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Aragon, Fernando and Gayoso, Vilma

Universidad del Pacifico

October 2005

Online at <https://mpra.ub.uni-muenchen.de/2108/>

MPRA Paper No. 2108, posted 09 Mar 2007 UTC

Intergovernmental transfers and fiscal effort in Peruvian local governments

Fernando M. Aragón
London School of Economics and Political Science
f.m.aragon@lse.ac.uk

Vilma J. Gayoso
*Universidad del Pacífico**

October 2005

Abstract

The purpose of this paper is to identify the causal relationship between intergovernmental transfers and fiscal effort. Empirical evidence from Peruvian municipalities supports a negative relation. The substitution effect is decreasing on the level of municipalities' expenditure and tends to disappear for high-expenditure localities. Given this phenomenon, devolving responsibilities to sub-national governments might reduce fiscal effort and deteriorate fiscal balance especially among localities with lower fiscal capacity. A possible solution might be the inclusion of fiscal effort indicators in the intergovernmental transfer design.

JEL Classification: H71, H77

Keywords: fiscal effort, intergovernmental transfers, fiscal decentralization, local taxation.

* This paper is a revised version of our licentiate thesis presented at Universidad del Pacífico. We are grateful to Carlos Casas, Hugo Santa Maria, Betty Alvarado, Enrique Vasquez and Eduardo Morón for useful comments and advice. The usual disclaimers apply.

1. INTRODUCTION

Devolving responsibilities to local governments has become an important component of development programs. Developing local capacities and augmenting local government's role is viewed as one way to enhance the responsiveness of governments to local needs (Faguet 2004). Because local governments are closer to their constituencies, they react better to local demands and their behavior is easily observed. According to this argument, local participation may increase allocation efficiency (Oates 1972). Local officials will provide public goods demanded by the community instead of just following central government policies.

Nonetheless, decentralization is not exempt from problems. Inequality between poor and rich communities may grow, production of local goods may be more costly and if sub-national fiscal deficits are not controlled, it might lead to higher macroeconomic instability (Prud'homme 1994). Furthermore, the effect of decentralization on corruption is unclear (Bardhan 2002; Fisman and Gatti 2002; Treisman 2002). Local governments may be more easily captured by elites increasing the risk of corruption. On the other hand, closeness of local officials to electors may facilitate monitoring and supervision. These possible side-effects are more relevant in poor, highly unequal countries. For example, in the Peruvian case, most local governments lack fiscal capacity and management skills and are highly dependant of central government transfers (Aráoz and Urrunaga 1996; Casas 1997; Alvarado, Rivera et al. 2003).

According to traditional fiscal federalism theories, intergovernmental transfers can be used to reduce problems associated to decentralization like inequality, externalities and poor quality of local public goods (Oates 1972). It is not surprising then that intergovernmental transfers are an essential part of any fiscal decentralization process. However, inadequate transfer designs may disincentive efficient use of resources or reduce fiscal effort.

This paper explores the relationship between intergovernmental transfers and local fiscal effort. In order to analyze it, a theoretical model is developed. Then the causal relationship is evaluated using an empirical model with data from Peruvian local governments.

What is the effect of transfers on fiscal effort? The model developed in this paper suggests that the relationship is negative and decrease with the initial level of local public expenditure. Then, an increase in transfers will reduce fiscal effort. Given decreasing marginal benefits, the trade-off between transfers and fiscal effort is higher in local governments with low levels of local expenditure.

The implications of the model are tested using socioeconomic and financial data from about 1,400 Peruvian district municipalities. The identification of the relationship between transfers and fiscal effort is complicated due to non-random transfer allocation and the presence of omitted variables. Firstly, given the equalization objective of the transfer system, communities with poor tax bases will receive more funds. Secondly,

there are many unobservable relevant variables like fiscal capacity, management skills, organization, etc. In any case, simply regressing local tax collection on transfers would produce inconsistent estimators.

This paper exploits a quasi experiment and panel data to address these identification problems. In 2001, an additional transfer ("*asignación adicional*") was conferred to Peruvian local governments receiving a minimum level of Foncomun ("*Fondo de Compensación Municipal*" or Municipal Compensation Fund) regardless of local tax collection or total expenditure. Participation in this program can be used as an instrumental variable since it explains increases on transfers but it is not correlated to local tax collection. As shown below, low and high tax collection municipalities are similarly distributed among treated and not treated groups. On the other hand, the model in first differences, exploiting panel data on treated and untreated municipalities, allows dropping out time-invariant unobservable variables.

The results from the empirical models confirm the existence of a negative relationship between transfers and local fiscal effort. In the Peruvian case, the elasticity of substitution is around -1.0. As predicted by the model, the effect of transfers on local effort decreases with the level of per capita expenditure of the local government. The reduction of fiscal effort is higher among local governments with lower levels of expenditure. As long as expenditure level increases, the effect tends to disappear.

These results are especially relevant in a context of growing participation of local governments. Delegating competences implies increments of local financial resources. This fiscal decentralization may involve creation or delegation of tax bases as well as transfers from central government. Redistribution of competences may increase allocation efficiency; however it may also disincentive fiscal effort. This situation might increase the degree of dependence of central governments and deteriorate fiscal balance. The effects might be worse among poorer communities, which are nowadays the most dependants on resources from the central government.

Reducing transfers is not a reasonable solution. Intergovernmental transfers play a substantial role to reduce inequality, to assure certain minimum level of local public goods and to incentive efficiency allocation of resources in a decentralized environment (Oates 1972). An alternative policy, suggested by the theoretical model, is the inclusion of conditions in the transfer assignment scheme. In particular, allocating certain proportion of transfers based on local fiscal effort indicators might increase effort and local tax collection.

This paper is organized in six sections including the present introduction. Section 2 presents a survey of empirical literature related to identification of the effect of transfers on fiscal effort. Special attention is given to Latin-American cases such as Colombia, Mexico and Peru. In section 3, a model is built to analyze the relationship between transfers and fiscal effort. A simple 1-period political maximization setup is assumed. Section 4

discusses the identification problems and the strategy used to deal with it. Section 5 and 6 present the results and conclusions respectively.

2. LITERATURE SURVEY

Fiscal federalism literature emphasizes two explanations of the effect of transfers on fiscal effort. The first one is based on the assumption of rational benefit maximization. According to this approach, transfer of additional resources reduces fiscal effort because of a substitution effect. Since local governments do not internalize costs of taxes collected to finance transfers, it is optimal for them to substitute local costly taxation with transfers (Peterson 1997). The limitation with this approach is that it assumes that local expenditure is fixed. In this case, the local governments are only reallocating their funding portfolio, choosing the cheaper source.

An alternative explanation is based on the flypaper effect. This phenomenon is based on some empirical evidence proposing that the increase of expenditure is higher when financed by unconditional aid than by own resources (Hines and Thaler 1995). This anomaly can be related to budget-maximizing public officials who are not subject to electoral competition and with uninformed voters (Filimon, Romer et al. 1982). In this case, expenditures might increase more than additional resources due to transfers; the fiscal gap should be filled using debt or levying additional taxes.

It is a common place in fiscal decentralization literature to consider the existence of a relationship between transfers and fiscal effort. However, there is still no consensus regarding its direction or magnitude. The available empirical evidence is not conclusive and in some cases, it is contradictory (Litvack, Ahmad et al. 1998). Most of analyses of the effect of transfers on fiscal effort are based on descriptive statistics like comparing evolution of tax collection and intergovernmental transfer (Cabrerero and Orihuela 2000). On the other hand, the use of econometric models has been limited by data availability and has been concentrated in developed countries such as United States, Canada and Germany (Gramlich 1987; Bird 1994).

In the case of Latin American countries, Colombia and Mexico are the most studied decentralization process. In both cases, the increase of transfers and responsibilities to sub-national governments were significant. Bird (1994) finds evidence of a strong correlation between transfers and local expenditures reduction in Colombian transfers programs. He concludes that receptor communities reduced their fiscal effort due to transfers. This result is consistent with Correa and Steiner (1999) who find evidence of "fiscal apathy" at sub-national level in Colombia. Their estimates suggest that 96% of transfers are used to reduce local taxes and only 4% is allocated to increase local expenditures.

Nevertheless, these results are not robust to changes of the time span of analysis. For instance, Garzón (1997) examines the period before and after the increase of transfer (1986 and 1996). He does not find evidence of reduction in general tax collection among Colombian municipalities. In the same line,

Jaramillo (1999) rejects the hypothesis of fiscal laziness. He finds that while transfers were augmenting, the participation of local governments on national tax collection increased from 9% to 13%.

Other studies support or reject the hypothesis that transfers reduced fiscal effort in Colombia (Ferreira and Valenzuela 1993; Fainboim, Acosta et al. 1994; Wiesner 1994; Vargas and Sarmiento 1997). However, as Bird and Fiszbein (1998) pointed, due to inappropriate use of data or identification methodology, many of them seem flawed.

In the case of Mexico, Nickson (2001) and Cabrero and Orihuela (2000) find evidence that increments of transfers were associated to reductions in fiscal effort. During 1980's, local tax collection was static and local deficits increased. The deficit increment occurred even though the Mexican transfer system includes matching grants designed to incentive local fiscal effort. In addition, Raich (2001) finds a negative relationship between transfers and fiscal effort when analyzing the impact of a transfer to municipalities of Puebla (FAISM, "*Fondo de Aportaciones para la Infraestructura Social Municipal*"). He concludes that the transfer reduced local tax collection and that the effect was greater among the less populated and poorer municipalities.

In the Peruvian case, previous studies find evidence of a negative relationship between transfers and fiscal effort of municipalities (Alvarado 1994; Alvarado, Rivera et al. 2003). The estimated substitution elasticity varies among -0.23 and -0.35. However, the estimation procedures do not consider solution for reverse causality and omitted variables problems that might lead to inconsistent estimations.

3. THE MODEL¹

Consider a local administration or mayor who can finance local expenditures with local taxes T or with transfers from central government Tr . For simplicity, assume that the local government can not save or borrow. Then, all available resources are spent.

$$G = T + Tr$$

Local taxation depends on the effort of the mayor e . Let's assume the following linear specification $T(e) = \gamma e$, where $\gamma > 0$ measures the relation between effort and taxation. Notice that other variables can be included such as fiscal capacity or legal institutions. Nevertheless, these changes do not modify the results of the model.

The transfers have two components. A fixed component F that is assigned considering equalization criteria and a conditional component directly linked to local tax effort αe , where $\alpha \geq 0$ measures how important is

¹ The basic setup of this model is similar to other models related to incentives of local authorities to provide public goods such as Zhuravskaya (2000).

local effort in the assignment formula². Let's assume that effort is observable by the central government. Thus, the transfers received are equal to:

$$Tr = F + \alpha e$$

Effort can increase taxation and transfers if $\alpha > 0$. Nonetheless, effort is costly for the mayor. In particular it is assumed that cost of effort is $0.5ce^2$, $c > 0$. This specific functional form is used for simplicity; any convex and increasing function would produce the same result.

According to the level of local expenditure, the mayor receives a political revenue $R(G)$ which can be interpreted as more popularity, more support for future political appointments or higher reelection probability. The political revenue function is increasing and concave. For simplicity, a Cobb-Douglas function is used.

$$R(G) = \beta G^\delta, \beta > 0, 0 < \delta \leq 1$$

The mayor's problem is to choose a level of effort to maximize the net benefits (political revenues minus cost of effort). $Max_e R(G) - 0.5ce^2$. The first order condition yields the following optimal effort level:

$$e^* = \frac{(\alpha + \gamma)\beta\delta}{c} \times \frac{1}{G^{1-\delta}}$$

Since $G = T + Tr$, effort is decreasing on transfers. Higher transfers increases local public expenditure, it reduces marginal political revenues and disincentives fiscal effort. Then, a negative relation between transfers and fiscal effort exists. Moreover, given the concavity of the political revenue function, the negative relationship between transfers and effort will decrease with the initial level of local expenditure³. Thus, the higher the level of initial expenditure, the lower will be the trade-off between transfers and fiscal effort (see Figure 1). These two implications are testable and will be used in the present paper.

Notice that this result does not imply that poorer communities will show less fiscal effort than richer ones. Actually, assuming the same underlying preferences and costs, the model predicts that local governments with lower levels of expenditure will choose higher levels of effort than richer communities.

² This "effort component" is currently not incorporated in Peruvian transfer system, but it is included in the model in order to analyse its effect in local tax effort.

³ Given the assumptions, $\frac{\partial e^*}{\partial Tr} = \frac{(\alpha + \gamma)\beta\delta(\delta - 1)G^{\delta-2}}{c} < 0$ and $\frac{\partial^2 e^*}{\partial Tr^2} = \frac{(\alpha + \gamma)\beta\delta(\delta - 1)(\delta - 2)G^{\delta-3}}{c} > 0$. Similar results can be obtained with any other concave function of political revenues.

The model has two relevant policy implications. Firstly, fiscal decentralization might reduce local tax collection. Given low fiscal capacity, fiscal decentralization usually involves increments in transfers to local governments. These additional resources may disincentive local tax effort and reduce observed tax collection. The substitution effect may be higher among local governments with lower levels of expenditure, because of decreasing marginal benefits. Secondly, it is possible to reduce this pervasive effect by including fiscal effort indicators in transfer allocation formula. Notice that fiscal effort is increasing in α , the degree of conditionality on effort of the assignment formula. This factor may attenuate the effects of decreasing political benefits or effort's cost.

4. IDENTIFICATION STRATEGY

4.1. Data

In order to identify the relationship between transfers and local fiscal effort financial and socioeconomic data from around 1400 Peruvian district municipalities is used⁴. The financial data contains detailed information about income sources (taxes, transfers and debt) and expenditures for the years 2000 and 2001. This data is continuously collected by the National Public Accounting Office ("*Contaduría Pública de la Nación*"). In addition, socioeconomic information was obtained from the National Census 1993, National Statistics Institute's population forecasts and poverty maps (see Table 1).

Even though it is compulsory to report budgetary and financial information to the Central Government, there is missing information for almost 160 municipalities. If there were any systematic difference between the observed and missing group, the results would be biased. Nonetheless, comparison among both groups using socioeconomic data suggests that they are similar and that reporting bias is not a relevant concern (see Appendix A).

4.2. Econometric model

The basic econometric model is defined as follows:

$$y_{it} = \beta x_{it} + w_t + z_i + \varepsilon_{it},$$

where y_{it} is an indicator of fiscal effort (e.g. tax collection per capita), x_{it} is the amount of transfers received, z_i is a set of time-invariant individual characteristics (e.g. management skills, political background, institutions,

⁴ There are 1818 municipalities in total, 194 at provincial level and 1624 at the district one.

fiscal capacity, etc.) and w_t is set of time-specific effects which affect all municipalities in a given period.

Exploiting the two-period data set, the model is transformed into a first-difference model. This configuration drops out time invariant variables and alleviates the omitted variable problem.

$$\Delta y_i = \alpha + \beta \Delta x_i + \mu_i$$

The model can be applied to different groups in order to allow a differentiated behavior. Considering the possibility that the effect of transfers on fiscal effort varies with initial level of local expenditure, a typology of municipalities, using the clustering technique, is created (see Table 2). Then, the model is applied separately to each subgroup.

A first approach to the data suggests a negative correlation between transfers and tax collection (see Figure 2). However this is not necessarily a causal relationship. It may reflect that transfers are allocated to localities where tax collection is intrinsically low due to reduced fiscal capacity. This is probably true in the Peruvian case where transfers are allocated using equalization criteria and are positively correlated to poverty (see Table 3 and Figure 3). Since poorer areas present lower levels of local tax collection (see Figure 4), it is possible that the observed negative correlation between transfer and tax collection includes the effect of transfers and different fiscal capacity

This reverse causality complicates the identification of the effect of transfer on fiscal effort since it may lead to biased and inconsistent estimations. The problem does not disappear when taking differences since tax collection of poor fiscal capacity municipalities grows slowly and transfers increments follow the same allocation criteria. Then, the reverse causality problem persists and the use of instruments to incorporate exogenous variation is required.

4.3. Using the “additional transfer” as an instrument

This paper exploits the occurrence of a quasi experiment as an instrument to identify the causal relationship between transfers and fiscal effort. Peruvian local governments are highly dependant on transfers from central government. Only 34% of the local budget is financed with local taxes. The access to credit is very low (around 5.5% of total budget). The main source of resources for the majority of municipalities is intergovernmental transfers.

The most important transfer is the Foncomun (“*Fondo de Compensación Municipal*” or Municipal Compensation Fund). This transfer accounts for 35% of local governments’ budget. However it is highly volatile because is basically funded by a value added tax sharing.

In 2000, value added tax decreased significantly due to economic recession and so the resources available for municipalities. Political pressure

arose to increase the transfers to local governments and an additional transfer ("*asignación adicional*") was created⁵.

The additional transfer was assigned to municipalities that were receiving a Foncomun's transfer less or equal to 25,000 soles per month, around US\$ 7,300 (see Table 4). It was valid from August 2000 to December 2001 and benefited more than half of district municipalities. Among the treated group, the additional transfer represented an increase of around 26% of the amount received for Foncomun. During 2001, the program represented an increment of transfer of S/. 39.9 millions (around US\$ 11.6 millions).

According to the law, the additional transfer should be used only in investment. However, in practice conditionality on transfers is not so binding. For example, consider the case of Foncomun. In 2000, the Foncomun was partially earmarked, 80% was supposed to be allocated to investment projects⁶. However, in practice, monitoring was highly unlikely. Alcázar, Lopez-Cáliz et al. (2003) find that only 6% of municipalities has been audited or supervised by a central authority. Therefore, it is not surprising that the financial data from 1998-2001 collected by the central government shows that the investment condition was not fulfilled in any year (see Table 5). This evidence suggests us that in practice the additional transfer was like an unconditional grant.

We claim that the additional transfer was not related to local fiscal capacity and therefore can be used as an instrument for transfer increments. As we mentioned, the allocation rule was based on the total amount of Foncomun received. The Foncomun is allocated mainly based on child mortality, rural and urban population. Then, a poor or rural municipality will receive more Foncomun per capita (see Figure 5). However, the data suggests that the total amount received depends finally on population size (see Figure 6 and 7). It is possible then that relatively rich but small localities received low levels of Foncomun and were able to access the additional transfer meanwhile poor but populated areas did not. This failure on transfer focalization is exploited in the identification strategy.

Furthermore there are no significant differences in treated and non-treated groups before the additional transfer implementation. The rates of poverty and tax collection per capita are similar between municipalities that received the additional transfer and municipalities that did not. There are also similarities in the degree of urbanization and coverage of water, sanitation and electricity services (see Table 6). Furthermore, the distribution functions of tax collection per capita among both groups are alike (see Figure 8). The level of tax collection is similarly distributed in both treated and untreated municipalities and there are not significant differences.

The main difference between both groups is size of population. This is consistent with the explanation that some municipalities received the additional transfer because they were relatively small and not because they had lower fiscal capacity or tax collection. Since receiving additional transfer

⁵ Ley N° 27298.

⁶ Since 2002, the Foncomun has become an unconditional transfer.

is not related to local tax collection and explains transfers increments, it can be used as an instrument to incorporate exogenous variation in the empirical model.

Using the additional transfer as a source of exogenous variation, the basic model can be redefined as a difference in difference model. In this case, the additional transfer is the policy intervention and municipalities which received the transfer are the treated group. The effect of the program is the variation on local tax collection.

$$\Delta y_i = \alpha + \gamma D_i + \mu_i$$

where $D_i = 1$ if municipality received additional transfer, 0 otherwise.

This method does not allow estimating the elasticity of substitution of transfers on fiscal effort (β) but only the total effect of transfer increase on fiscal effort (γ). The program impact can be estimated using propensity score matching. This estimation method improves the comparability of treated and control group and it may reduce any selection bias in the allocation of the additional transfer (Heckman et al. 1998).

5. RESULTS

5.1. Instrumental variable estimations

The results confirm the existence of a negative relationship between transfers and fiscal effort of local governments. The elasticity of substitution estimated using the instrumental variable model is around -1.0. It means that for the average municipality, a transfer increment of US\$1 causes a US\$0.15 reduction of local taxes. The empirical result is robust to changes of control variable sets and exclusion of extreme cases (see Table 7).

As previously noticed, in presence of diminishing political benefits, it is optimal for the mayor to substitute local taxation by transfers, since the former are costly. However, in terms of social welfare this decision is probably inefficient and it might reflect the fact that the mayor does not internalize costs associated to central government taxes.

The magnitude of the estimated elasticity of substitution contrasts with previous studies that found values of -0.24 and -0.35 (Alvarado 1994; Alvarado et al. 2003). The higher currently estimated elasticity is consistent with a previous downward bias due to omitted variables positively correlated to transfers and negatively correlated to local taxation (e.g. fiscal capacity).

There is also evidence of a differentiated effect. Municipalities with lower levels of expenditure per capita present higher substitution elasticity. As long as the initial expenditure increases, the effect becomes smaller and, in the high expenditure group, insignificant (see Table 8 and Figure 9). In the case of low expenditure group, a US\$1 increment of transfers decreases local tax collection by US\$ 0.28 in the average municipality. The trade-off is lower

in the medium expenditure group (only US\$ 0.16) and becomes statistically non different from zero for local governments with high levels of public spending.

5.2. Difference-in-difference estimations

The additional transfer represented a significant increase of transfers among the benefited municipalities. In average, transfers increased on 5% meanwhile among the non-treated group, transfers decreased on 18%. Tax collection variation also differs (see Table 9). Meanwhile the non-treated group increased tax collection on almost 27% the increment among the treated group was only 6%. This evidence is consistent with a negative relation between transfers and fiscal effort.

In order to obtain more accurate difference-in-difference estimators we will use propensity score matching. We preferred this method, instead of simpler difference-in-difference estimations, in order to take into account any possible differences between both treated and non-treated.

The procedure implemented is as follow. First, we estimate the probability (or propensity scores) of receiving the additional transfer. We consider several financial and socioeconomic variables to estimate the propensity score (see Appendix B). Then, we match the treated and control municipalities using kernel matching. Finally, we estimate the difference in difference effect. Since the results are sensible to bandwidth specification, we perform a sensitivity analysis using different bandwidth values.

The results are similar to the obtained with the instrumental variable model. The impact of the additional transfer was negative, reducing the local tax collection almost 20% in average (see Figure 10). The estimated effect is robust to changes in bandwidth values. Furthermore, the effect is also differentiated by type of municipality. The negative impact of the transfer is higher between low expenditure municipalities. The effect dilutes as long as the expenditure level increases (see Figure 11).

The similarity of treated and control groups and the estimated effects suggests that selection bias is not a significant problem. The additional transfer was allocated to municipalities with less population. However, the poverty and fiscal capacity characteristics were similar. When the indicators are scaled by population (e.g. per capita tax collection) the differences between treated and control groups disappear. Then, the propensity score matching estimates become similar to the instrumental variable models.

5.3. Is this a causal relationship?

There is reasonable evidence that the estimators are consistent and that a negative relationship has been identified. Firstly, the use of a two period first-difference model, equivalent to a fixed effect panel data, reduces the presence of omitted variables. Unobservable factors such as fiscal capacity, political background, local institutions, managerial skills, etc. may affect significantly

the level of local tax collection. Excluding them from a regression may lead to inconsistent estimations. Nonetheless, these factors are quite invariable in the two-year period of analysis. Moreover, there were not local elections or significant changes in local taxes or transfer system besides the additional transfer.

The selected model specification drops out most of the effect of these unobserved determinants. It is favorable for identifying the relationship between transfers and fiscal effort. However it eliminates the possibility to explore their effect. For instance, the model is unable to address the importance of fiscal capacity, socioeconomic conditions or political variables.

In second place, the probable causal reverse problem is addressed using the additional transfer as a source of exogenous variation. Reviewing the institutional procedure to allocate this transfer shows that it was not related to local tax collection but to population size. In addition, both treated and untreated groups present similar levels of tax collection per capita and poverty index reassuring the presumption that the transfer was distributed regardless of these factors.

5.4. Net effect on local governments' budget constraint

A relevant policy question is to ask if the transfer increased the net resources available for local governments. In order to solve this question, we run the following difference-in-difference model $\Delta y_i = \alpha + \gamma D_i + \sum_k \delta_k z_{ik} + \mu_i$ where D is a dummy variable to identify a municipality that received additional transfer and z_k are control variables (e.g. poverty rate, density, population, etc.). Note that this model is similar to the propensity score matching but the parameters are estimated using ordinary least squares. As we argued before, the additional transfer is an exogenous variable and the selection bias is not a significant problem. Then, it is safe to use least squares. As expected, the estimated effect of transfers on local tax is similar to the values obtained using the other methods (see Table 10).

Using the estimated parameters, we predict the growth rate of local tax collection for year 2001 with and without additional transfer. Then, we apply the estimated growth rates to the previous tax collection base to obtain estimations of tax collection levels with and without additional transfer. This is a gross procedure since it assumes that the response of the agents to other factors remain similar. However, since the other variables are relatively structural and time invariant, we have confidence that the results will not be too biased.

The results of this exercise are presented in Table 11. The estimated reduction on local tax collection in 2001 is around S/. 36 millions. In the same period, the amount distributed as additional transfer was S/. 39.9 millions. If we consider that the reduction on local tax collection is a point estimate, the net change in local governments' budget is negligible. Furthermore, the substitution of local taxation by transfers is mainly explained by reduction on

tax collection in local governments with low and medium levels of per capita expenditure. These two groups absorb 88% of tax collection reduction and also present higher relative reductions. Meanwhile the additional transfer reduced tax collection of high expenditure governments in 1.2%, the reduction on low and medium expenditure governments was around 5-6%.

6. FINAL REMARKS

Devolving responsibilities to local governments has been considered as a mechanism to improve government responsiveness to local needs. However, efficiency gains have been contrasted with risk of local capture, corruption and higher production costs. This paper explores an additional side effect: disincentive of local fiscal effort due to transfers from central government.

The analytical model shows that in presence of diminishing marginal political benefits, transfer increments will induce the mayor to reduce fiscal effort. This trade-off will be greater among communities with low levels of public expenditure. The identification of the causal relationship is not straightforward. Usual econometric estimations face omitted variables and reverse causality problems. Due to these problems, estimations would be biased and inconsistent.

This paper exploits panel data specification and a quasi experiment to identify the relationship. Using financial and socioeconomic data from about 1,400 Peruvian local governments, a first-difference instrumental variable model is estimated. In addition, propensity score matching is used to address possible selection bias and to check the robustness of the findings.

The results confirm the hypotheses from the analytical model. There is evidence of a negative relationship between transfers and fiscal effort. The estimated elasticity of substitution is around -1.0. Moreover, the substitution effect is greater among local governments with lower levels of per capita expenditure.

The negative relationship between transfers and fiscal effort has serious implications in fiscal decentralization design, especially in the actual Peruvian decentralization process. Devolving expenditure responsibilities to sub-national governments requires providing them enough financial resources. Given lack of local fiscal capacity, most of the new expenditures must be financed via intergovernmental transfers. As the available evidence suggests, fiscal decentralization may reduce local fiscal effort and local tax collection, increasing dependence from central government and augmenting aggregate fiscal deficit. The effect would be greater among local governments with lower levels of per capita expenditure.

Incorporating an effort-related component to equalization transfers may reduce the negative incentives of transfers. For example, fiscal effort indicators such as the ratio of actual collected revenues to some measure of fiscal capacity can be included in the allocation formula.

Figure 1: Fiscal effort and transfers

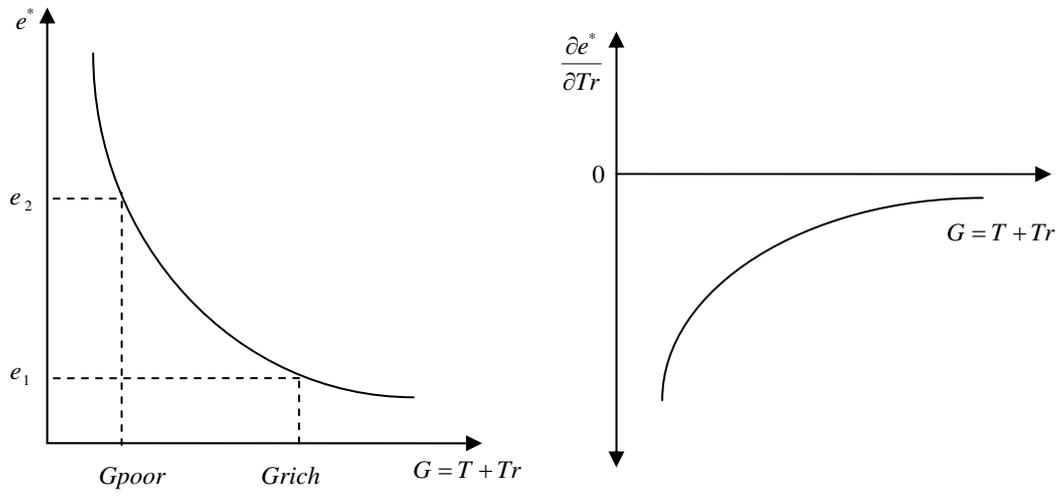


Figure 2: Tax collection and transfer per capita

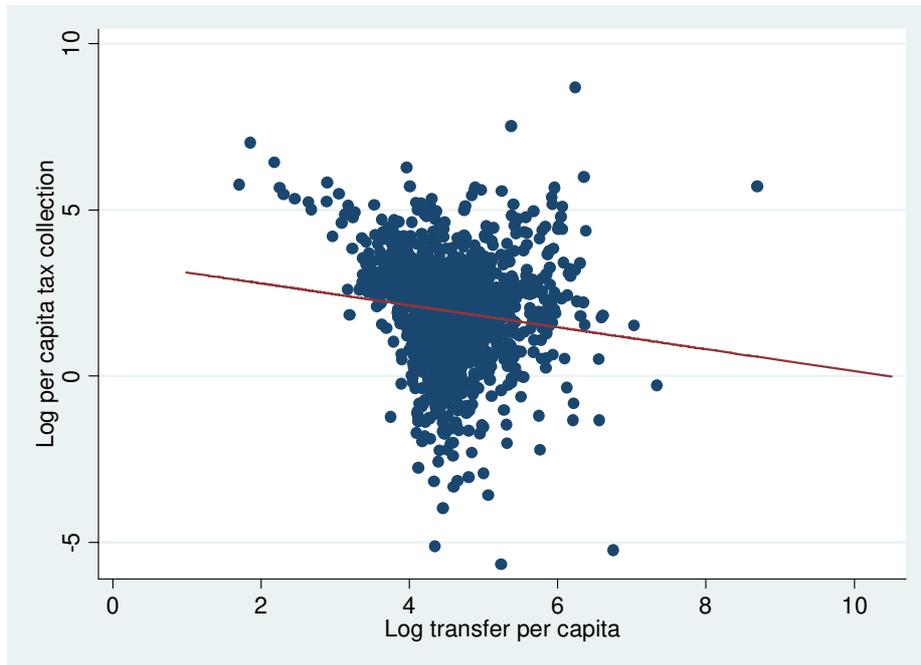


Figure 3: Transfers and poverty rate

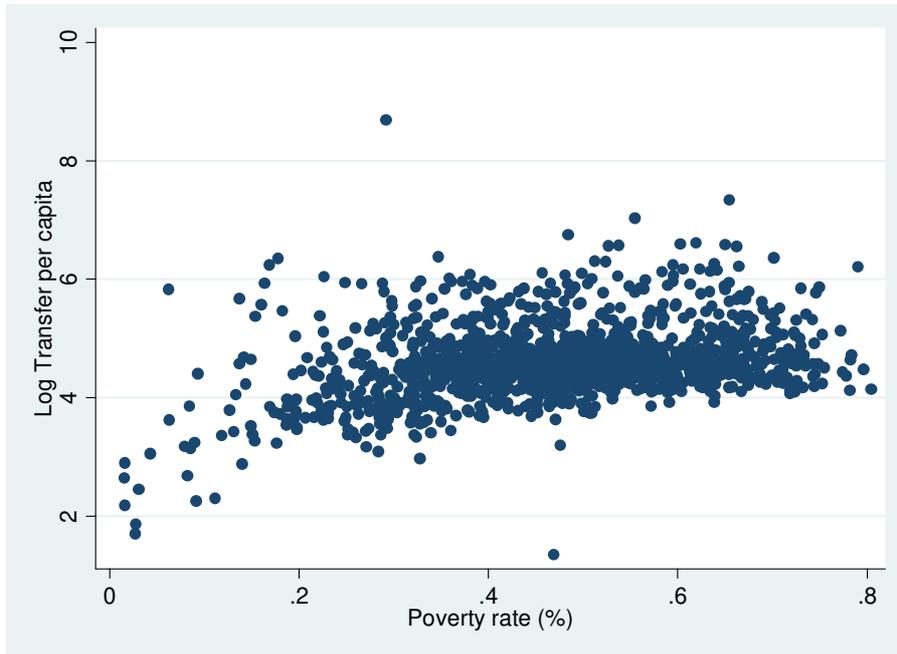


Figure 4: Tax collection and poverty rate

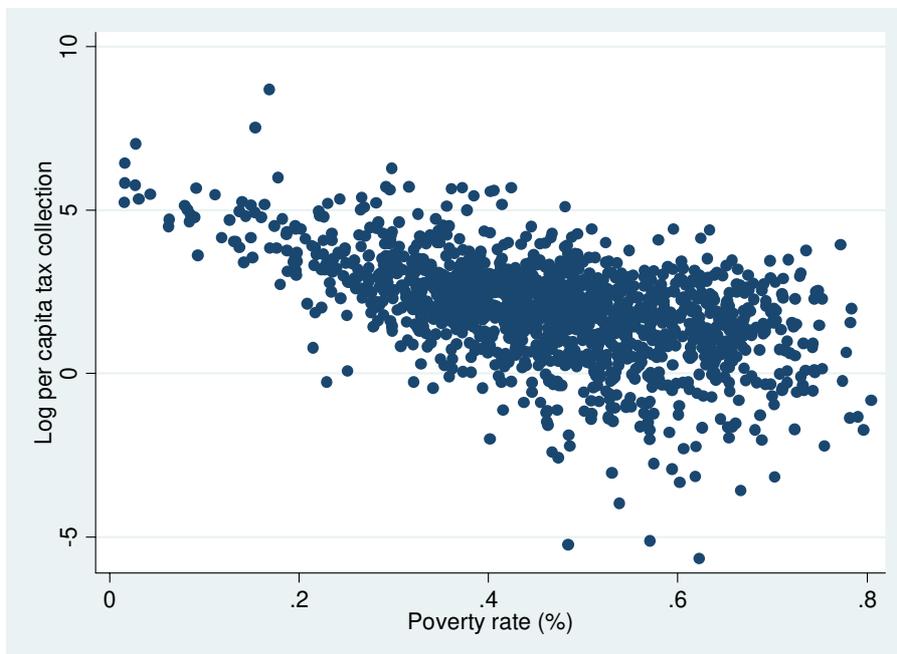


Figure 5: Foncomun per capita and poverty rate

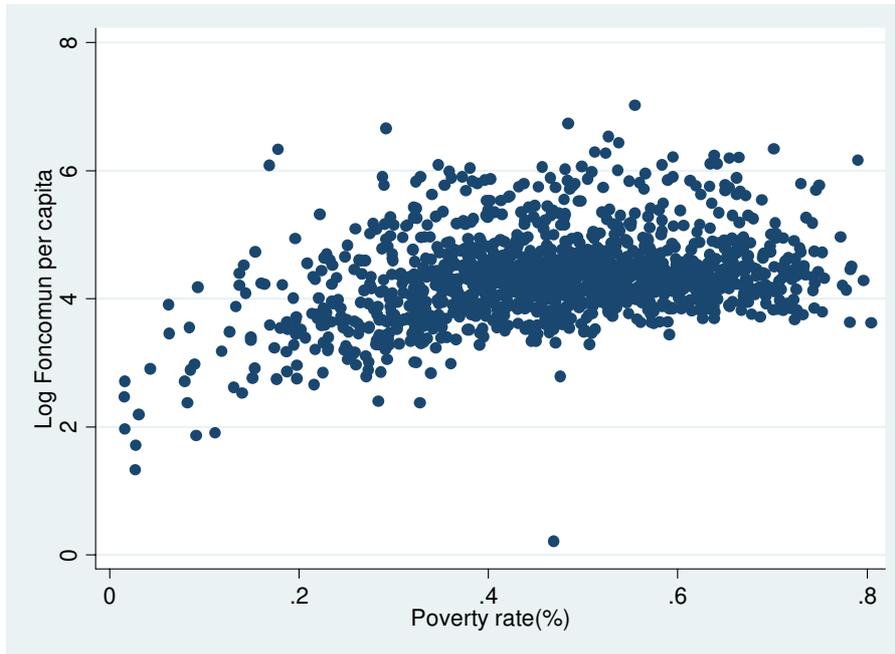


Figure 6: Total Foncomun and population

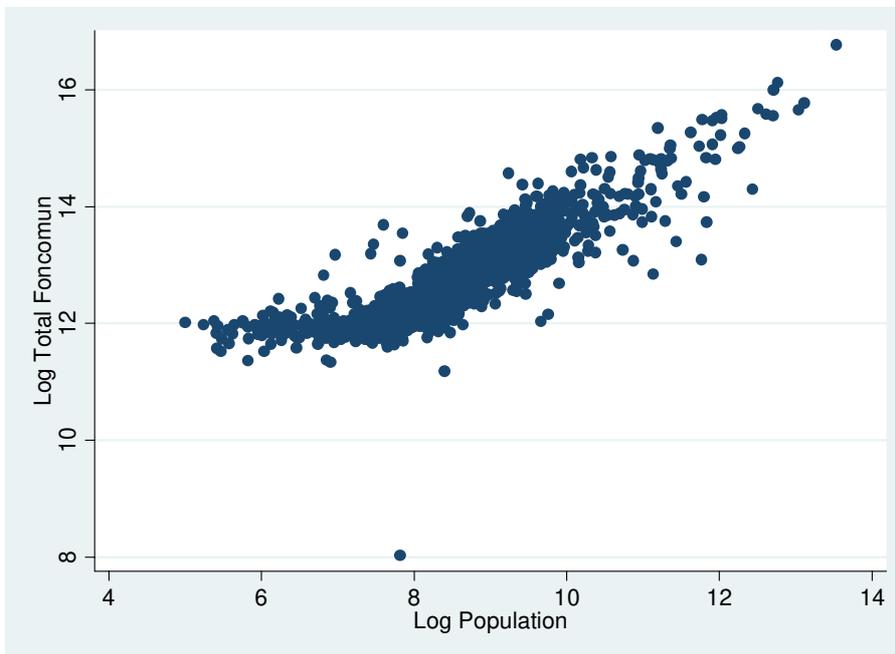


Figure 7: Total Foncomun and poverty rate

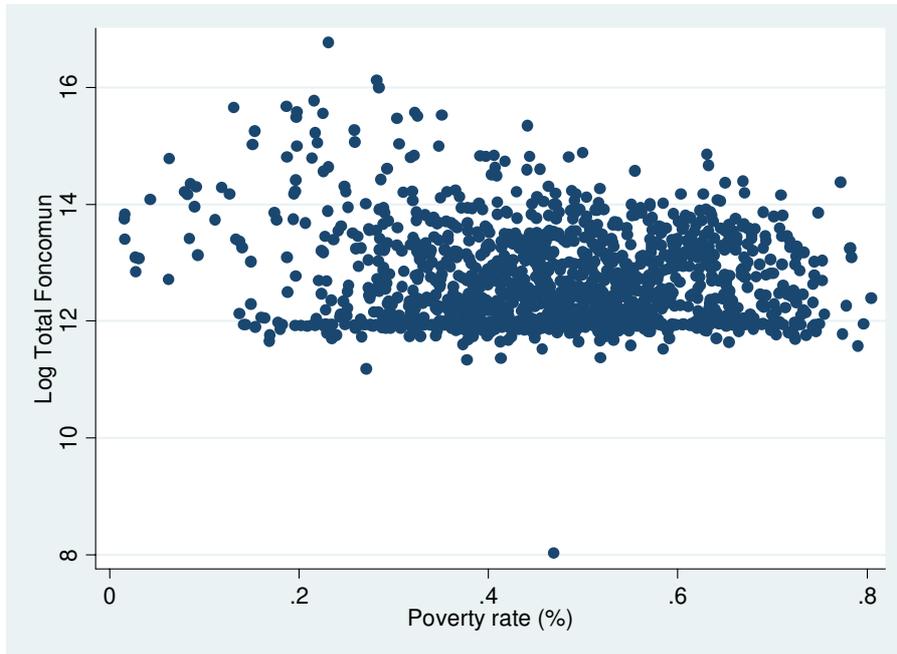


Figure 8: Kernel density of Log per capita local tax collection

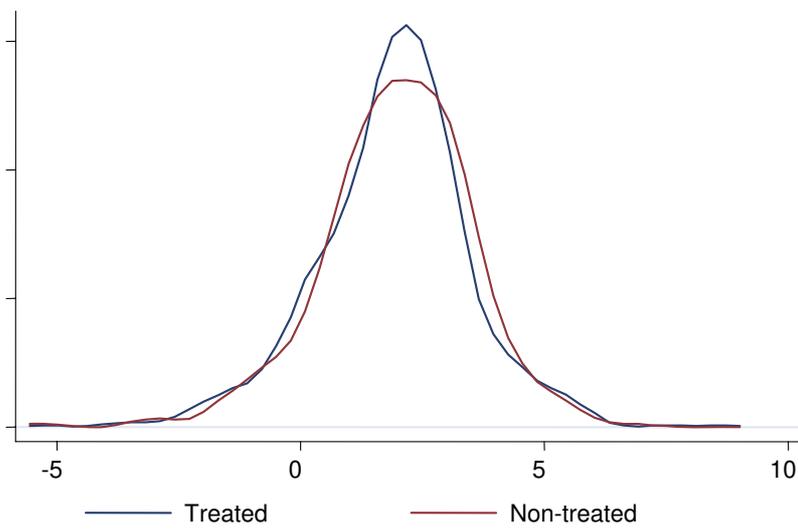
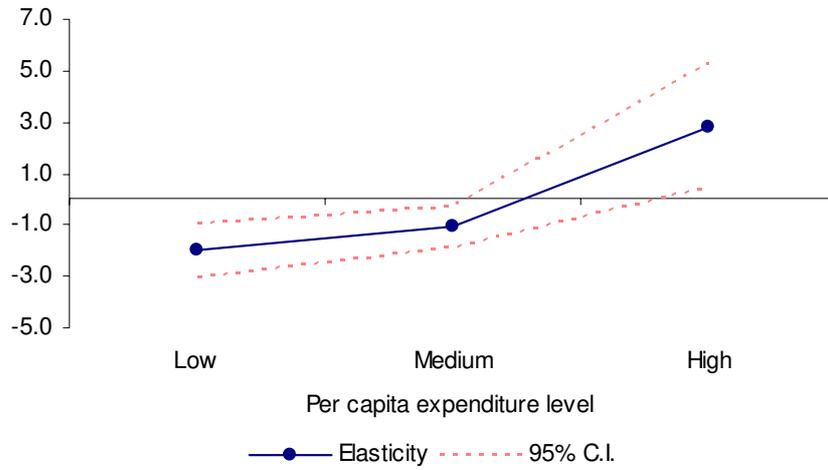
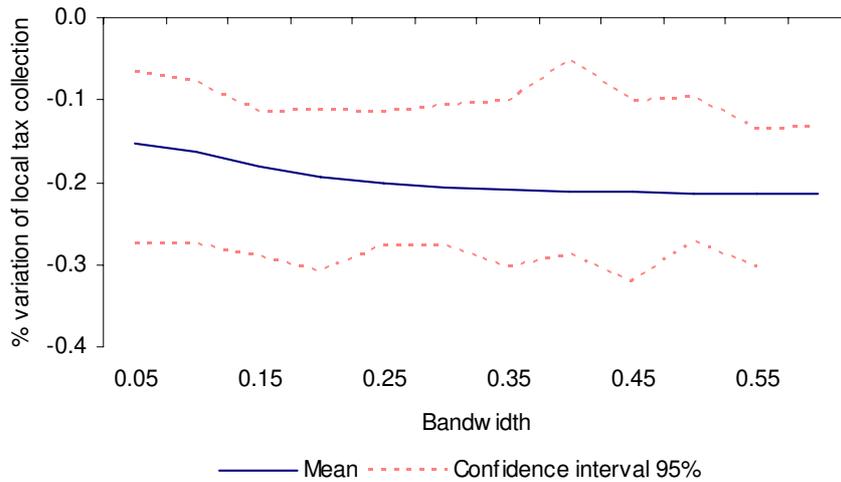


Figure 9: Effect of transfers on local tax collection by type of municipality



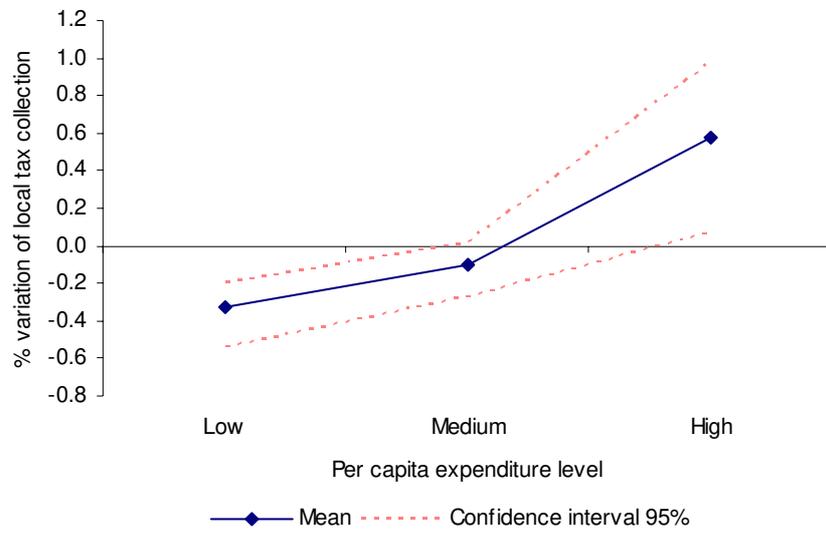
Note: the values correspond to the model with control variables.

Figure 10: Impact of additional transfer on local tax collection (estimated using propensity score matching)



Note: Standard errors estimated with bootstrapping.

**Figure 11: Impact of additional transfer on local tax collection
by type of municipality**
(estimated using propensity score matching)



Note: Standard errors estimated with bootstrapping. Bandwidth = 0.1

Table 1: Description of dataset

Variable	Unit	Period	N	Source
1 Directly collected resources	Current Nuevos Soles	2000, 2001	1391, 1459	National Public Accounting Office
2 Municipal local taxes	"	"	"	"
3 Foncomun	"	"	"	"
4 Canon	"	"	"	"
5 Custom rent	"	"	"	"
6 Donations	"	"	"	"
7 Internal credit	"	"	"	"
8 External credit	"	"	"	"
9 Received additional transfers	Dummy variable (1 if received it, 0 otherwise)	2001	1458	Ministry of Economics and Finance
10 Population	Number of persons	2002	1458	National Statistics Institute
11 Urban population	"	1993	1367	National Census 1993
12 Rural population	"	"	"	"
13 Size	Km ²	"	"	"
14 Poverty index	Index	2000	1457	Poverty Map
15 Population without water	Percentage	"	"	"
16 Population without sanitation	"	"	"	"
17 Population without electricity	"	"	"	"

Table 2: Characteristics of municipalities by type

Variable	Per capita expenditure level		
	Low	Medium	High
% Received additional transfer	44.7	63.7	80.4
Expenditure per capita (S/.)	85.4	155.0	531.9
Tax collection per capita (S/.)	9.9	19.2	121.2
Per capita Foncomun	56.1	98.9	259.6
Local tax / Total expenditure	11.9	12.0	16.4
Transfers / Total expenditure	84.4	80.9	75.2
% households without water	37.4	36.2	41.9
% households without sanitation	76.4	72.3	66.6
% households without electricity	61.8	60.9	61.9
Poverty Index (% households poor)	46.4	47.4	45.8
Population (N° persons)	17,457.6	7,719.3	6,221.6
Urban density	284.4	404.9	438.5
Urban population / total population	38.7	39.1	52.2
N° municipalities	664	571	153

Table 3: Summary of transfers to district municipalities

Transfer	Revenue source	Assignment rule	Use restrictions
Foncomun (Fondo de Compensación Municipal)	Mainly, share in value add tax. Other taxes such as recreational yachts tax, gambling tax, etc. also contributes but in very small amount.	Assigned in two stages. In the first stage is assigned among provinces considering population size and children mortality rate. In the second stage, it is distributed inside the province considering urban and rural population size. The amount assigned cannot be under certain minimum level (around US\$3300 per month in 2000)	Until 2001, 80% to capital expenditures. Since 2002 it is an unconditional transfer.
Canon y Sobre canon 1/	Share in profit tax of mining companies	Only to municipalities in the region where the mine is located. The index is similar to Foncomun's but there is not a minimum level.	None
	Share in oil sales	Only to municipalities in oil production areas. Distribution in two stages. In the first stage is distributed between regional governments, research centers or universities and local governments. In the second stage, it is distributed among local governments considering mainly geographical size and population.	None
Renta de aduanas	Share in custom duties	Only to municipalities in provinces with a custom. In one case (Provincia de El Callao) it is allocated between regional government (70%), an educational fund (10%) and local governments (20%). In the rest of cases, 50% is distributed in equal parts between local governments and the remain considering population size.	Only in a specific case (Provincia de El Callao). In the rest of provinces there is no conditionality.
Vaso de Leche	Central government budget	Allocated considering the number of potential beneficiaries of the food provision program.	Conditioned to finance a food program. The "Vaso de Leche" program provides milk to children, pregnant women and elders.

1/ This table reflects the situation in the year 2001. There were substantial changes in the year 2002.

Table 4: Distribution of additional transfer
(In Nuevos Soles)

Type	Monthly amount received for Foncomun	Monthly additional transfer
A	11,000 to 17,000	4,000
B	17,001 to 20,000	3,000
C	20,001 to 23,000	2,000
D	23,001 to 25,000	Variable 1/

1/ Difference between 25,000 and actual transfer.

Table 5: Effective use of Foncomun
(% of total transfer)

Type of expenditure	Year			
	1998	1999	2000	2001
Non-investment 1/	33.4	34.6	41.8	46.4
Investment	66.6	65.4	58.2	53.6

1/ Includes current expenditures and payment of debt principal and interests.

Table 6: Characteristics of municipalities before additional transfer

Variable	Non-treated		Treated	
	Mean	St. Dev.	Mean	St. Dev.
Tax collection per capita (S/.)	21.7	2.6	29.2	8.1
Urban population / total population	38.2	1.4	42.0	1.0
Poverty Index (% households poor)	46.1	0.6	47.2	0.5
% households without water	41.3	1.3	34.5	1.2
% households without sanitation	77.3	1.1	70.8	1.2
% households without electricity	61.6	1.4	61.4	1.3
Population (N° persons)	24,875	2,306	2,434	61

Table 7: Instrumental variable model

dLog (Local tax per capita)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
dlog (Transfer per capita)	-0.925 (0.237)**	-0.927 (0.239)**	-1.171 (0.292)**	-1.255 (0.296)**	-1.164 (0.285)**	-0.817 (0.222)**	-0.797 (0.221)**	-0.797 (0.221)**	-1.069 (0.261)**	-0.986 (0.254)**
Poverty rate		0.329 (0.197)	0.15 (0.207)	0.163 (0.214)	-0.133 (0.254)		-0.209 (0.217)	-0.209 (0.217)	-0.363 (0.235)	-0.582 (0.264)*
Population			0 (0.000)**	0 (0.000)**	0 (0.000)**				0 (0.000)**	0 (0.000)*
Urban density				-0.001 (0.001)	-0.002 (0.001)				-0.002 (0.001)*	-0.002 (0.001)*
% urban population					0.272 (0.110)*					0.212 (0.098)*
Constant	0.104 (0.032)**	-0.051 (0.089)	0.05 (0.092)	0.067 (0.095)	0.045 (0.093)	0.02 (0.031)	0.119 (0.099)	0.119 (0.099)	0.234 (0.107)*	0.211 (0.106)*
N° obs.	1260	1259	1259	1232	1232	1037	1036	1036	1013	1013
d(Tax)/d(Transfer) ^{1/}	-0.14	-0.14	-0.18	-0.19	-0.18	-0.12	-0.12	-0.12	-0.16	-0.15

Robust standard errors in parentheses. * 5% significant ** 1% significant

In all the models the variable $D\log(\text{transfer per capita})$ was instrumented using variable "Additional transfer" (1 if municipality received additional transfer, 0 otherwise) and the remaining control variables.

Models (6) to (10) use sample without extreme values of local tax per capita.

1/ Approximate value obtained multiplying substitution elasticity by average Tax/Transfer

Table 8: Instrumental variable model by type of municipality

dLog (Local tax per capita)	Expenditure per capita 2/					
	Low		Medium		High	
dlog (Transfer per capita)	-1.548 (0.423)**	-1.985 (0.522)**	-0.759 (0.312)*	-1.09 (0.392)**	2.233 (1.223)	2.832 (1.191)*
Poverty rate		0.142 (0.478)		-0.561 (0.359)		-1.457 (0.689)*
Population		0 (0.000)*		0 (0.000)*		0 0.000
Urban density		-0.001 (0.001)		-0.004 (0.002)*		-0.023 (0.013)
% urban population		0.418 (0.182)*		0.295 (0.172)		0.053 (0.465)
Constant	0.052 (0.064)	-0.218 (0.161)	0.086 (0.040)*	0.243 (0.140)	0.133 (0.115)	0.84 (0.369)*
N° obs.	607	590	521	512	132	130
d(Tax)/d(Transfer) ^{1/}	-0.219	-0.281	-0.113	-0.162	0.487	0.618

Robust standard errors in parentheses. * 5% significant ** 1% significant

In all the models the variable Dlog(transfer per capita) was instrumented using variable "Additional transfer"

(1 if municipality received additional transfer, 0 otherwise) and the remaining control variables.

1/ Approximate value obtained multiplying substitution elasticity by average Tax/Transfer

2/ Typology was constructed using cluster analysis.

Table 9: Tax collection and transfer variation after additional transfer

Per capita expenditure level	Var. % Transfers		Var. % Local tax collection	
	Non treated	Treated	Non treated	Treated
Low	-0.188	0.065	0.225	0.035
Medium	-0.188	0.030	0.345	0.027
High	-0.182	0.059	-0.257	0.235
Total	-0.188	0.051	0.276	0.063

Table 10: Effect of additional transfer on local tax collection

dLog (Local tax per capita)	(1)
Received additional transfer	-0.237 (0.055)**
Poverty rate	-0.088 (0.242)
Population	0 (0.000)*
Urban density	-0.001 (0.001)
% urban population	0.243 (0.106)*
Constant	0.217 (0.087)*
N° obs.	1233

*Robust standard errors in parentheses. * 5% significant ** 1% significant
Model estimated using least squares.*

Table 11: Loss on local tax collection due to additional transfer

Level of per capita expenditure	Predicted local tax collection 2001 (S/. mn)		Loss due to additional transfer (2) - (1)	% total loss
	With additional transfer (1)	Without additional transfer (2)		
Low	249.4	262.1	12.7	35%
Medium	294.3	313.4	19.1	53%
High	344.5	348.7	4.2	12%
Total	888.2	924.2	36.0	100%

APPENDIX A: REPORTING SELECTION BIAS

The comparison of socioeconomic information between reporting and non-reporting municipalities suggests that there are no significant differences among them (see Table A.1). Both groups present similar poverty rates and access to basic utilities.

In order to evaluate any systematic difference in a more rigorous way, a probit model was estimated (see Table A.2). This procedure is equivalent to the first stage of a Heckman selection-bias model. None of the available variables is significant. This evidence rejects the hypothesis of existence of selection bias.

Table A.1: Comparison of reporting and non-reporting municipalities

Variable	Reporting		Non-reporting		Total	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Foncomun 2001	512,768	23,733	414,104	39,853	498,534	21,121
Population 1999	11,572	1,002	7,393	1,592	10,969	888
Foncomun 2001 per capita	114.1	3.1	124.8	8.9	115.6	2.9
Poverty Index (% households poor)	46.7	0.4	46.9	0.9	46.8	0.4
Malnutrition rate (% children under 5)	37.2	0.3	37.3	0.7	37.2	0.3
% households without water	37.5	0.9	41.6	2.2	38.1	0.8
% households without sanitation	73.6	0.8	76.6	2.0	74.0	0.8
% households without electricity	61.5	0.9	63.3	2.2	61.7	0.9

Table A.2: Probit model of probability of reporting information

Reported financial information	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Foncomun 2001 per capita	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
Population 1999	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	
Porverty index	0.734 (0.527)	0.521 (0.467)	0.323 (0.439)	0.042 (0.410)	0.115 (0.284)		
Malnutrition rate	-0.003 (0.005)	-0.002 (0.005)	-0.002 (0.005)	0.001 (0.005)			
% households without water	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)				
% households without sanitation	-0.002 (0.00)	-0.002 (0.00)					
% households without electricity	-0.001 (0.001)						
Constants	1.158 (0.175)**	1.146 (0.174)**	1.073 (0.163)**	1 (0.158)**	1.014 (0.148)**	1.07 (0.058)**	1.106 (0.053)**
Observations	1622	1622	1622	1622	1622	1622	1622

*Robust standard errors in parentheses. * 5% significant ** 1% significant*

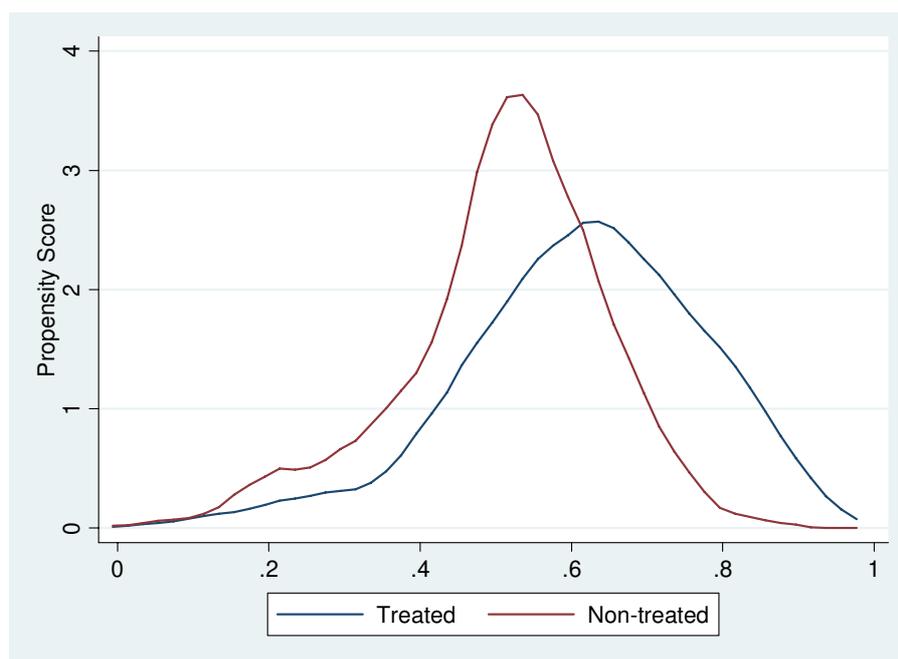
APPENDIX C: PROPENSITY SCORE MATCHING

The construction of the propensity scores incorporated the following variables:

- Ln tax collection per capita
- Local tax collection / total expenditure
- Poverty rate
- % households without water
- % households without sanitation
- % households without electricity
- Urban density
- Urban population / total population

The existence of a common support was tested comparing the distribution of treated and control observations. The common support is broad and includes around 86% of observations (see Figure C.1).

Figure C.1: Distribution and common support of propensity score



The average treatment effect was estimated considering different bandwidth values. The results are presented in the following table.

Table C.1: Propensity Score matching estimates

Bandwidth	ATT	Confidence interval 95% 1/	
0.05	-0.15	-0.27	-0.07
0.10	-0.16	-0.27	-0.08
0.15	-0.18	-0.29	-0.11
0.20	-0.19	-0.31	-0.11
0.25	-0.20	-0.28	-0.11
0.30	-0.21	-0.28	-0.11
0.35	-0.21	-0.30	-0.10
0.40	-0.21	-0.29	-0.05
0.45	-0.21	-0.32	-0.10
0.50	-0.21	-0.27	-0.10
0.55	-0.21	-0.30	-0.14
0.60	-0.21	-0.30	-0.13

1/ Estimated using bootstrapping.

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