expenditure (EXTHE); respectively, such that equation (18) reduces to the function:

$$y_t - \rho y_{t-1} = \beta(X_t - \rho X_{t-1}) + \alpha(1 - \rho) + e_t \qquad (19)$$

where β denotes a vector of coefficients and X_t represents a matrix of exogenous variables.

The second health expenditure model estimated elasticities of health financing arrangements indicators defined by the function:

$$y_t - \rho y_{t-1} = \pi_1 (z_{1t} - \rho z_{1t-1}) + \pi_2 (z_{2t} - \rho z_{2t-1}) + \pi_3 (z_{3t} - \rho z_{3t-1}) + c(1 - \rho) + \upsilon_t \qquad (20)$$

where y_t denotes the regressand Current Health Expenditure (CHE) and q_t, r_t and s_t are exogenous variables Government Financing Arrangements (GFA), Voluntary Health Insurance (VHI) and out-of-pocket (OOP) payments; respectively, such that equation (20) reduces to the subsequent function:

$$\sqrt{1-\rho^2 y_1} = \pi_1\left(\sqrt{1-\rho^2 q_1}\right) + \pi_2\left(\sqrt{1\text{-}\rho^2 r_1}\right) + \pi_3\left(\sqrt{1-\rho^2 s_1}\right) + c\left(\sqrt{1-\rho^2}\right) + \sqrt{1-\rho^2 \upsilon_1} \quad (21)$$

The Cochrane-Orcutt transformed regression estimator was used to correct for first order serial correlation by searching for an estimate of ρ that minimized the sum-of-squared residual of the transformed equation. Reported statistics of the two national health expenditure models were based on the ρ -transformed variables, where ρ was estimated without errors (Judge et al, 1985).

4. Results and Analysis

4.1. Stationarity Results

Table 1. ADF stationarity tests in first differences results

Health Expenditure Models	Model	Critical Value			t-statistic
		$\alpha = 1\%$	$\alpha = 5\%$	$\alpha = 10\%$	a_n, z_t, d_o
Dependent Variable (both Models)					
Current Health Expenditure	No Constant	-2.660	-1.950	-1.600	-2.407**
	Trend Term	-4.380	-3.600	-3.240	-3.704**
	Drift Term	-2.681	-1.782	-1.356	-2.403**
Sources of Funds for Health Expenditure					
Domestic General Government Health Expenditure	No Constant	-2.660	-1.950	-1.600	-3.169***
	Trend Term	-4.380	-3.600	-3.240	-3.660**
	Drift Term	-2.681	-1.782	-1.356	-3.650***
Domestic Private Health Expenditure	No Constant	-2.660	-1.950	-1.600	-3.128***
	Trend Term	-4.380	-3.600	-3.240	-3.672**
	Drift Term	-2.681	-1.782	-1.356	-3.663***
External Health Expenditure	No Constant	-2.660	-1.950	-1.600	-2.393***
	Trend Term	-4.380	-3.600	-3.240	-2.243
	Drift Term	-2.681	-1.782	-1.356	-2.362**
Health Financing Arrangements					
Government Financing Arrangements	No Constant	-2.660	-1950	-1.600	-2.812***
	Trend Term	-4.380	-3.600	-3.240	-2.848
	Drift Term	-2.681	-1.782	-1.356	-3.011***
Voluntary Health Expenditure	No Constant	-2.660	-1.950	-1.600	-3.269***
	Trend Term	-4.380	-3.600	-3.240	-3.047
	Drift Term	-2.681	-1.782	-1.356	-3.139***
Out-of-Pocket Payments	No Constant	-2.660	-1.950	-1.600	-1.359
	Trend Term	-4.380	-3.600	-3.240	-1.905
	Drift Term	-2.681	-1.782	-1.356	-1.693*

[***] (**) * denote significance at [1] percent, (5) percent and 10 percent levels; respectively. τ_n, τ_t, τ_d signify ADF test statistics computed at no constant (n), trend term (t) and drift term (d) options; respectively

Stationarity test statistics in first differences with no constant and a drift term rejected the null hypothesis of presence of unit roots in all variables at 5% significance level. Optimal lag order 2 was chosen for both the model with no constant and a model with a drift based on the Final Prediction Error (FPE), Akaike Information Criterion (AIC), HQIC and SBIC methods (Appendix A).

4.2. Cointegration Results

Table 2. Johansen tests for cointegration results – trend: none*.

Sources of Health Expenditure Funds	r = 0 vs. r = 1	r ≤ 1 vs. r = 2	r ≤ 2 vs. r = 3	r ≤ 3 vs. r = 4
Maximum Statistic [Critical Value]	398.33* [23.80]	25.85* [17.89]	10.51 [11.44]	6.87* [3.84]
Trace Statistic [Critical Value]	441.57* [39.89]	43.24* [24.31]	17.38* [12.53]	6.87* [3.84]
Health Financing Arrangements	r = 0 vs. r = 1	r ≤ 1 vs. r = 2	r ≤ 2 vs. r = 3	r ≤ 3 vs. r = 4
Maximum Statistic [Critical Value]	31.05* [23.80]	19.85* [17.89]	9.84 [11.44]	1.19 [3.84]
Trace Statistic [Critical Value]	61.94* [39.89]	30.89* [24.31]	11.03 [12.53]	1.19 [3.84]

* represents presence of a cointegrating relationship.

Table 2 results reveal presence of four cointegrating relationships among the sources of funds for health expenditure variables, and two cointegrating relationships among health financing arrangements variables, which confirm existence of long-run relationships among variables.

4.3. Health Expenditure Models Estimates

Table 3. Sources of health expenditure funds: Cochrane-Orcutt AR (1) regression iterated estimates.

Source	SS	df	MS		No. of obs	=	15
Model	0.618	3	0.206		F (3, 12)	=	133.11
Residual	0.018	12	0.001		Prob > F	=	0.000
Total	0.636	15	0.042		Adj R^2	=	0.963
logCurrent Health Expenditure	Coeff.	S.E.	t-stat	p>| t |	[95% Conf. Interval]		
logDomestic General Government Health Expenditure	0.240	0.092	2.60	0.023	0.038		0.441
logDomestic Private Health Expenditure	0.265	0.099	2.66	0.021	0.047		0.483
logExternal Health Expenditure	0.070	0.0759	0.93	0.371	-0.094		0.236

Durbin-Watson statistics: original = 0.291, transformed = 1.168, and rho = 0.900.

Results presented in Table 3 show that domestic general government health expenditure and domestic private health expenditure had statistically significant positive impacts on overall health expenditure, as measured by the current health expenditure over the sample period 2000 to 2015. In relative terms, domestic private health expenditure had a marginally higher positive impact on current health expenditure than domestic general government health expenditure, while the impact of external health expenditure on overall health expenditure was positive but insignificant. Estimates of the sum of squares reveal that from the total sum of square of 0.636, about 0.618 was accounted for by the model, while merely 0.018 remained unexplained.

The estimated elasticities show that a 1 percent increase in domestic private health expenditure led to about 0.27 percent increase in overall health expenditure. Moreover, a 1 percent increase in domestic general government health expenditure led to approximately 0.24 percent increase in overall health expenditure over the period 2000 to 2015. An increase in external health expenditure by 1 percent led to merely 0.07 percent rise in the overall health expenditure.

The adjusted R-squared shows that the set of sources of funds for health expenditure exogenous variables included in the estimated health expenditure model accounted for about 96 percent variation in overall health expenditure over the sample period under review. Given that all estimates are conditional on rho (ρ), the DW (Durbin-Watson, 1950) transformed value of 1.168 vis-à-vis the original value of 0.291 shows that the estimated health expenditure model was corrected for first order serial correlation.

Table 4. Health financing arrangements: Cochrane-Orcutt AR (1) regression – SSE search estimates

Source	SS	df	MS		No. of obs	=	15
Model	1.373	3	0.457		F (3, 12)	=	713.28
Residual	0.007	12	0.000		Prob > F	=	0.000
Total	1.380	15	0.092		Adj R^2	=	0.993
logCurrent Health Expenditure	Coeff.	S.E.	t-stat	p>| t |	[95% Conf. Interval]		
logGovernment Financing Arrangements	0.375	0.123	3.05	0.010	0.107		0.643
logVoluntary Health Insurance	0.563	0.186	3.02	0.011	0.156		0.969
logOut-of-Pocket Payments	-0.756	0.213	-3.54	0.004	-1.222		-0.291

Durbin-Watson statistics: original = 0.689, transformed = 1.722, and rho = 0.850.

Table 4 results indicate that government financing arrangements and voluntary health insurance had statistically significant positive impacts on overall health expenditure, while the downward trend in out-of-pocket payments (Appendix B2) confirms the statistically significant negative impact the respective indicator had on overall health expenditure over the sample period 2000 to 2015. Voluntary health expenditure demonstrated a relatively higher positive impact on current health expenditure than government financing arrangements. Estimates of the sum of squares segment show that from the total sum of square of 1.380, approximately 1.37 was accounted for by the model, while merely 0.007 remained unexplained.

The estimated results show that a 1 percent increase in voluntary health insurance led to about 0.56 percent rise in overall health expenditure. Concomitantly, a 1 percent increase in general government financing arrangements led to about 0.38 percent increase in overall health expenditure over the period 2000 to 2015. Given the continuous downward trend in out-of-pocket payments through the entire sample period, a decline in out-of-pocket payments by 1 percent led to about 0.75 percent decrease in current health expenditure. The adjusted R-squared shows that the set of health financing arrangements exogenous variables integrated in the estimated health expenditure model accounted for about 99 percent variation in overall health expenditure over the sample period under review. Since all estimates are conditional on rho, the DW transformed value of 1.722 vis-à-vis the original value of 0.689 shows that the health expenditure model estimated using health financing arrangements indicators was indeed corrected for first order serial correlation.

5. Conclusion

From a universal health care perspective, the relatively more significant positive impacts of both domestic private health expenditure and voluntary health insurance vis-à-vis the domestic general government health expenditure and government financing arrangements indicate that the healthcare financing system in South Africa is dominated by voluntary private medical scheme contributions. Coupled with lack of pooling of both funds to guarantee risk cross-subsidization and financial risk protection, some members of the highly fragmented private insurance schemes make co-payments and direct out-of-pocket payments for medical services not covered by their respective schemes while the poor suffer most from potentially high costs of health care. Based on regression estimates, the statistically significant negative impact demonstrated by direct out-of-pocket payments on current overall national health expenditure suggests the possible financial catastrophe and impoverishment experienced by individuals or households; largely the poor, when financing health care services in seeking medical treatments.

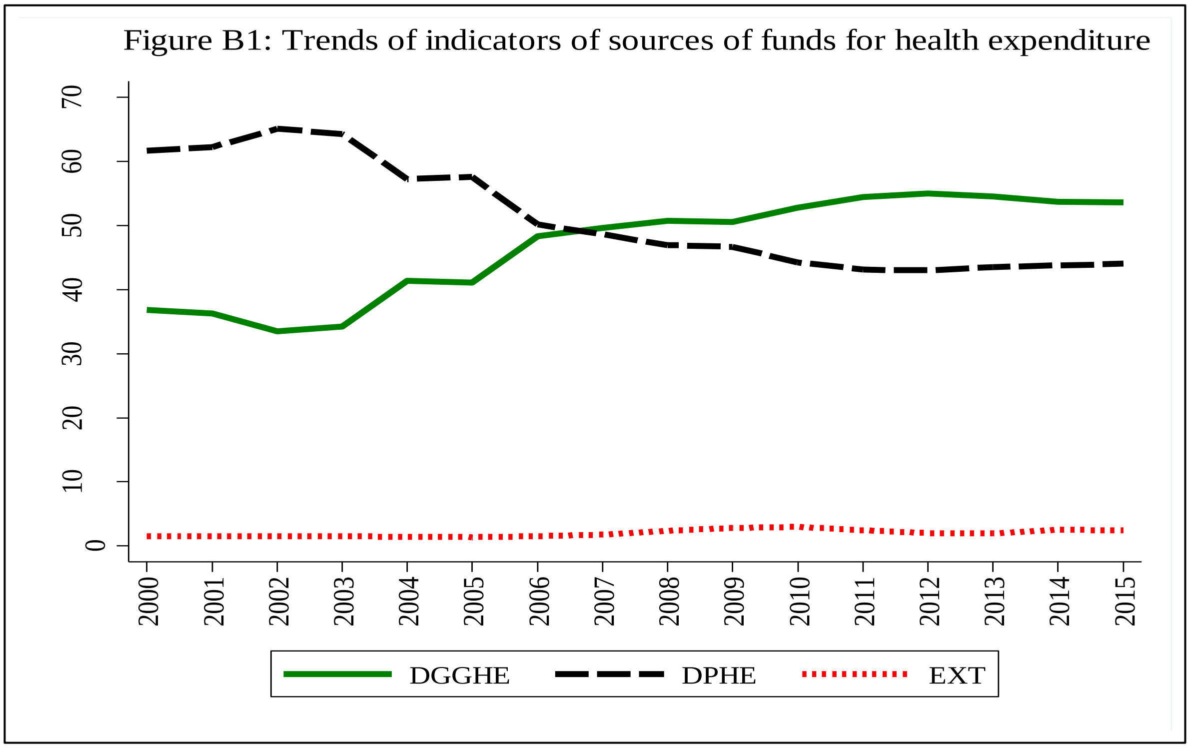
In order to address fragmentation in the health care financing system, mandatory prepayment funding mechanisms in form of general tax revenues and mandatory health insurance would have to be probably considered to be efficiently implemented as principal health care financing mechanisms. Furthermore, budget allocations in the public health sector from nationally raised revenue sources would not need to be conducted largely based on the incremental budget approach, but rather based on differentials in health care financing needs of health care institutions and facilities on a realistically justifiable case-by-case criterion, as well as health expenditure needs of populations.

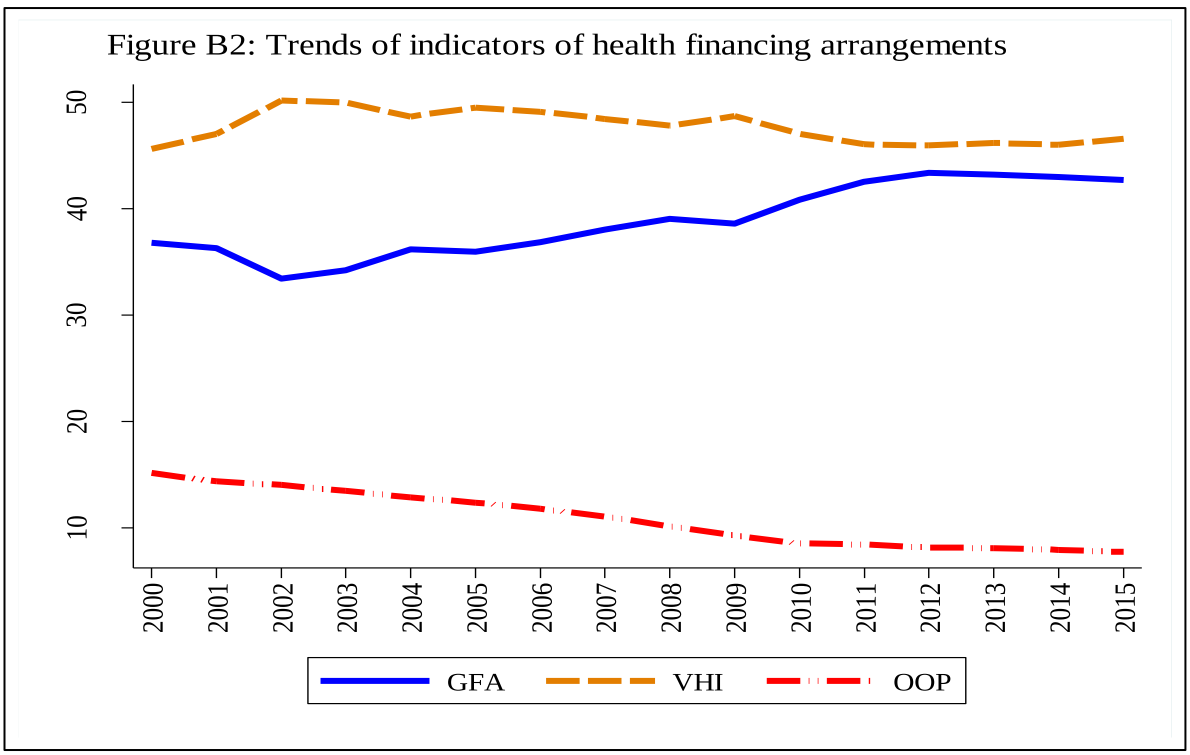
Appendix A: Optimal Lag Order Selection

Source of funds for health expenditure variables						
Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-6.749		0.300	1.624	1.580	1.746
1	9.261	32.021	**0.025***	**-0.876***	-0.936	**-0.715***
2	9.537	0.551	0.029	-0.756	-0.830	-0.554
3	9.726	0.378	0.034	-0.621	-0.710	-0.378
4	12.006	4.559	0.030	-0.834	**-0.939***	-0.551
Health financing arrangements variables						
0	-1.231		0.143	0.871	0.812	1.033
1	10.749	23.961	**0.023***	**-0.958***	**-1.033***	**-0.756***
2	10.921	0.343	0.028	-0.820	-0.909	-0.577
3	11.2218	0.593	0.034	-0.703	-0.807	-0.420
4	13.186	3.937	0.003	-0.864	-0.984	-0.541

* indicates the optimal lag order selected by the respective criterion.

Appendix B: Health Expenditure Trends





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