Can Fiscal Transfers Increase Local Revenue Collection? Evidence From The Philippines

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Abstract

Federal lump sum transfers often fund the majority of developing country local budgets. Standard median voter models predict that most of these transfers will be returned to voters through tax decreases,"crowding out" local revenue collection. However, there is little evidence on crowd out in developing countries, where deviations from the standard model might generate very different responses to transfers. I exploit exogenous variation in federal lump sum transfers to Philippine municipalities to identify the effect of transfers on local revenue collection. Contrary to the standard prediction, I find that transfers increase, or "crowd in" local revenue by 0.34-0.39 cents per dollar of transfer. Additionally, transfers induce small declines in child malnutrition. I consider two likely explanations for these results: (i) fixed costs and credit constraints and (ii) fiscal stimulus. I conclude that (i) is most consistent with my results, indicating that fiscal transfers can build capacity and that credit constraints be considered in fiscal models of developing country localities.

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1 Introduction

Can decentralization improve service provision in developing countries? Classic models predict federal transfers, common in decentralized developing countries, to decrease local revenue collection rather than improve local capacity to deliver services to the poor.[1] However, Bardhan (2002) argues these models have limited applicability in developing countries. Decentralization policies are typically (i) motivated by poverty alleviation, not efficiency, and (ii) vulnerable to corruption due to weak governance. Given these differences, it is an empirical question whether transfers build capacity or fuel corruption. Recent empirical evidence from Brazil supports the latter: transfers encourage more corrupt local mayoral candidates and patronage in weakly governed localities (Brollo et al. (2013) and Caselli and Michaels (2013)).

This paper is the first to examine the causal effect of developing country federal transfers on a measure of local capacity: the ability of local governments to collect their own revenues. Using data from 1465 Philippine municipalities over nine years,[2] I find evidence that transfers can be capacity building even in the presence of weak governance. Contrary to standard public finance model predictions, transfers increase, or "crowd in" local revenue by 0.34-0.39 cents per dollar of additional transfer. Within local revenues, transfers increase both tax and non tax revenue. I explore heterogeneous effects of transfers, and find that revenue increases are higher in municipalities with higher levels of existing capacity, proxied by the ratio of registered municipal births to total municipal births from the 2007 census. The transfer does not appear to help places with low levels of existing state capacity increase local revenues. Rather, it is the higher state capacity places that are in a position to use the transfer to build further capacity. I also find that transfers decrease child malnutrition,

[1] Developing country local governments rely on transfers from the national government to finance anywhere from 45% (Colombia) to 85% (Philippines) of their budget, relying on locally collected taxes and fees to cover remaining spending needs (Melo (2002)). In contrast, U.S. municipal governments receive significantly less of their budget (25%-30%) from state and federal sources, raising a much larger fraction from local sources (National League of Cities (2014)).

[2] The Philippine equivalent of U.S. counties.

evidence that the additional revenues are put towards welfare improving programs rather than toward patronage or the mayor's private income.

The Philippines is an exceptional testing ground to study whether developing country federal transfers build capacity or fuel corruption. The transfer I study is (i) large, accounting for the majority of municipal government revenue, (ii) automatically disbursed directly to municipal governments and (iii) formula based, generating exogenous variation. The Philippines is also characterized by weak governance. Transparency International continually ranks the Philippines near the bottom 25th percentile in their Corruption Perceptions Index, and extortion and vote buying are common in local governments (Cruz (2014)).

To identify causal effects, I instrument for reported federal transfers using exogenous variation in an allocation formula used to determine the amount of transfer each municipality receives. The formula contains five main sources of variation: municipal census population (measured every 5-7 years), municipal land area, the total size of the municipal transfer program, total municipal land area and total municipal census population. These sources enter multiplicatively into the allocation formula, generating variation in transfers that is exogenous to local revenue collection conditional on controls.

The standard median voter model predicts that federal transfers decrease local revenue. In equilibrium, the median voter's preferred bundle of private and public goods is implemented. Voters treat public income (government's budget) and private income (voter's budget) as equivalent. Increases in transfers represent an increase in public income. When income increases (public or private), the income effect induces the median voter to increase demand for both public goods, through increased government spending and private goods, through lower taxes. Thus, transfers decrease, or "crowd out" local revenues.

However, deviations from this standard model can produce the "crowd-in" effect I identify. I consider three such deviations. These explanations require mechanisms beyond those in the current fiscal transfer literature, which focuses almost exclusively on developed countries.

I consider three potential mechanisms: (i) fixed costs and credit constraints and (ii) fiscal stimulus.

Fixed costs and credit constraints are a straightforward deviation from the standard model that is absent from the literature, but likely to occur in developing countries. There may be fixed costs to revenue collection, and credit constrained municipalities cannot cover these costs on their own. Once a large enough transfer comes in, municipalities can cover fixed costs and increase revenue collection.

An alternative mechanism is fiscal stimulus. In this world, the municipality receives a transfer spends most of it on public goods. These public goods stimulate spending on private goods. Private goods are taxed, thus increased spending on private goods drives increased tax revenues.

I conclude that (i), fixed costs and credit constraints, is most consistent with my results by ruling out the other two explanations as dominant mechanisms. I rule out fiscal stimulus as the dominant effect by finding no evidence that private sector activity drives my results, as measured by municipal new construction.

Finally, I show that transfers generate small, but measurable declines in local child malnutrition. In contrast to the recent studies in Brazil, this result suggests that transfers do not flow primarily to patronage, vote buying or the mayor's private income. Rather, additional revenues are spent on increased public services that alleviate poverty.

This paper contributes to the vast "flypaper effect" literature that tests the median voter crowd out prediction empirically. These papers find that spending on public services increases by more than the model predicts, and taxes decrease by less than the model predicts (see Hines and Thaler (1995) for a review, Dahlberg et al. (2008) for a more current example). This literature explores various mechanisms for this result: asymmetric information (Filimon et al. (1982)), costly taxation (Aragon (2013)), fiscal illusion (Hines and Thaler (1995)) and budget persistence Chamberlain (2013). However, these mechanisms are not sufficient to

explain why local revenues increase, only why they decrease less than expected. Therefore, these mechanisms alone cannot explain my result.

This paper also contributes to a small, but growing literature on transfers to local governments in developing countries. Recent evidence from Brazil suggests that transfers can have adverse effects in the presence of weak governance. Transfers have been shown to increase local corruption (Brollo et al. (2013)) and oil windfall revenues are suspected to flow towards patronage and embezzlement (Caselli and Michaels (2013)). This paper is the first to provide evidence that transfers can be capacity building and welfare improving even in the presence of weak governance.

Finally, this paper adds to the broader literature on fiscal decentralization in developing countries (see Bardhan (2002) for a review). In practice, many developing countries (including the Philippines) have devolved service provision but not revenue collection(Gadenne and Singhal (2013)). In other words, federal transfers, rather than local revenues, fund a large portion of local service provision in many decentralized developing countries. Thus, understanding federal transfers is critical to the study of decentralization in developing countries.

Because transfers comprise the majority of Philippine local government budgets, there is also considerable policy work exploring the impact of transfers (Manasan (2007), Gatmaytan (2001)). These studies focus on design, implementation, and transfers' role in local fiscal autonomy, or the ability of local governments to raise their own revenues. The most related work is Capuno (2001), a policy oriented paper examining a major decentralization policy change in a panel of Philippine provinces. He finds that transfers are correlated with increases in local revenues after the policy change, but does not attempt to address the endogeneity of transfers or explore the theoretical implications.

This paper proceeds as follows. Section I describes the Philippine context: why it is exceptional for studying transfers and local revenues, what data are available, and how local

revenue collection works. Section II outlines the instrumental variables strategy. I present results in Section III. In Section IV, I describe three sets of mechanisms that generate transfer crowd-in, rather than crowd out, of local revenues. Section V concludes.

2 Philippines Data and Context

2.1 Why The Philippines?

The Philippines is an exceptional context to study whether federal transfers build capacity or fuel corruption. Philippine local governments are weakly governed, as extortion and vote buying are common. Federal transfers are (i) large, (ii) automatically disbursed to municipal governments and (iii) formula based, generating exogenous variation. Known as the Internal Revenue Allotment (IRA), federal transfers are funded by a fixed percentage of national tax revenues from three years prior, which typically increase over time. Figure 1 illustrates that the municipal transfer program increases almost every year in my sample. On average, municipalities receive around 1 billion dollars (49,905 million PHP) total in transfers (Table 2, Tot Mun. IRA Transfer).

IRA transfers fund the majority of average municipal budgets. Figure 2 depicts the distribution of the IRA transfer as a share of the total local budget for municipalities in the Philippines. The average municipality takes in 85% of its revenues from the IRA. This is on the high end for developing countries. Transfers account for around 45% of local revenues in Colombia and 60% of local revenues in Peru (Melo (2002), Aragon (2013)). For the US, the figure is around 25-30% (National League of Cities (2014)).

The IRA transfer is disbursed directly to municipal governments from the national government. Thus, there is less potential for endogenous political manipulation and leakages at the province or regional level before the transfer reaches municipal authorities. This system of

transfers has existed in its current form since the early 1990s, when the Philippines enacted the Local Government Code of 1991 (LGC), a policy designed to expand the autonomy of local governments by delegating service provision and various regulatory powers to localities. The IRA transfer's allocation formula was designed to make transfer distribution less politicized after the highly discretionary transfer system under autocrat Ferdinand Marcos. The transfer itself was designed to provide local governments with the additional resources necessary to fund their new responsibilities. For Philippine municipalities, these responsibilities include providing primary health care through municipal and barangay (village) health offices (Atienza (2004)) and running various public enterprises (markets, bus terminals, slaughterhouses) and extension services (agricultural, veterinarian, irrigation (BLGF (2007)).

2.2 Data

To test for the effect of transfers on local revenues, I use publicly available annual municipal budget data from the Philippines Bureau of Local Government Finance (BLGF) for 2000-2008.[3] Each year, local budget officers submit budget reports to the BLGF recording municipality revenues and expenditures in a variety of categories. I focus on the revenues side, which includes both locally raised revenues and the reported amount of IRA transfer received by the municipality.[4] Data on well-being at the municipal level are hard to come by in the Philippines. Fortunately, I have access to two such measures: (i) local economic conditions, proxied by the annual value of newly constructed buildings in each municipality, and (ii) local child malnutrition, proxied by the annual percent of severely underweight children in each municipality. The construction data come from building permits issued in each municipality, which are publicly available from the National Statistics Office. The

[3] 2001-2008 are available online at http://blgf.gov.ph. Year 2000 data were collected on site at the BLGF headquarters in Manila.

[4] The local expenditure data are thought to be unreliable due to discrepancies in capital versus current accounts, which should not affect the local revenues data.

malnutrition data come from Operation Timbang, an extensive local level health initiative that identifies malnourished children by sending representatives from the National Nutrition Council to each village to weigh all children under age 6.

For my identification strategy, I calculate the formula the central government uses to determine how much IRA transfer each municipality receives. This formula, described in more detail below, is a weighted sum of census population share, land share, and the inverse number of total municipalities. To calculate the formula, I use census data from 1995, 2000 and 2007 obtained from the National Statistics Office and land data from the Bureau of Land Management.

2.3 Local Revenues and Philippine Municipalities

Philippine municipalities collect local revenue from both tax and non tax revenue sources. Tax revenues account for 60% of local revenues, non tax revenues account for the remaining 40%. Figure 3 presents the various sources of tax and non-tax revenue. The majority of tax revenues come from business taxes and real property taxes. Non-tax revenues are made up primarily of various user and regulatory fees and receipts from economic enterprises run by the municipality (mostly public utilities, markets and slaughterhouses).

Municipalities exercise some control over both local tax and local non tax revenue. On the tax side, business and property tax rates are exogenously set at higher levels of government. However, municipalities are charged with collecting these taxes.[5] In a country where tax evasion rates are high, tax collection is a nontrivial task (NTRC (2010)). Thus, in practice municipalities play a large role in determining the level of local revenue collection by controlling the level of enforcement. In other words, municipalities set an effective tax rate (less than or equal to that set by law). On the non tax side, municipalities set both the rate and

[5]Business taxes are 1% of the previous year's gross receipts, while real property tax rates are around 1% of the previous year's assessed values

enforcement for local non tax revenues. Upon receiving additional fiscal resources (such as transfers), municipal governments are free change the level of either tax or non tax revenues in response.

To illustrate some basic characteristics of Philippines municipalities, Table 2 presents summary statistics for the 1465 municipalities in my sample.[6] There is wide variation within Philippine municipalities. They range from very small (hundreds of people) to very large (hundreds of thousands of people), though the typical municipality has a population of around 35,000. The average municipality has a yearly total budget of around $900,000 (45.55 million PHP), or in per capita terms, around $30 per person. As shown in Figure 2, the IRA transfer makes up the majority of this budget (around 85%) and there is very little local revenue collection (local revenues comprise the majority of the remaining 15%). There are some municipalities do not collect any local revenues at all in certain years. In this case, crowd out (i.e. decreasing taxes) is not possible since revenue collection cannot decrease any further.

Philippine municipalities also exhibit wide variation in measures of health and economic well-being. In the average municipality, 1.66% of children are severely underweight. However, some municipalities manage to have no underweight children, in others as much as 21% of children are severely underweight. In terms of economic well-being, the average municipality builds around $500,000 (23.24 PHP) worth of new buildings, but in some years do not see any new construction whatsoever.

Finally, Table 2 also illustrates that credit availability is limited. The typical municipality borrows a mere $12,000 USD (0.60 million PHP) per year, a tiny fraction of the total local

[6] In the Philippines, municipalities can change both geography and local government classification. Larger municipalities divide into smaller municipalities. Very large municipalities convert into cities, a different type of local government designation. Cities get IRA transfer as well, but from a separate pot than the municipalities. To maintain geographic and administrative consistency, I drop municipalities that split and those that converted into cities (once they became cities), totaling around 1% of the sample. Additionally, there are around 70 municipalities missing from the 2000 fiscal data, but that appear in later years. These 70 municipalities are included for 2001-2008 and the panel is thus unbalanced.

budget ($\approx 1\%$). The 90th percentile of loan income in a given year is zero, and two thirds of municipalities never take out loans at all during the sample.

3 Empirical Strategy

3.1 Estimation Model

Let R_{it} be local revenues and τ_{it} be federal transfers reported in the budget in municipality i, year t. If reported transfers τ_{it} were randomly distributed across municipalities, I could estimate β_1, the average annual change in municipal revenue per additional dollar of federal transfer using OLS:

$$R_{it} = \alpha + \beta_1 \tau_{it} + \alpha_i + e_{it} \tag{1}$$

There are several reasons to believe that OLS estimates are biased. The allocation formula itself, described in more detail below, is exogenously determined by the federal government. Thus, reported transfers contain two sources of variation: variation explained by the formula and variation unexplained by the formula. While the formula explains a significant fraction of the variation in reported transfers (the first stage F statistic for a regression of reported transfers on the allocation formula is 638 with an R^2 of 0.52), Figure 4, a partial regression plot of the changes in reported transfers on changes in formula predicted transfers, illustrates that there is extra variation in the reported transfer that is not explained by the formula. Some places report they receive more transfer than they should, while others report they receive less transfer than they should.[7]

[7]The IV specification is run in first differences, but the formula itself is implemented in levels. Thus, the levels regression of the first stage has a higher R^2 of around 0.95. This is because differencing lowers the signal to noise ratio.

These discrepancies between the formula and the reported transfer are likely to bias the OLS estimates in (1). They could be simple reporting errors by the municipality. Annual budget data are recorded by each of the 1465 individual municipal budget officers. Thus, budget figures may sometimes be misreported. If this reporting error is uncorrelated with local revenue collection, it is classical measurement error, biasing OLS estimates downward relative to IV estimates.

The discrepancies could instead be driven by political manipulation. Mayors may be able to use their political power to negotiate a higher transfer than is guaranteed in the formula. This type of variation is very likely to correlate directly with local revenue collection, as politically powerful mayors are likely to also be good at collecting taxes. Thus, higher transfers are correlated with higher taxes and OLS estimates would be bias upward relative to IV estimates.

To eliminate these biases, I implement the following two stage least squares specification:[8]

$$\Delta\tau_{it} = \alpha_i + \gamma_1 \Delta z_{it} + \gamma_2 \Delta w_{it} + \delta_t + v_{it} \tag{2}$$

$$\Delta R_{it} = \alpha_i + \beta_1 \widehat{\Delta\tau_{it}} + \beta_2 \Delta w_{it} + \delta_t + e_{it} \tag{3}$$

where R_{it} is local revenues in municipality i in year t, τ_{it} is the reported transfer and z_{it} is the formula driven transfer given in (4). Standard errors are clustered at the municipality level. The exclusion restriction requires that the formula driven transfer z_{it} have no direct

[8]There is no general consensus in the literature for whether to run these specifications in logs or levels. Running this particular specification in logs separates the multiplicative terms in the allocation formula into additive terms. This eliminates useful variation in total transfers and total municipal land and population, which would both be absorbed by year fixed effects.

impact on local revenues R_{it}, conditional on controls.

First differencing removes municipal fixed effects (which removes sources of biased variation listed above that are fixed within municipality over time) and controls for nonstationarity in the levels of unobserved local revenues R_{it} and unobserved instrumented transfers $\hat{\tau_{it}}$. From Figure 1 it is clear that transfers are autocorrelated. I also include municipality specific linear trends α_i, year fixed effects α_t, and additional municipality specific controls w_{it} to address validity concerns in the IV estimates, discussed in detail below. Standard errors are clustered at the municipal level.

3.2 IV Construction

To instrument for reported transfers, I exploit exogenous variation in the IRA transfer τ_{it} generated by an allocation formula codified in the Philippines Local Government Code of 1991. Each year, the Department of Budget and Management (DBM) uses this formula to calculate each municipality's IRA transfer. The formula, shown in (4), has three terms: (i) a population share term, (ii) a land share term, and (iii) an equalization term. The equalization term, which divides 25% of the total transfer program evenly among the M_t municipalities, is absorbed by year fixed effects in (2). Thus, I use variation in (i) and (ii) in my analysis, allowing me to run an overidentification test on the instrument.

$$\begin{aligned} z_{it} &= 0.50\left(\frac{census\_pop_{it}}{\sum_{j=1}^{M_t} census\_pop_j} * T_t\right) \\ &+ 0.25\left(\frac{land_i}{\sum_{j=1}^{M_t} land_j} * T_t\right) \\ &+ 0.25\left(\frac{1}{M_t} * T_t\right) \end{aligned} \tag{4}$$

Collectively, the remaining two components of the formula have four main sources of vari-

ation: census population ($census\_pop_{it}$), total municipal transfers (T_t), and total municipal census population ($\sum_{j=1}^{M_t} census\_pop_j$) and total municipal land mass ($\sum_{j=1}^{M_t} land_j$). Census population changes discretely within municipality across year each time new census population numbers are applied to the formula. Total municipal transfers change across year but remain fixed across municipalities, as they are a fixed fraction of national tax revenues from three years prior. The total number of municipalities M_t changes across year each time a municipality converts into a different Philippine administrative unit known as a city. These changes drive variation in total municipal census population and land mass. Each time a municipality converts into a city, the set of municipalities decreases, thus total municipal population and land also decrease. Each remaining municipally gets a proportional boost in transfer.[9]

In any given year, the allocation formula (4) changes due to variation in at least one of these four components. These components enter multiplicatively in the formula, rather than additively, which is important for identification. The majority of the variation comes from total municipal transfers T_t. However, I must use all sources of formula variation to have enough power to identify second stage effects.

Taken together, these four sources of variation are a mix of anticipated and unanticipated variation in local transfers. However, total municipal transfers T_t drive most of the variation, and they are fully anticipated. Thus, my results should be interpreted as the effect of an exogenous, but anticipated increase in transfers on local revenues.

[9]During my sample period, roughly 50 large municipalities elected to convert into cities, a different type of administrative classification. Cities are larger than municipalities in population and income. They receive their own transfer determined by a separate city IRA transfer formula. Thus, the municipality IRA transfer formula only includes the population and land totals for municipalities, and not cities. Over the sample period 2000-2008, roughly 50 large municipalities converted into cities. The national government makes no adjustments to total municipal transfers when faced with such conversions (i.e. it does not lower the total amount of municipal transfers T_t to account for the fact that there are now fewer municipalities, nor does it raise the total amount of city transfers to account for the fact that there are now more cities).

3.3 IV Validity

The exclusion restriction requires that variation in the allocation formula z_{it} be uncorrelated with unobserved local drivers of municipal revenue R_{it}. The formula contains four potentially endogenous sources of variation: total transfers, census population, total municipal land and total municipal census population. In levels, these sources of variation have a direct impact on municipal revenues in levels. However, in the formula, they enter multiplicatively, allowing me to control for the endogenous level variation and isolate the exogenous interaction variation.

Total transfers are correlated with macroeconomic conditions from three years prior, which may affect current macroeconomic conditions and thus current local budgetary decisions. To address this concern, I control for current macroeconomic conditions with year fixed effects.

Census population changes discretely with each new census. This discrete jump contains two sources of variation: true population and administrative error. This error is uncorrelated with factors that determine local budget decisions. Instead, it is driven by administrative processes at the National Statistics Office (NSO).[10] True population is endogenous: higher population growth means more people to tax. To address this concern and isolate the variation in administrativeve error, I include a variety of municipality specific controls for population growth (municipality specific linear trends, municipality specific quadratic trends, a proxy for local economic activity and indicators for population quartile-year).

Census population may also be endogenous due to direct manipulation by local authorities. According to an investigative journalism report, the 2007 census population growth rates for provinces in the Autonomous Region in Muslim Mindanao (ARRM) are glaringly out of line with the growth rates of the rest of the country (Landingin (2010)). Figure 5 confirms

[10]This variation is closely related to that used in Gordon (2004) and Serrato and Wingender (2010), both studies of US federal transfers.

this irregularity. The rural ARRM region has a growth rate of nearly 35%, while the next highest region's growth rate is only half as large. The report suggests that the 2007 census population was inflated by local political actors to increase the amount of transfer they received. Thus, I rerun my analysis to confirm that my results are robust to excluding these provinces.

Finally, total municipal land and population are driven by large municipalities choosing to convert into cities, another type of Philippine administrative unit. Each time a municipality converts into a city, it is dropped from both the municipal transfer pool and from my sample. The remaining municipalities receive a proportional boost in transfer. Conversion to city status is likely endogenous to local tax collection in the municipalities that choose to convert, since cities receive larger transfers. However, it is likely exogenous to the remaining municipalities that are still in the sample. Moreover, the timing of these conversions is unpredictable since the majority of the variation is driven by Supreme Court decisions. Famously, there are 16 cities that have converted in and out of city status twice due to the Supreme Court's reversals. These decisions force the national government to make unexpected adjustments to the transfer allocations in the middle of the year.

3.4 IV Relevance

Figure 4 and Table 1 show that the allocation formula IV is a strong predictor of the reported transfer in the annual budget data. Figure 4 displays a scatter plot of the first stage (2), indicating a strong positive relationship between changes in the reported transfer and changes in the formula-calculated transfer (F statistic of 758). To put these changes in perspective, the average percent change in formula-calculated municipal transfer from year to year is around 8%. This amount translates to 6.4% of total income for the average municipality. Thus, variation generated by the instrument represents nontrivial movement in local resources.

4 Results

4.1 OLS and IV Results

Table 3 presents the results for all local revenues combined, including all locally collected tax and non tax revenues shown in Figure 3. The table includes the OLS and IV estimates for equation (3), regressing changes in local revenues on changes in instrumented transfers. For comparison, columns 1 and 2 show OLS and IV results from estimating equation (3) without municipality specific linear trends. These regressions include no controls for true municipal population other than municipal fixed effects. Point estimates for transfers are positive and significant for both OLS and IV. Columns 3 and 4 add municipality specific linear trends, and the results remain robustly positive and significant. For an additional dollar of transfer, IV results predict local revenues to increase by 36 cents. Point estimates for regressions with municipal trends are smaller than those without trends. This is expected, since controlling for true municipal population eliminates some of the upward bias driven by census population in the instrument.

The dependent variable in the Table 3 regressions is total locally collected revenue (i.e. combined tax and non tax revenues). However, the local government budget data allow me to distinguish between different sources of local revenue. Thus, I test for whether this result is driven primarily by tax or non tax revenues, and find the most robust results for regulatory and user fees. However, the point estimate for fee revenue is not large enough to account for the entire effect.

Table 4 displays the results of re-running the specifications in Table 3, but with the two major sources of tax revenue, business and real property taxes, as the dependent variable. Thus, it appears that tax revenues drive a the majority of the increase in total revenues.

I re-run the analysis for regulatory and user fees (Table 5), and I find robustly positive and significant effects across all specifications. The point estimates are smaller than those for

total local revenues (Table 3), suggesting that local regulatory and user fees account for some, but not all, of the increase in local revenue.[11]

Classical measurement error is likely the dominant source of bias. IV point estimates are statistically higher than OLS estimates. Among likely sources of bias, classical measurement error is the only source of negative bias. The other likely sources (systemic reporting error and political manipulation) would inflate OLS estimates upward.

Table 6 explores heterogeneous effects of state capacity proxied by the ratio of registered municipal births to total municipal births from the 2007 census. A higher ratio of registered births indicates a higher level of state capacity. Surprisingly, the transfer does not appear to help places with low levels of existing state capacity increase local revenues. Rather, it is the higher state capacity places that are in a position to use the transfer to build further capacity. Column 1 displays these heterogenous state capacity results by interacting the fraction of registered births with the transfer. The coefficient is positive and significant, indicating that places with higher state capacity achieve larger increase in local revenues than do places with lower state capacity. This measure of state capacity may simply be a proxy for population (more populous places have higher levels of state capacity). However, Column 2 shows that this is not the case. When the transfer is interacted with the level of local population (linearly interpolated from the census data), there are no significant heterogenous effects.

Finally, Table 7 illustrates that transfers decrease child malnutrition. I run (3) with the percent of severely underweight children on the left hand side. I find that transfers cause small but statistically significant decreases in child malnutrition. For an additional dollar of transfer, the percent of severely malnourished children decreases by 0.014 from average of around 1.7 during the sample period, around a 0.8% decline. Though this decrease is small, it suggests that local governments are using additional funds in a way that improves child

[11] I also run these regressions with spending on the left hand side, even though spending data are thought to be unreliable due to discrepancies in capital versus current accounts. The results are noisy and uninformative.

welfare. Such programs may not be explicitly targeted at children, but may nonetheless result in child welfare improvements.

4.2 Threats to Validity

The major threat to validity in my specification is that municipalities with faster true population growth both receive more transfers and collect more revenue. If I do not adequately control for true population growth, my results simply show that faster growing places collect more revenue than slower growing places, biasing estimates upward.

I rule out differential changes in revenue for municipalities of different sizes in Table 8 by showing my results are robust to controlling for true population growth in a number of ways. The first column replicates the baseline results for total revenues with municipality specific trends, and the following columns add different controls for population on top of these linear trends. Column 2 shows that results are robust to including yearly economic activity as proxied by the value of new municipal private construction. These results alleviate bias from shocks to local economic activity can drive large, nonlinear population shifts (i.e. a large new factory attracts a lot of new residents, or a typhoon displaces a lot of current residents). However, note that the sample size decreases in Column 2, as local level construction data is available starting in 2003. For comparison, Column 3 shows results from (3) on the same sample as Column 2, but without controlling for new construction. The results are nearly identical. Column 4 adds municipality specific quadratic trends. Finally, column 5 includes indicators for population-quartile-year bins, which control flexibly for unobserved municipality-year effects. The results are marginally insignificant, but likely underpowered due to a large number of parameters.

Another threat to validity is political manipulation. There are certain provinces whose 2007 census population growth rates were glaringly large and out of line with the rest of the country. All of these provinces are all located in the same partially autonomous area in

one of the poorest regions in the Philippines, the Autonomous Region in Muslim Mindanao (ARMM). Table 9 reproduces Table 3, dropping the affected municipalities. Results are still robustly positive and significant.

Finally, since the allocation formula contains two instruments (the first and second terms in (4)), I can run an overidentification test for validity of the instruments. Table 3, column 4 reports Hansen's J statistic for the main specification. The test fails to reject the null that the instruments are valid.

4.3 Robustness Tests

I run several additional specifications to demonstrate the robustness of my results. I show that my results are robust to (i) including the census population growth directly as a control (Table 10), (ii) per capitizing the entire specification (Table 11), and (iii) adding lagged instrumented transfers to control for autocorrelation (Table 12).[12]

5 Results Interpretation

I find that, contrary to the predictions of standard public finance models, transfers increase rather than decrease total local revenues (i.e. transfers crowd in local revenue collection). I also find evidence of improved welfare outcomes, since I find that transfers decrease child malnutrition. These results address the policy concern that local governments only use transfers as a substitute for raising their own revenue (i.e. spending "free" money from the central government rather than raising money on their own). These results also challenge the use of standard public finance models in the developing country context, suggesting mechanisms beyond those in the flypaper literature to explain local fiscal response to lump sum transfers.

[12] Adding more than one lag does not significantly alter the results.

By ruling out endogenous population growth in Section 4.2, I turn to theoretical explanations to interpret my results. The flypaper effect literature identifies several mechanisms to alter the median voter model such that transfers increase government spending by more than model predictions.[13] However, these explanations are not sufficient to explain why transfers increase tax revenue. They can only explain why taxes decrease by less than expected. Thus, I alter the median voter model with mechanisms beyond those in the flypaper literature to reverse the standard prediction that transfers decrease, rather than increase, tax revenues. Moreover, these three mechanisms are more likely to be relevant in developing countries: (i) revenue collection fixed costs and credit constraints and (iI) fiscal stimulus. By ruling out fiscal stimulus as the dominant mechanism for my results, I find that (i), revenue collection fixed costs and credit constraints, is most consistent with my results.

Fixed costs and credit constraints are straightforward deviations from the median voter model that are not considered in the flypaper literature. However, developing country local governments may face fixed costs to revenue collection, and credit constraints may prevent them from covering these costs on their own. Instead, transfers must cover the fixed collection costs. Once the cost is paid, the municipality can increase local revenue collection. This mechanism is reasonable in the Philippine context. Philippine local governments use very little credit and appear to be credit constrained (Liu et al. (2013)). There may be a fixed cost to tracking down unlicensed businesses and buildings, which are common in the Philippines. But, once they are licensed and "on the books," they generate a steady stream of license renewal and tax revenue (and back tax revenue, as municipalities often issue a new permit conditional on paying back taxes (GIZ Decentralization Progam (2007)). [14]

[13] These mechanisms include asymmetric information, fiscal illusion and costly taxation. Under asymmetric information, voters do not observe transfers, and a budget maximizing government is free to spend the entire transfer on public services (Filimon et al. (1982)). Under fiscal illusion, voters confuse the average and marginal prices of public goods. Transfers decrease the average price of public goods, inducing an increase in demand for government spending (Hines and Thaler (1995)). However, the price elasticity of public goods would have to be astronomically high to generate crowd in. Finally, if it is costly to raise local revenue, then transfers act as a source of "free money." Transfers again lower the price of public goods, and increase demand (Aragon (2013)).

[14] An alternate, less optimistic, mechanism is a fixed cost of extortion. In the Philippines, both insurgent

One testable implication of the fixed costs mechanism is that transfers cause persistent increases in local revenues. Once a municipality has paid the fixed cost, its revenues should continue to be higher in subsequent years. A test for these persistent effects is to run a regression that includes both transfers and lagged transfers as explanatory variables, then test whether the sum of the coefficients is greater than zero. I run such a regression in Table 12. However, the standard errors on the lagged coefficient are too large to run a precise test. Thus, I do not have enough power to identify these dynamic effects.

An alternative mechanism is fiscal stimulus. In this world, the municipality receives a transfer and, due to the various mechanisms identified in the flypaper literature, spends most of it on public goods rather than decreased taxes. These public goods stimulate spending on private goods. Private goods are taxed, thus increased spending on private goods drives increased tax revenues. Since transfers represent a large fraction of developing country local budgets, stimulus effects are more likely to be large enough to generate increased tax revenues.

This interpretation can partially explain my results. Due to differential timing of fee and tax revenue collection, fiscal stimulus can only explain why permit fees increase, but not why total revenues increase. Suppose fiscal stimulus causes new businesses to open and new homes to be built. These new entities require local permits, thus owners will pay all regulatory fees before opening. This could explain the observed increase in local regulatory fees. Owners will also owe taxes, but these taxes will not be due until the following year (as in the US).[15]. Thus, increases in tax revenues from the current year cannot be driven

groups and the government compete for control over municipalities (Berman et al. (2013)). Control over a municipality is lucrative, as it allows access to public funds and extortion opportunities. If insurgents control a territory, they extract extortion rents from the local population and local mayor. If the mayor wishes to control the territory, he must pay a fixed cost to controlling the municipality by hiring a private army to win control from the insurgents (not uncommon in the Philippines). The transfer can fund this army. The army can then intimidate the local population into paying increased tax revenues. However, this story is unlikely given how local extortion works in the Philippines. Common types include: a permit for a building is only issued once the builder agrees to use a "mayor approved" contractor, or only after the builder contributes to the mayor's "charity" (i.e. his private income) (Palabrica (2014)). Neither of these types of extortion would be reported in the official local budget as tax revenues. I cannot rule out that extortion occurs, but it is unlikely to be the effect I identify.

[15]Unlike in the US, in the current fiscal year, Philippine municipalities report tax revenues collected during the *same* fiscal year, rather than in the previous fiscal year

by fiscal stimulus. Rather, they must be driven by increased tax collection of taxes owed from the previous year. Since permit fees only account for around 10% of the increase in local revenues, they cannot account for the entire observed effect (which includes tax and fee revenues). The fixed cost mechanism can explain increases in both.

Fiscal stimulus has several testable implications. First, transfers induce increases in private sector spending, which I can proxy for using new construction data. Table 8, column 2 runs the baseline specification with new construction as a control. If private sector activity were driving my effect, the coefficient on transfers should be insignificant and the coefficient on new construction should be significant. However, including private sector construction as a control in the baseline specification has very little effect on the coefficient on transfers.[16]

Second, the timing of tax collection implies that lagged transfers should induce increases in current tax revenues (since lagged transfers predict lagged private sector activity, the taxes for which are owed during the current year). Column 3 of Table 12 reruns the regressions of tax revenues on instrumented transfers but includes lagged transfers as an explanatory variable. If transfers increased taxable private sector activity, we would expect the coefficient on lagged transfers to be positive and significant. However, the estimate is underpowered and I cannot rule out the possibility of large increases or decreases in current tax revenues. These two tests suggest that fiscal stimulus cannot fully explain my results.

I use empirical and contextual evidence to rule out fiscal stimulus the dominant mechanism for my results, leaving fixed costs and credits constraints. My results suggest that fixed costs and credit constraints be considered in public finance models of developing country local governments. However, to show definitely that transfers are capacity building, I must demonstrate that additional revenues improve local welfare outcomes.

Recent evidence from Brazil shows that when political systems are weak, transfers may fuel

[16] I also ran the baseline regression with private construction on the left hand side. If transfers increase private sector activity through fiscal stimulus, the coefficient on transfers will be positive and significant. It is positive and similar in magnitude to the coefficients on local revenues in Table 8, but the standard errors are large, and I cannot rule out large decreases in private sector activity.

corruption and patronage. Increased transfers induced more corrupt mayoral candidates to run for office (Brollo et al. (2013)). Increased oil windfall revenues increased spending, but did not translate to improved welfare outcomes. Instead, revenues were likely spent on patronage (Caselli and Michaels (2013)). To test for these effects in the Philippines, I rerun my baseline specification with a proxy for local poverty, municipal child malnutrition. Unlike in Brazil, I find that transfers generate small reductions in child malnutrition, evidence that additional revenues are spent on local services rather than patronage or vote buying.

6 Conclusion

This paper uses exogenous variation in Philippine municipal transfers to find that fiscal transfers increase local revenue collection, a measure of local capacity. I rule out fiscal stimulus as a potential mechanism for these results, concluding that fixed costs and credit constraints are the dominant mechanism driving increase local revenue collection. In addition to showing that transfers increase local revenue collection, I show that show that transfers decrease child malnutrition. Thus, I provide evidence that despite weak governance, transfers can increase capacity and reduce poverty, a major goals of developing country decentralization.

Future empirical work is needed to further our knowledge of transfers and capacity building in developing countries. Future theoretical work can reveal how fixed costs and credit constraints affect fiscal models of local governments.

References

Fernando Aragon. Local spending, transfers and costly tax collection. *National Tax Journal, forthcoming*, 2013.

Maria Ela L. Atienza. The politics of health devolution in the philippines: Experiences of municipalities in a devolved set-up. *Philippine Journal of Political Science*, 2004.

Pranab Bardhan. Decentralization of governance and development. *Journal of Economic Perspectives*, 2002.

Eli Berman, Joseph Felter, Ethan Kaptsein, and Erin Troland. Predation, taxation, investment and violence: Evidence from the philippines. *NBER Working Paper*, 2013.

BLGF. Statement of receipts and expenditures: Systems, concepts, input preparation and reporting. 2007.

Fernanda Brollo, Tommaso Nannicini, Roberto Peroitt, and Guido Tabellini. The political resource curse. *American Economic Review*, 2013.

Joseph Capuno. Estimating the income elasticity of local government revenues and expenditures under decentralization. *University of the Philippines School of Economics Discussion Paper*, 2001.

Francesco Caselli and Guy Michaels. Do oil windfalls improve living standards? evidence from brazil. *American Economic Journal: Applied Economics*, 2013.

Andrew Chamberlain. The effect of federal intergovernmental grants on state taxes: New evidence of budget persistence. *Working Paper*, 2013.

Cesi Cruz. Buying one vote at a time or buying in bulk? politician networks and electoral strategies. *Working Paper*, 2014.

Matz Dahlberg, Eva Mörka, Jørn Rattsød, and Hanna Ågrena. Using a discontinuous grant rule to identify the effect of grants on local taxes and spending. *Journal of Public Economics*, 2008.

Radu Filimon, Thomas Romer, and Howard Rosenthal. Asymmetric information and agenda control. *Journal of Public Economics*, 1982.

Lucie Gadenne and Monica Singhal. Decentralization in developing countries. *NBER Working Paper*, 2013.

Dante B. Gatmaytan. Cost and effect: The impact and irony of the internal revenue allotment. *The Philippine Law Journal*, 2001.

GIZ Decentralization Progam. Revenue mobilization coursebook. 2007.

Nora Gordon. Do federal grants boost school spending? do federal grants boost local spending? evidence from title i. *Journal of Public Economics*, 2004.

James Hines and Richard Thaler. Anomalies: The flypaper effect. *Journal of Economic Perspectives*, 1995.

Roel R. Landingin. Alarm bells for may 10 elections? sharp spike in maguindanao, armm population a big riddle. *Philippine Center for Investigative Journalism*, 2010.

Lili Liu, Gilberto Llanto, and John Peterson. The philippines: Recent developments in the subnational government debt markets. *Until Debt Do Us Part: Subnational Debt, Insolvency, and Markets*, 2013.

Rosario Manasan. Ira design issues and challenges. *Philippines Institute for Development Studies*, 2007.

Ligia Melo. The flypaper effect under different institutional contexts: The colombian case. *Public Choice*, 2002.

National League of Cities. Revenue from intergovernmental transfers. 2014.

NTRC. A study on real property ownership and tax compliance by gender/group in nabunturan, compostela valley: Cy 2009. *NTRC Tax Research Journal.*, 2010.

Raul J. Palabrica. Ease of doing business in ph. *Philippine Daily Inquirer*, http://business.inquirer.net/158651/ease-of-doing-business-in-ph, 2014.

Juan Carlos Serrato and Philippe Wingender. Estimating local fiscal multipliers. *Working Paper*, 2010.

Figure 1: Total Municipal IRA Transfer, 2000-2008

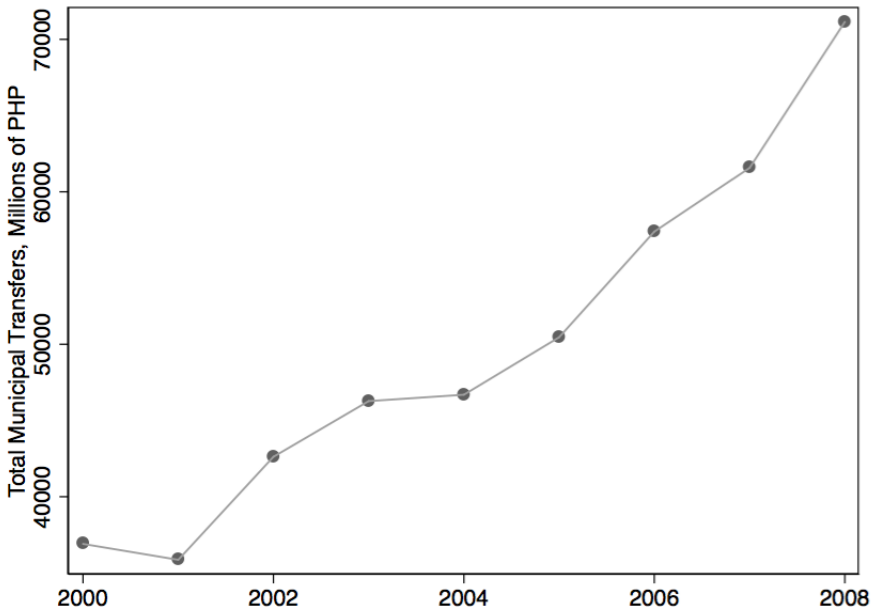
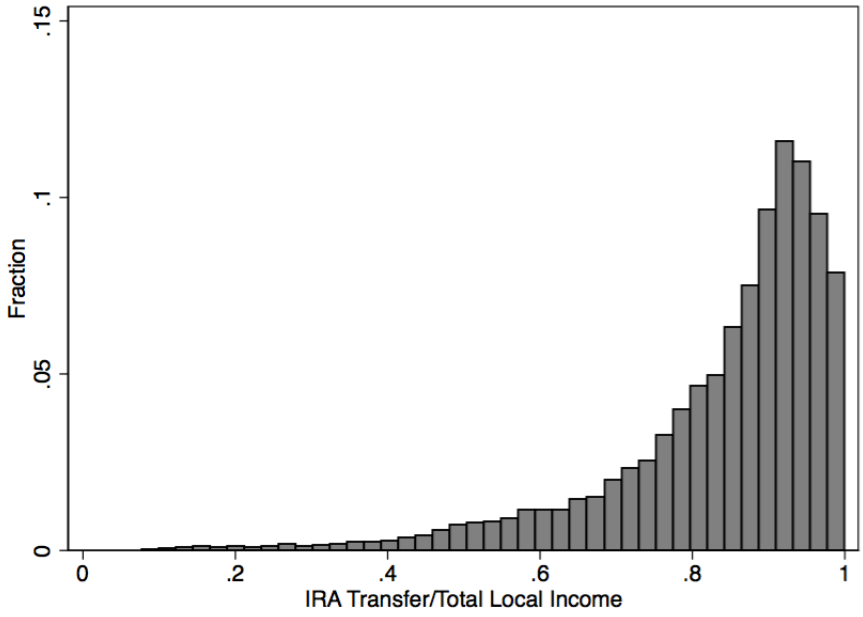
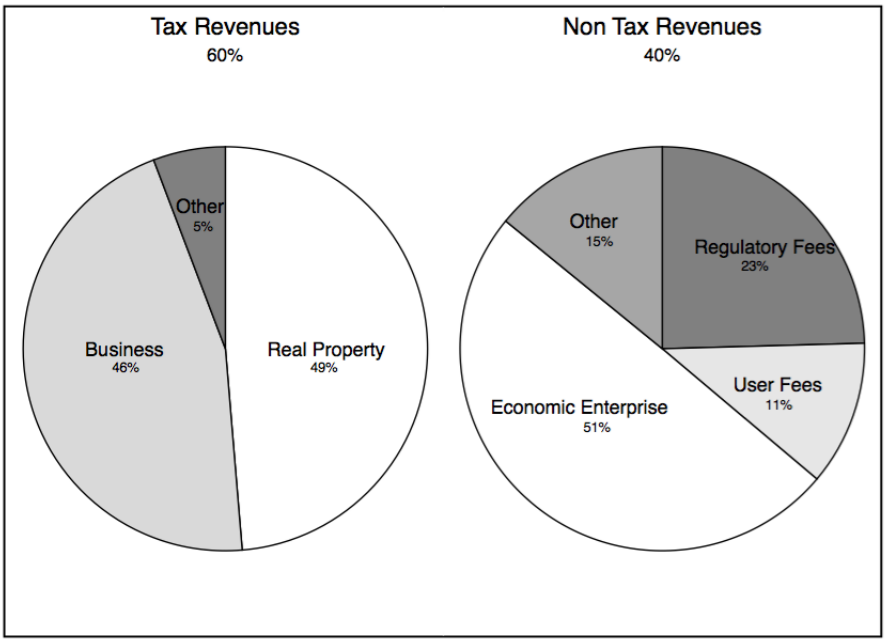


Figure 2: Distribution of IRA Transfer as Share of Total Local Revenues



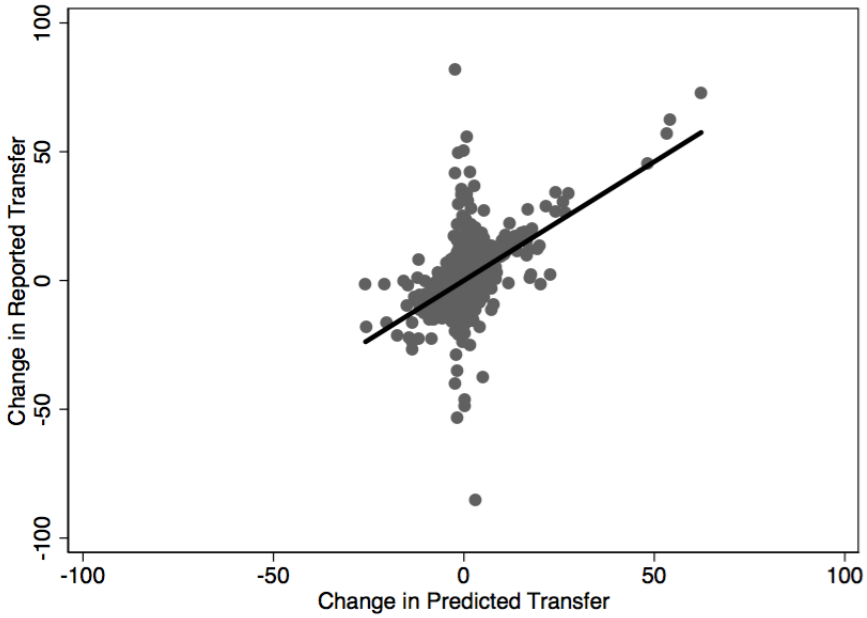
Municipality-year level, 2000-2008.

Figure 3: Sources of Local Revenue



Municipality-year level, 2001-2008. Revenue reporting not consistent across all revenue categories for year 2000.

Figure 4: First Stage



Partial regression plot of first stage. Coefficient = 0.99, F=757.74. Standard errors are clustered at municipality level.

Figure 5: Census Population Growth Rates by Region, 2000-2007

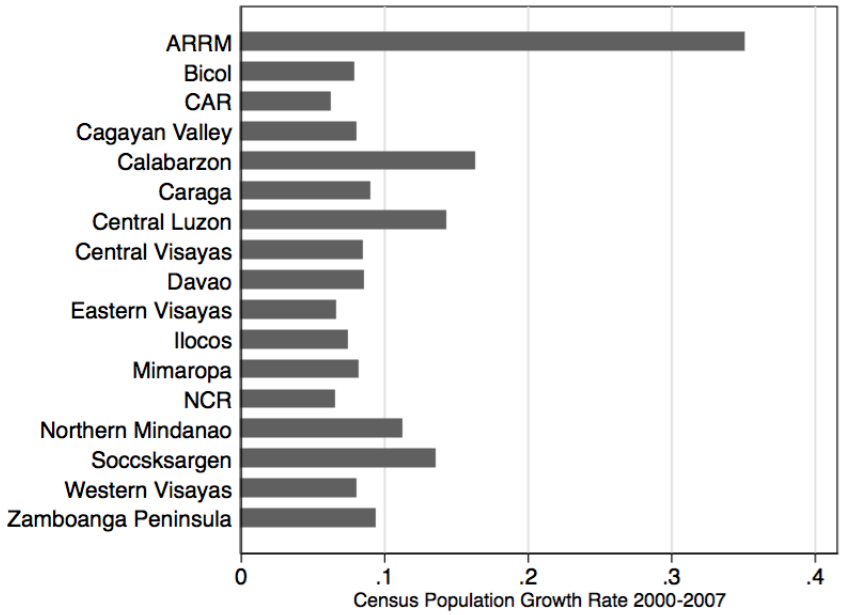


Table 1: First Stage and Reduced Form

Dependent Variable: Reported Transfer		
	(1)	(2)
VARIABLES	FS	RF
(Pop Share)xT	0.949***	0.359**
	(0.0420)	(0.167)
(Land Share)xT	1.115***	0.0671
	(0.0678)	(0.0803)
Observations	11,041	11,041
R-squared	0.516	0.030
F	435.2	

Robust standard errors in parentheses, clustered on municipality. *** p<0.01, ** p<0.05, *p<0.1

Table 2: Summary Statistics

	Mean	Std Dev	Min	Max	N
Budget Data					
Total Expenditures	41.33	40.94	0.00	885.92	12721
Per Capita Expenditures	1493.78	3325.56	0.00	274258.22	12721
Total Local Revenues	45.55	45.73	4.93	1059.27	12721
Per Capita Revenues	1647.59	3503.25	256.56	268862.72	12721
IRA Transfer	34.44	20.18	4.38	369.63	12721
Loans	0.73	6.48	0.00	406.00	12721
Total Local Revenue	9.18	27.45	0.00	634.10	12721
Tax Revenue	5.61	22.70	0.00	557.03	12721
Real Property Taxes	2.72	11.10	0.00	267.98	12721
Real Property Taxes	2.58	11.98	0.00	354.37	12721
Non Tax Revenue	3.57	6.85	0.00	143.31	12721
Regulatory/User Fees	1.23	3.12	0.00	97.17	12721
Welfare Data					
% Children Severely Underwgt.	1.66	1.90	0.00	21.47	5163
New Construction Value	23.24	121.77	0.00	6522.85	8514
Allocation Formula Data					
1995 Census Population	30131	24765	349	381350	12721
2000 Census Population	33790	29734	223	467375	12721
2007 Census Population, NSCB	38502	38101	114	610795	12721
Municipal Land Area, Hectares 2007	204	214	5	2189	12721
Total Mun. IRA Transfer	49905	10990	35860	71143	12721

Municipality-year level, 2000-2008 (with the exception of Total Mun. IRA Transfer, which is the same across municipalities within year). Budget and construction data in millions of PHP, with the exception of per capitized figures (1 PHP $\approx$ 0.2USD).

Table 3: Local Revenues and IRA Transfers

Dependent Variable: Local Revenues				
	(1)	(2)	(3)	(4)
VARIABLES	OLS	IV	OLS	IV
IRA Transfer	0.234***	0.490***	0.132**	0.355**
	(0.0614)	(0.111)	(0.0652)	(0.160)
Constant	-0.118	-2.165***	0.763	
	(0.436)	(0.801)	(0.476)	
Observations	11,041	11,041	11,041	11,041
R-squared	0.036	.	0.150	.
Mun Linear Trends	N	N	Y	Y
Hansen's J				2.054

Robust standard errors in parentheses, clustered on municipality. Dependent variable is total local revenues. *** p<0.01, ** p<0.05, *p<0.1

Table 4: Local Business and Real Property Taxes and IRA Transfers

Dependent Variable: Local Business and Real Property Taxes				
	(1)	(2)	(3)	(4)
VARIABLES	OLS	IV	OLS	IV
IRA Transfer	0.169***	0.363***	0.0963*	0.283*
	(0.0564)	(0.102)	(0.0583)	(0.155)
Constant	-0.305	-1.861**	0.316	
	(0.394)	(0.728)	(0.423)	
Observations	11,041	11,041	11,041	11,041
R-squared	0.021	.	0.009	.
Mun Linear Trends	N	N	Y	Y

Robust standard errors in parentheses, clustered on municipality. Dependent variable is the sum of real property and business taxes, the two main sources of tax revenue in Philippine municipalities. *** p<0.01, ** p<0.05, *p<0.1

Table 5: Local Fees and IRA Transfers

	Dependent Variable: Local User and Regulatory Fees			
	(1)	(2)	(3)	(4)
VARIABLES	OLS	IV	OLS	IV
IRA Transfer	0.0318**	0.0739***	0.0122	0.0428**
	(0.0128)	(0.0154)	(0.0141)	(0.0171)
Constant	0.000518	-0.336***	0.168	
	(0.0970)	(0.115)	(0.111)	
Observations	11,041	11,041	11,041	11,041
R-squared	0.008	.	0.049	.
Mun Linear Trends	N	N	Y	Y

Robust standard errors in parentheses, clustered on municipality. Dependent variable is the sum of local user and regulatory fees. *** p<0.01, ** p<0.05, *p<0.1

Table 6: Total Local Revenues - Heterogeneous Effects

	Dependent Variable: Total Local Revenues		
	(1)	(2)	(3)
VARIABLES	IV	IV	IV
IRA Transfer	-0.0487	0.458**	0.395**
	(0.101)	(0.217)	(0.200)
Population/10k x Transfer		-0.00505	
		(0.00610)	
Population/10k (Linear Interp)		0.470	
		(0.465)	
Frac. of Registered Births x Transfer	0.443**		
	(0.222)		
Avg Prov Violence x Transfer			-0.000342
			(0.000351)
Observations	11,041	11,041	11,041
R-squared			.
Mun Linear Trends	Y	Y	Y

Robust standard errors in parentheses, clustered on municipality. Dependent variable is toga local revenues. Population has been linearly interpolated for each municipality from census data. Fraction of registered births is the number of registered births divided by the number of total births in a municipality measured in the 2007 census, a proxy for state capacity. *** p<0.01, ** p<0.05, *p<0.1

Table 7: Malnutrition and IRA Transfers

VARIABLES	(1) OLS	(2) IV	(3) IV	(4) IV	(5) IV
IRA Transfer	0.00660	-0.0137**	-0.0139**	-0.0137**	0.489
	(0.00672)	(0.00578)	(0.00572)	(0.00578)	(0.341)
New Construction			8.98e-05		
			(0.000157)		
Constant	-0.0449				
	(0.0665)				
Observations	3,381	3,381	3,381	3,381	3,381
R-squared	0.237	.	.	.	.
Mun Linear Trends	Y	Y	Y	Y	Y

Robust standard errors in parentheses, clustered on municipality. Dependent variable for columns 1-4 is the yearly municipal percentage of severely underweight children, available starting in 2005. Column 5 displays results for the baseline regression of total revenues on the subsample in which malnutrition data is available. *** p<0.01, ** p<0.05, *p<0.1

Table 8: Total Revenues - Flexible Controls for Population

Dependent Variable: Total Local Revenues

VARIABLES	(1) IV	(2) IV	(3) IV	(4) IV	(5) IV
IRA Transfer	0.355**	0.386*	0.382*	0.336*	0.327
	(0.160)	(0.220)	(0.224)	(0.182)	(0.199)
New Construction		-0.0107**			
		(0.00533)			
Observations	11,041	6,964	6,964	11,041	11,041
R-squared	.	.	.	.	
Mun Linear Trends	Y	Y	Y	Y	Y
Quadratic Trends	N	N	N	Y	N
Pop Quart x Yr Indicators	N	N	N	N	Y

Robust standard errors in parentheses, clustered on municipality. Dependent variable is total local revenues. Column 1 replicates the baseline regression with municipality specific linear trends. Remaining columns add various controls for local population. Column 3 replicates the main result on the subsample for which new construction data are available, starting in 2003. *** p<0.01, ** p<0.05, *p<0.1

Table 9: Political Manipulation: Drop ARMM

Dependent Variable: Total Local Revenues

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Total Revs	Total Revs	Tax Revs	Tax Revs	Fees	Fees
IRA Transfer	0.358**	0.368**	0.283*	0.290*	0.0428**	0.0443**
	(0.162)	(0.166)	(0.155)	(0.159)	(0.0171)	(0.0174)
Observations	11,041	10,646	11,041	10,646	11,041	10,646
Mun Linear Trends	Y	Y	Y	Y	Y	Y

Robust standard errors in parentheses, clustered on municipality. Columns 1,3 and 5 replicate baseline regressions for comparison. Columns 2, 4 and 6 reruns baseline regressions on subsample excluding provinces suspected of manipulating census population figures. *** p<0.01, ** p<0.05, *p<0.1

Table 10: Robustness Check: Include Census Population Level

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Total Revs	Total Revs	Tax Revs	Tax Revs	Fees	Fees
IRA Transfer	0.358**	0.372**	0.283*	0.197	0.0428**	0.0423
	(0.162)	(0.152)	(0.155)	(0.149)	(0.0171)	(0.0398)
Census Population		-1.00e-05		5.80e-05		3.65e-07
		(0.000149)		(0.000139)		(2.11e-05)
Observations	11,041	11,041	11,041	11,041	11,041	11,041
Mun Linear Trends	Y	Y	Y	Y	Y	Y

Robust standard errors in parentheses, clustered on municipality. Columns 1,3 and 5 replicate baseline regressions for comparison. Columns 2,4 and 6 include census population directly as a control. *** p<0.01, ** p<0.05, *p<0.1

Table 11: Robustness Check: Per Capita Results

	Dependent Variable: Per Capita Total Local Revenues			
	(1)	(2)	(3)	(4)
VARIABLES	Total Revs	Total Revs	Fees	Fees
IRA Transfer	0.358**		0.0428**	
	(0.162)		(0.0171)	
Per Cap. IRA Transfer		0.106**		0.0103**
		(0.0505)		(0.00519)
Observations	11,041	11,041	11,041	11,041
Mun FE	Y	Y	Y	Y
Mun Trends	Y	Y	Y	Y
FS F-Stat	637.9	337.3	637.9	337.3

Robust standard errors in parentheses, clustered on municipality. All regressions weighted by population. *** p<0.01, ** p<0.05, *p<0.1. Per capitized values calculated using a yearly measure of population that has been linearly interpolated between census years.

Table 12: Robustness Check: Autocorrelation

	Dependent Variable: Total Local Revenues		
	(1)	(2)	(3)
VARIABLES	Total Revs	Fees	Taxes
IRA Transfer	0.312*	0.0338**	0.295
	(0.186)	(0.0151)	(0.182)
Lagged IRA Transfer	-0.141	0.0213	-0.0145
	(0.110)	(0.0638)	(0.169)
Observations	9,396	9,396	9,396
R-squared	.	.	.
Mun Linear Trends	Y	Y	Y
Quadratic Trends	N	N	N

Robust standard errors in parentheses, clustered on municipality. *** p<0.01, ** p<0.05, *p<0.1