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Health Spending and Decentralization in Indonesia

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Health Spending and Decentralization in Indonesia

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Abstract

Using a panel dataset of 320 Indonesian districts we examine the impact of district budgets on public health spending, utilization patters in the public and private sector, and private health spending in the four years after decentralization. We exploit the panel structure of the data and the fact that district budgets are largely driven by central government transfers to determine causal patterns. We find that the elasticity of public health spending with respect to district budgets is around 0.9 with a higher elasticity for development spending than for routine spending. District splits reduce public health spending. We find a positive effect of public district health spending on public sector utilization, with the strongest effects in the poorest two quintiles. We find no significant effects on private sector utilization and out of pocket health expenditures.

1. Introduction

In recent years, most developing countries have introduced decentralization policies which, to varying degrees, delegate the provision of local services (including key health services) to sub-national Governments. Given the significance of this trend and of the new responsibilities vested in local administrations, it is particularly important to understand how sub-national government revenues –and their composition- translate into health spending. Moreover, looking at decentralized health finances as opposed to cross country data allows to overcome some of the methodological problems that have plagued the analysis of health spending effectiveness in the past and to draw general conclusions on the transmission channels between public spending and health outcomes.

Most of the literature on the determinants of health spending analyzes cross-country variation. Several authors have noted that total health spending is closely correlated with GDP, with an elasticity around one (Ulf-G. Gerdtham and Bengt Jönsson, 2000). The share of public spending devoted to health however varies a lot across governments. Shelton (C. A. Shelton, 2007) found that governments that have older populations and more fractionalization within the population spend more on health. Mauro found that corruption is associated with lower government spending on health care (Paolo Mauro, 1998) .

There is also a large literature on the effectiveness of public health spending, which again is mostly based on cross country variation. Filmer and Pritchett note the lack of correlation between public health spending and child mortality and conclude that governance, or the way in which resources translate into actual programs, and crowding out of private services by public services are the *missing chains* that explain the low correlation (D. Filmer and L. Pritchett, 1999). Supporting empirical evidence for the first claim is provided by Rajkumar and Swaroop (2008), who show that more public health spending reduces child mortality in good governance countries. Making a similar

argument, McGuire shows that in a cross section of developing countries, access to maternal and infant health programs is correlated with decreased under 5 mortality, while public health spending is not (J. W. McGuire, 2006). This indicates that it is the quality of the implemented programs that matter, and not the spending per se. The effects of public health spending may also vary by population segment. Gupta *et al.* (2003) show, using cross-country data, that higher public health spending reduces child mortality among the poorest quintile, while no effects can be detected among the rich.

However, conclusions regarding the determinants and effectiveness of public health spending based on cross-country analysis should be interpreted with caution. Omitted variable bias, resulting from country specific unobserved historic and institutional factors that influence both public spending decisions and health outcomes make it difficult to interpret the estimated relationships as causal. Moreover, cross-country analysis cannot be used to analyze the determinants of public health spending as the main variable, the available budget, is a function of the same fiscal policy that determines public health spending. Yet, understanding this relationship would be informative for donors considering providing budget support to governments, and are concerned whether these additional resources will be devoted to public spending in the social sectors. Finally, cross-country studies are typically prone to measurement error, due to inconsistencies between countries in data quality, data collection tools, and underlying sources of (micro) data.

Analyzing sub-national expenditures in a decentralized context overcomes many of the problems associated with cross country analysis. As sub national governments operate within the same institutional setting, and often share data collection tools, the analyses are less plagued by omitted variable biases. Bhalotra (2007) analyzes the effects of state health expenditures in India on child mortality using a 29 year panel of 15 states. She finds generally small effects, with a negative significant effect appearing in the third lag of public health expenditures for rural areas.

This paper contributes to the literature on sub national health spending by analyzing public health care spending, its determinants and impacts, in 320 Indonesian districts. We

look at mechanisms through which local governments' resources affect district level public spending on health, and the impact this has on utilization of health services and private health spending. The analysis is based on budget data from 320 Indonesian districts from 2001 to 2004 combined with data from household surveys that are representative at the district level. In 2001, Indonesia decentralized the health sector to the district level, and districts received far reaching authorities to set the size and composition of their spending. This period just after decentralization, when budgets were still in flux, provides a unique opportunity to analyze the determinants and impacts of public health spending, across governments that inherited a similar institutional setting.

The nature of the data and country setting allows us to analyze sub national health expenditures from a different angle compared to previous studies. Because district governments are largely dependent on the central government for their budgets, this allows us to estimate the Engel curve of public health expenditures, and to test whether district governments treat differently various sources of revenues. We also test whether the composition of public health expenditure depends on the source of revenues. With a large number of districts, but a short panel, we restrict our analysis of outcomes to variables which respond quickly to changes in public expenditures. The data on utilization of public and private services allow us to test demand response to changes in public spending, and the unintentional effect of crowding out private sector services. By including an analysis of private health spending we investigate whether increases in public spending reduce private spending on health.

The paper is organized as follows. Section 2 provides an overview of decentralization in the health sector in Indonesia. We quickly describe the sources of revenues of districts, and the trends in central and district government expenditures over the period of study. Section 3 analyzes the determinants of district public health pending, and section 4 the impacts of district health spending.

Section 2 Institutional Setting and Data

Using the methodology developed by Bosserts to determine the extent and depth of a country's decentralization process it appears that Indonesia's health sector can be classified as highly decentralized (Thomas Bossert, 1998)(

Table **7**). While districts have the legal responsibility to provide basic health care, they have the freedom to set fees for public health services (to be used as a revenue stream for local government operations) and there are no rules or guidelines for allocating resources and carrying out particular programs. Districts are not required to justify local spending to the central government based on outputs or pre-defined objectives. Instead, district governments are accountable to district parliaments. Indonesia's health care system also retains important centralist features. The central government sets employment conditions for civil servants, including those paid by district governments. It also finances and runs the health insurance program for the poor. As a result, total health spending is split almost evenly between the central/provincial level on one hand and the district level on the other hand; in 2005, they accounted for 48 percent and 52 percent of public health expenditures respectively(World Bank, 2008).

In spite of their high share of expenditures, districts remain highly dependent on the central government for their revenues, 90 percent of which they receive as transfers from the center (World Bank, 2008). The largest transfer, 56 percent of total revenues, is the general allocation grant (DAU), which is a formula based untied grant. The other main transfers are shared tax revenues - 11 percent of total revenues - and shared non-tax revenues - 12 percent of total revenues. The former consists largely of property and income taxes that are administered by the central government and transferred back to the districts. The shared non-tax revenue is largely a natural-resource revenue that is distributed back to the districts (World Bank, 1997). Finally, there is the specific allocation grant (DAK) ,a tied resource whose use is determined centrally but which only accounts for a modest share of district revenues (3 percent in 2005). Districts own revenues are non-negligible and have been increasing as a share of total district revenues (from 10 to 16 percent from 2001 to 2004)(World Bank 2007), but they are unequally distributed. The non-tax revenue, in particular, is a function of the natural resources harvested in the district.

Overall public resources for health increased considerably between 2001 and 2004 (Table 1.) Total health expenditures increased on average 23 percent on a year to year basis. For

comparison, the average inflation rate equalled … over this period and the average increase in nominal total public expenditures of all levels of government … percent. Indonesia is no anomaly in this respect; other countries that decentralized also increased spending in the public sector (F. Javier Arze del Granado, 2005). Both local and central governments contributed to rising health expenditures. The elasticities reported in this paper thus reflect mostly the impact of increases in public spending, which may differ from the ones resulting from downward adjustments (Santiago Lago-Penas, 2008).

Table 1 Public spending on health by level of Government (Nominal, in billion Rupiah)

Year	2001	2002	2003	2004	Average annual increase
Central Government	3,119	2,907	5,752	5,595	29%
Provincial spending	1,745	2,372	2,821	3,000	20%
District Government	4,387	5,725	7,473	8,108	23%
Total public health spending	9,251	11,004	16,046	16,703	23%

Source: World Bank (2008).

The empirical analysis in this paper draws on two main data sources. The first is Indonesia's national household survey, Susenas, which is fielded every year and is representative at the district level. It contains information on household socio-economic characteristics, health services utilization, and private expenditures, including on health. The second source, compiled by the Ministry of Finance, contains detailed records of local government revenues and expenditures for the post decentralization years; both routine and development expenditures can be broken down by sector, including health. Routine expenditures consist of salaries and operational costs of providing health services at public facilities. Development expenditures are investments, such as upgrading of health facilities and training. However, the data do not allow a facility level stratification.

We combined the two data sources to construct a district level panel. Since the household survey data are collected around February, while the fiscal data reflect expenditures during the calendar year, theeffects of changes public spending are observed in the Susenas of the subsequent year. We thus constructed a panel that contains the spending data of 2001 to 2004, linked with the Susenas data for 2002 to 2005.

During the 4 years analyzed, almost a hundred new districts emerged as a result of district splits. In such cases, we aggregated the data from the split districts, and assigned those to the original district definition. We used variables to track the year and the number of "child" districts for each split. We applied the 1998, pre-decentralization, district definition frame, which comprised 305 districts. Another problem arose from incomplete household survey data. Over the period under investigation, Indonesia faced several local conflicts that made it unsafe for surveyors to collect information. Only those districts for which we have complete data, 274, are included in the analysis. Since consistent budget data is not available for all districts, 67 observations were lost (24% of Susenas panel) when estimation was based on both data sources. Finally, two provinces, Aceh and Papua, are excluded from our analysis since both have been granted a special autonomy status since 2001 and their budgets are not included in the dataset compiled by the Ministry of Finance. The balanced panel contains data from 207 districts.Table 2 Descriptive statistics for balanced panel (district averages)

	2001	2002	2003	2004
Per capita district revenues and spending				
Total revenues	415,987	508,375	557,883	563,934
DAU revenues	316,289	369,773	377,826	371,202
Shared tax revenue	31,218	39,180	44,927	50,786
Shared non tax revenue	20,258	36,496	37,821	40,204
DAK revenue	5,296	2,728	17,559	19,180
Own revenues	27,429	38,724	41,112	41,767
Revenues from other sources	15,497	21,472	38,637	40,795
Total public spending on health	26,057	32,329	39,033	41,959
Development spending on health	5,611	7,735	15,830	17,514
Routine spending on health	20,446	24,594	23,203	24,445

	2002	2003	2004	2005
Household utilization and spending on health				
Nr of outpatient visits per month to public health care providers	0.0727	0.0874	0.0827	0.0944
Nr of outpatient visits per month to private health care providers	0.0793	0.0786	0.0753	0.0724
Per capita out of pocket spending on health	8,368	6,526	6,664	7,242
Utilization and spending on				

health of households in poorest quartile				
Nr of outpatient visits per month to public health care providers	0.0736	0.0716	0.0892	0.0825
Nr of outpatient visits per month to private health care providers	0.0530	0.0464	0.0476	0.0459
Per capita out of pocket spending on health per month	3,339	2,668	2,498	2,386
N	207	207	207	207

Note: District revenue, public spending and OOP health payments in 2001 constant prices Rupiah.

Source: Revenue from fiscal data from ministry of finance, utilization and out of pocket spending from Susenas household survey

Table 2 shows descriptive statistics for the balanced panel of districts[1], including (i) per capita district revenues by source, and health spending for budget years 2001 to 2004, and (ii) average district utilization rates and out of pocket (OOP) health spending by households in the month prior to the survey, in 2002 to 2005[2]. .

Both district revenues and public health spending increased strongly during the first four years of decentralization in Indonesia. Total per capita district revenues increased from 415,987 Rupiah in 2001 to 563,934 Rupiah in 2005. The bulk of district income comes from DAU allocations, but its share decreased from 75 percent in 2001 to 66 percent in 2004. This is mainly due to increases in shared non tax revenue and DAK spending. Public health spending by districts also increased per capita, from 26,057 Rupiah in 2001 to 41,959 Rupiah in 2004. This change is driven by development health spending, its share increasing from 22 to 42 percent, respectively.

Average utilization of public outpatient care in districts increased from 0.073 out patient visits per person per month (vppm) in 2002 to 0.094 vppm in 2005, with a slight dip in 2004. This trend contrasts private health care utilization, which decreased slightly from 0.079 vppm in 2002 to 0.072 vppm in 2005. We observe somewhat similar patterns for the poorest quarter of the Indonesian population. District average for utilization of public health care by the poorest quartile increased from 0.074 vppm in 2002 to 0.083 vppm in

[1] District revenue, public spending and OOP health payments are reflected in 2001 constant prices. Rupiah – USD exchange rate for 2001 is 10,246 (IMF article IV consultation 2004)

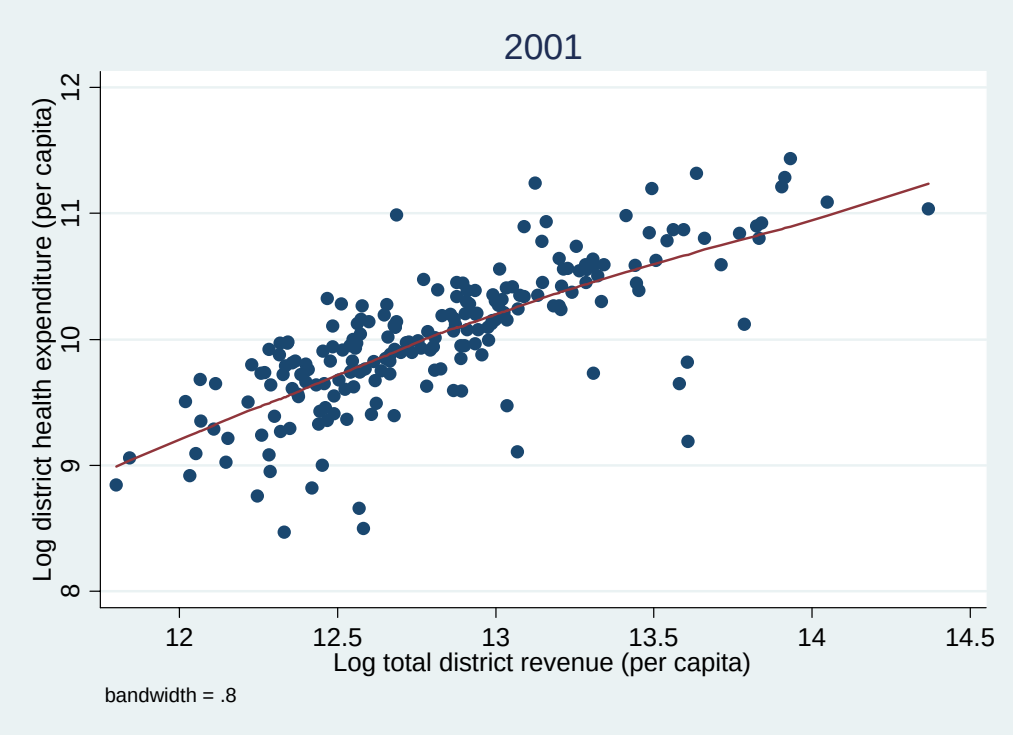
[2] Note that utilization and OOP spending do not reflect national averages, but the average of the district averages (i.e. the observations for our balanced panel).

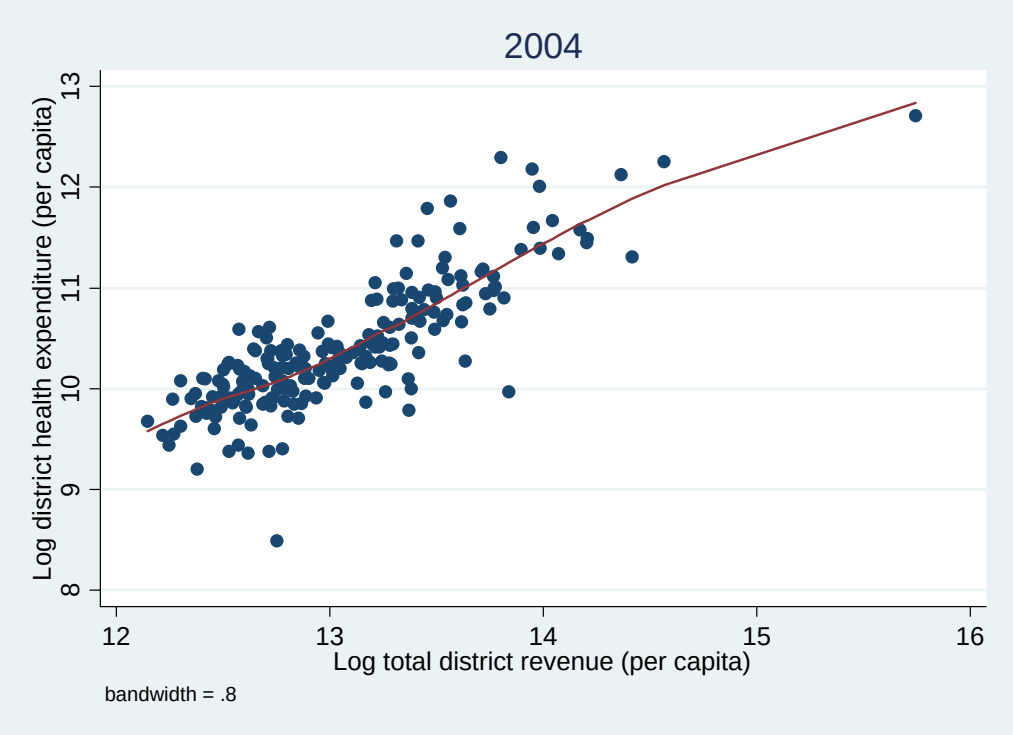
2005, most of which occurred after 2003. Utilization of private care decreased from 0.053 vppm in 2002 to 0.046 vppm in 2005. This gradual move from private to, largely subsidised, public utilization is reflected in average per capita OOP health spending by the poorest, decreasing from 3,339 Rupiah per capita per month to 2,386 Rupiah in 2005.

3. Determinants of district public health spending

Public spending on health is closely correlated with overall levels of district government revenues (**Figure 1**). Comparing the pattern of 2004 with that of 2001, the slope is steeper and the fit of the curve improves, indicating that districts are converging towards a common spending pattern; also, in a simple cross section regressions, the gradient increases from 0.91 to 0.99 and the R-squared from 0.58 to 0.70. When we compare the changes in district ranking by revenue with changes in ranking by health spending, the Spearman Rank correlation between district per capita revenue in 2001 and 2004 is 0.706, while for district health spending this is 0.674, indicating that district revenue rank is more stable over time than spending rank. We conclude that spending is adjusting to revenues, rather than the other way around.

Figure 1 Correlation between district log per capita health spending and log per capita revenues in 2001 and 2004


2001
Log district health expenditure (per capita)
8
9
10
11
12
12
12.5
13
13.5
14
14.5
Log total district revenue (per capita)
bandwidth = .8


2004
Log district health expenditure (per capita)
8
9
10
11
12
13
12
13
14
15
16
Log total district revenue (per capita)
bandwidth = .8

To identify effects of local revenues (R_{it}) on public health spending patterns (H_{it}) further, model (1) relates district per capita public health spending to district per capita revenues, time variant district observable variables, time invariant district unobservable variables, a time trend and an error term

$$\log H_{it} = c + \beta \log R_{it} + \sum_{r=2}^{6} \gamma_r s_{rt} \log R_{it} + \phi X_{it} + \alpha_i + \delta_t + \varepsilon_{it} \quad (1)$$

where i denotes the district and t the year. Imposing this log-log specification, we interpret β as the elasticity of health spending with respect to revenues at the district level. We also investigate whether the source of revenue matters for health spending, by introducing interaction terms of the share of each main revenue source, s_{rt}, with log total revenue[3]. The set of control variables X_{it} includes average house ownership in the district as proxy for average district welfare, demographic variables (average age, household size and percentage female population), fraction of the population that lives in rural area, and region fixed effects[4]. Time dummy variables pick up aggregate time shocks δ_t. Since the panel is based on the district definition of 1998, we also include a variable that tracks the number and timing of district splits.

Our aim is to identify the causal effect of revenues on health spending. District unobservable factors, such as the number of civil servants employed at the time of decentralization, could influence both revenues and health spending and if ignored would lead to false conclusions regarding inference. By including a district effect, $\alpha_{i,}$, into the equations, we correct for time invariant district specific omitted variables. We employ two specifications for α_i. The first, random effect model, assumes the district time invariant unobservable α_i to have a normal distribution with mean zero and unknown variance. The second, fixed effect model, puts no distributional assumptions with respect to α_i. In the latter model the regional effects are absorbed by the district fixed effects.

Table 3 summarises the estimates of the elasticity of per capita district health expenditures on per capita district revenue. Equation (1) is estimated first without the

[3] In case of perfect fungibility of district revenue, we should find that $\gamma_r = 0$, for all revenue sources r.
[4] We define 5 regions: (i) Java and Bali, (ii) Sumatra, (iii) Sulawesi, (iv) Kalimantan and (v) Other Islands.

interaction terms, and separately for total public health spending, routine spending and development spending. A Hausman test rejects the random effects model in favour of the fixed effects model, although the elasticities are fairly robust to choice of specification. The elasticity of total health spending with respect to revenue is slightly below one, at 0.88. Development spending is more sensitive to district revenue than routine spending: a one percent increase in revenue is associated with about a 1.12 percent increase in development health spending whereas routine expenditure increases by only 0.83 percent. We conclude that the share of development health expenditures increases as districts have access to more resources.

Table 3 Elasticity of per capita district public health spending w.r.t per capita district revenue

	Random effects	Fixed effects	Hausman test
Routine spending	0.8431**	0.8284**	0.0022
	[0.0465]	[0.0657]	
Development health spending	1.2371**	1.1192**	0. 5717
	[0.0723]	[0.1376]	
Total health spending	0.9468**	0.8789**	0. 0133
	[0.0344]	[0.0449]	

Statistical significance: + at 10 percent, * at 5 percent, and ** at one percent level.
Note: balanced panel of 207 districts, 828 observations, 2001-2004. All models control for demographic characteristics (average age, household size and percentage female population), percentage rural population, average house ownership, district splits, region fixed effects and aggregate time shocks. The Hausman test reports p-values for rejecting the hypothesis that the difference in coefficients is not systematic. See the supplemental appendix for detailed estimates. Standard errors in brackets.

The fixed effects approach leaves a potential source of bias through endogeneity in changes in revenues and spending over time. But the scope for time variant confounding effects is small, as all major sources of district revenue are determined exogenously with respect to public health spending. The only revenue source that is potentially susceptible to endogeneity is own revenues, for example if increased public spending would be used to reduce user fees. In addition to this, we estimated equation (1) excluding own revenues. We found the results to be not sensitive to excluding own revenues.[5]

[5] These results are not shown here, but are reported in a supplemental appendix, which is available upon request.

We examined the relationship between categories of expenditure and sources of revenue (Table 4) by including the s_{rt} log R_{it} interaction terms in the specification. Economic theory predicts that the revenue sources do not affect expenditure decisions: money being fungible (except for DAK revenues), the revenue source should not pre-determine the allocation of resources to various uses. Even for earmarked grants, such as the DAK, an increase does not necessarily translate in an equal increase in the associated sector spending, as government can adjust the allocation of other budgets (Richard F. Dye and Therese J. McGuire, 1992). The interaction term for the DAU share is the base reference. Hence, the reported estimates indicate how the spending elasticity would change with a result of a fraction change in the share of a specific revenue source (divided by 100 *[Right?]*) with respect to DAU funding, keeping all else constant. The baseline coefficient (β) can be interpreted as the elasticity of DAU transfers.

The results suggest that the source of funding does matter for public health spending. The overall elasticity of spending of DAU funding is similar to that of total revenue, but a percent change in DAU funding has relatively larger effect on routine spending then on development spending (as compared to total spending).

Districts with a relatively larger share of own revenue have a higher elasticity of routine spending: a one percent increase in own revenue with respect to DAU increases the routine and total health spending elasticity by 0.0015 and 0.0011, respectively. A one percent increase in DAK allocation increases the development spending elasticity by 0.0024 with respect to DAU funding. This could be explained by the earmarking of DAK funds. We further find a negative effect of the share of shared tax revenue on development spending, while there is no differential effect for shared non tax revenue.

Districts splits reduce public health spending. A district that split into two districts over the period of investigate – and is treated as one observation throughout – has on average 6 percent lower public per capita health expenditures after the split. It is not possible to separately identify the effect of a split on routine and development spending, both elasticities are insignificant. Considering the external effects of public health spending that go beyond district boundaries, the negative effect of a district split is expected. When

districts split, these benefits are not internalized anymore when taking district spending decisions.

Table 4 Elasticity of per capita district public health spending w.r.t per capita district revenue (district fixed effects)

	Routine	Development	Total
Total district revenue	0.8569**	1.0588**	0.8789**
	[0.0666]	[0.1393]	[0.0456]
Interaction terms with revenue shares			
Own revenue	0.1513**	0.1182	0.1129**
	[0.0560]	[0.1171]	[0.0383]
Shared tax revenue	0.0346	-0.2564**	-0.0672*
	[0.0417]	[0.0871]	[0.0285]
Shared non tax revenue	-0.0624	-0.0018	-0.0392
	[0.0443]	[0.0927]	[0.0303]
DAK revenue	-0.0849	0.2352*	0.0122
	[0.0543]	[0.1136]	[0.0372]
Revenue from other sources	-0.0360	0.0370	-0.0182
	[0.0271]	[0.0567]	[0.0186]
District splits	-0.0254	-0.0029	-0.0637*
	[0.0415]	[0.0869]	[0.0284]

Statistical significance: + at 10 percent, * at 5 percent, and ** at one percent level.
Note: balanced panel of 207 districts, 828 observations, 2001-2004. All models control for demographic characteristics (average age, household size and percentage female population), percentage rural population, average house ownership, district splits, aggregate time shocks and district fixed effects. See the supplemental appendix for detailed estimates. Standard errors in brackets.

3.2 Public health spending and utilization of health services

To uncover causal effects of district health spending on health care utilization we specify the utilization rate or log average OOP health care payments, u_{it}, as a log-linear function of one-year lagged per capita district health spending and a set of control variables:

$$u_{it} = c + \pi \log H_{it-1} + \eta_{dh} s_{dt-1} \log H_{it-1} + \lambda X_{it} + \alpha_i + \delta_t + v_{it} \quad (2)$$

The parameter π now reflects the unit change in the utilization rate associated with a one percent increase in district per capita public health spending. The control variables X_{it} are the same as in equation (1). We investigate the differential effect of development and

routine spending, by means of an interaction effect of the lagged share of development spending in overall district health spending, s_{dt-1}, with lagged log district health spending.

Again we need to consider possible endogeneity biases that may result from unobserved district specific effects, omitted variables related to local welfare that drive tax revenues and health care demand, or even direct reverse causality if increased utilization of public care in fact drives up district health budgets. Time invariant district effects that affect both health spending and utilization are corrected for by including district fixed effects. Dynamic effects, such as a sudden increase in utilization resulting in a sudden increase in health expenditures, are to a large extent corrected for by using the previous years' budgets as the explanatory variable for this years' utilization. Nevertheless, confounding time variant unobservables could still frustrate identification through serial correlation in v_{it}. We therefore test for endogeneity using a Durbin-Wu-Hausman test, instrumenting H_{it-1} with the shares of different revenues from central government (s_{rt-1}): DAU transfers, shared non tax revenue and DAK transfers. These seem suitable instruments as there is no reason to expect correlation of lagged revenue source shares with current health care utilization, while they are likely to affect district spending decisions, as shown in the previous section. The instruments provide sufficient support for identification as they are jointly significant at 5 percent level and the validity of the exclusion restriction is supported by a Sargan test. The Sargan Chi-squared test statistics vary between 0.061 to 2.406, with a critical value of 4.61 at 10 percent level and 2 degrees of freedom. Finally the Durbin-Wu_Hausman test results show no evidence of endogeneity of H_{it-1} with respect to u_{it}.[6] We therefore choose the fixed effects specification for the remainder of the analysis. We also estimated a random effects model, but Hausman tests rejected this in favour of the fixed effects specification in all cases except the effect of routine and development spending on public utilization.[7]

The results of the fixed effect regressions excluding and including the development spending share interaction term (Table 5) suggest that public spending indeed affects

[6] The results are not shown here, but are reported in a supplementary appendix, which is available upon request.
[7] For detailed estimation results we refer again to the supplemental appendix.

overall health care utilization. A one percent increase in district public health spending leads to an increase of 0.016 vppm in the overall utilization rate. This result is mainly due to the positive effect on public utilization, at 0.011 vppm. Overall, there is no evidence of crowding out effects, as the effect on private utilization is but not statistically significant but positive. However, in the specification with development spending share interaction term routine spending seems to have a positive effect on private care. This could be explained by the fact that many physicians in public health centres operate a private practice on the side, often referring public care patients to their private practice. Hence, increased public utilization through increased routine budgets for public health clinics appears to have a positive spill over for the private sector. The development spending interaction effect, on the other hand, is negative and statistically significant, probably due to the specific nature of development spending. *[Does this make sense?]* There seems to be no differential effect of development spending for public health care utilization. Given the increase in public sector utilization that goes with additional public spending, and the absence of substitution effects, we would have expected to find some increase of public spending on household health expenditures. However, we find no statistically significant effect in the data. This would suggest that either increased local public heath budgets have been partly used to reduce the direct costs of public care for patients, or that prices in the private sector have been cut in response to public sector investments.

Table 5 Effect of (lagged) per capita district public health spending on outpatient health care utilization rates and household out-of-pocket health spending (district fixed effects)

	Public	Private	Total	OOP
A. Without interaction terms				
District health spending	0.0114**	0.0042	0.0156**	-0.0173
	[0.0039]	[0.0036]	[0.0060]	[0.0530]
B. With interaction terms				
District health spending	0.0108**	0.0068+	0.0176**	-0.0115
	[0.0040]	[0.0036]	[0.0061]	[0.0546]
Interaction with share of development health spending	0.0005	-0.0022**	-0.0017	-0.0049
	[0.0008]	[0.0007]	[0.0012]	[0.0110]

Statistical significance: + at 10 percent, * at 5 percent, and ** at one percent level.
Note: balanced panel of 207 districts, 828 observations, 2002-2005. All models control for demographic characteristics (average age, household size and percentage female population), percentage rural population, average house ownership, district splits, aggregate time shocks and district fixed effects. A Hausman test

rejects the random effects in favour of the fixed effects specification in all cases except for public utilization. See the supplemental appendix for detailed estimates. Standard errors in brackets.

We next investigate the distributional effects of public health spending on utilization, by taking the utilization rate of different per capita expenditure quartiles as outcome variable in equation (2)[8]..

The fixed effect results are given in Table 6. Additional district health spending increases health care utilisation mainly for the poorest half of the population. A one percent increase in public spending increases the utilization rate by 0.014 vppm for the poorest quartile and 0.020 for the second quartile. This mainly occurs at public centers, with no differential effect between routine and development spending. We find no effect of public spending on OOP health spending by households. The coefficients are negative, but not statistically significant.

Table 6 Effect of (lagged) per capita district public health spending on outpatient health care utilization rates and household out-of-pocket health spending, by per capita expenditure quartile (district fixed effects)

	Public	Private	Total	OOP
Quartile 1 (poorest)	0.0175**	-0.0032	0.0143+	-0.0738
	[0.0065]	[0.0039]	[0.0083]	[0.0733]
Quartile 2	0.0164**	0.0032	0.0197**	0.0224
	[0.0055]	[0.0042]	[0.0075]	[0.0607]
Quartile 3	0.0063	0.0005	0.0068	-0.0088
	[0.0060]	[0.0050]	[0.0087]	[0.0675]
Quartile 4 (richest)	-0.0055	-0.0048	-0.0104	-0.0723
	[0.0085]	[0.0090]	[0.0149]	[0.0948]

Statistical significance: + at 10 percent, * at 5 percent, and ** at one percent level.
Note: balanced panel of 199 districts, 796 observations, 2002-2005. The number of districts differs from Table 5 as we only use districts from the balanced panel for which the survey data contains at least 50 observations for each quartile. Model specification similar to Table 5. See the supplemental appendix for detailed estimates. Standard errors in brackets.

DROP THIS TABLE? Effect of (lagged) per capita district public health spending and interaction with share of development health spending

[8] Since we only use districts from the balanced panel for which survey data contains at least 50 observation per quartile, for the quartile analysis we lose 8 districts from the balanced panel, reducing it to 199 districts, with 796 observations from 2002-2005..

	Public	Private	Total	OOP
Quartile 1 (poorest)				
District health spending	0.0192**	-0.0025	0.0167+	-0.0500
	[0.0067]	[0.0041]	[0.0085]	[0.0755]
Interaction with share of development health spending	-0.0015	-0.0006	-0.0020	-0.0199
	[0.0013]	[0.0008]	[0.0017]	[0.0152]
Quartile 2				
District health spending	0.0164**	0.0053	0.0217**	0.0122
	[0.0057]	[0.0043]	[0.0077]	[0.0626]
Interaction with share of development health spending	0.0000	-0.0017*	-0.0017	0.0085
	[0.0011]	[0.0009]	[0.0016]	[0.0126]
Quartile 3				
District health spending	0.0058	0.0036	0.0094	0.0079
	[0.0062]	[0.0052]	[0.0090]	[0.0695]
Interaction with share of development health spending	0.0004	-0.0026*	-0.0022	-0.0141
	[0.0012]	[0.0010]	[0.0018]	[0.0139]
Quartile 4 (richest)				
District health spending	-0.0069	-0.0003	-0.0073	-0.0748
	[0.0088]	[0.0093]	[0.0153]	[0.0977]
Interaction with share of development health spending	0.0012	-0.0038*	-0.0026	0.0021
	[0.0018]	[0.0019]	[0.0031]	[0.0196]

Conclusion

This paper analyses spending patterns and utilization of health services during the first years of decentralization in Indonesia. We looked in particular at the relationship between local revenues and health spending categories (development and routine), and their effect on health care utilization. Indonesia's decentralization is a partial decentralization in the sense that a large proportion of the health budget remains under central control. It also brought about a massive redistribution of resources across districts.

Local government health spending increased sharply with decentralization, reflecting the transfer of responsibility and authority from the centre to the districts. Health care utilization increased from 2001 to 2004, in particular in the public sector.

Public health spending appears close to elastic with respect to local revenues, with an elasticity of around 0.9. Spending is mostly driven by DAU transfers. Thus, DAU transfers can be an important tool for influencing local health sector budgeting. Inequalities in local revenues sources also appear to play an important role for routine health spending, suggesting divergence in spending due to differences in local endowments. Transfers from the central government (DAU and DAK) are also the most important source of financing for development spending, while we do not find that resource rich districts allocate more funds to development health spending. The elasticity of development spending with respect to DAU and DAK funding suggests that any inequalities in district public health spending could be offset by reallocation of central funds.

Local public health spending seems to increase overall health care utilization, in particular for the poorest half of the population, without affecting OOP health payments, once we control for confounding factors. Increased routine spending seems to have positive effects on both public and private health care utilization.

Our results suggest that increased public health spending improves targeting of public funds to the poor. At the margin, increased local public health spending leads to net

public resource transfers to the poor, as it increases both public health care utilization by the poor and the average benefit of public funds through using these services.

Table 7 Decision space of Indonesia's decentralization in health

Function	**Indicator**	Range of choice Narrow (centralized)	Moderate	Wide (highly decentralized)
Finance				
Source of revenue	Intergovernmental transfers as % of total local health spending		DAU2001/8614.3 billion	
Allocation of expenditures	% of local spending that is explicitly earmarked by higher authorities		Many vertical programs remain. Central/local health exp =72%	
Fees	Range of prices local authorities are allowed to choose			No rules
Contracts	Number of models allowed			No rules
Service organisation	X			
Hospital autonomy	Choice of range of autonomy for hospitals		A number of vertical hospitals remain, Many hospital doctors financed out of central budget	
Insurance plans	Choice of how to design insurance plans	Main insurance plans- health card for the poor, ASKES for civil servants remain central		
Payment mechanism	choice of how providers will be paid (incentives and non-salaried)			Freedom
Required programs	specificity of normal for local programs		Functions are specified	
Human resources	X			
Salaries	choice of salary range	Centrally decided		
Contract	contracting non-permanent staff			
civil service	Hiring and firing permanent staff		Difficult under civil servant rules	
Access rules	X			
Targeting	defining priority populations		Central guidelines local implementation	
Governance rules	X			
facility boards	Size and composition of boards			Freedom
district offices	Size and composition of local offices	Old system still in place		
Community participation	Size, number, composition and role of community participation		Wide variation	

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