

**International Studies Program
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Evidence of Their Effect on Tax Effort
for Municipalities in Sinaloa, Mexico**

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Fiscal Transfers a Curse or Blessing? Evidence of Their Effect on Tax Effort for Municipalities in Sinaloa, Mexico *

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Abstract

This article studies the impact of vertical fiscal transfers on local tax effort in Mexico, considering evidence for municipalities in Sinaloa between 1993 and 2008. Based on cadastral information, gross added value and property taxes we create a “pure” indicator of fiscal effort which is used to analyze the effect of conditional and unconditional transfers on this indicator. We employ econometric techniques such as panel data and the Arellano Bond method to correct endogeneity. The results show that conditional transfers, which began in 1998, have generated laziness towards property tax collection, negatively affecting the fiscal effort, even after controlling for demographic factors, population and the index of exclusion.

JEL Code: H71, H77, O16

Key words: transfers, fiscal equality, tax effort, property taxes, Mexico, Sinaloa.

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1. Introduction.

Mexico has been one of the countries with the lowest tax collection, in the last eight years it has represented only 9.4 percent of the gross domestic product, while the average in Latin America has been the 15% percent. (Astudillo. 2009:4).

Fiscal imbalances are a fundamental topic for Latin American countries due to the existing asymmetries not only in the local revenues, but also in the expenditure side. In this sense, vertical transfers are one of the principal instruments governments use to correct these imbalances. Despite the positive influence that transfers have, naturally, they also have a moral hazard component, given that they can generate “negative” reactions from the sub-national governments in terms of fiscal laziness, which in case can be translated in lower fiscal effort.

We examine the effects of transfers on the tax effort of local tax collection, specifically for the case of property tax and total local tax revenue of municipalities in Sinaloa, a state located in the northwest of Mexico.

This article provides an important contribution to the literature, given the new evidence for the worldwide debate regarding fiscal decentralization.¹ In particular, we attempt to answer the following questions: What is the impact of conditional and unconditional federal transfers² on municipalities’ tax efforts? Are federal transfers responsible for the negative impact on the tax efforts of Sinaloa’s municipalities?

In México, the literature regarding local fiscal efforts is limited and has different problems, particularly with respect to its estimation and information availability. The most important studies were those regarding the state of Puebla by Raich (2002), who used descriptive statistics, or those by Sour (2007) and Moreno (2003), who used econometric tools to measure the performance Mexican municipalities. This study tries to fill the existing gap in the literature by using unique official information for the state of Sinaloa and the implementation of robust and consistent econometric techniques.

To study the impact of federal transfers on the tax effort in Sinaloa municipalities, we use information for 18 municipalities in Sinaloa between 1993 and 2008. To evaluate our research questions, we apply econometric techniques for static and dynamic data panel. We correct for potential endogeneity problems by using generalized method of moments (GMM) estimation (Arellano and Bond, 1991). The results show that the conditional transfers implemented since 1998 have generated laziness in collecting property taxes, negatively

¹ The concept of local or sub-national governments in this article refers to municipalities.

² The conditional transfers in this country are also known as federal contribution or branch 33, while the unconditional transfers are called federal participations or branch 28.

affecting the fiscal effort. We also find evidence that fiscal effort is also negatively affected for demographic factors such as population and the exclusion index.

The rest of this paper is structured as follows: Section 2 presents a review of the literature regarding fiscal imbalances, tax effort and transfers. Section 3 describes the transfer systems and fiscal efforts in México and Sinaloa. Section 4 describes the empirical strategy and the information used in it, Section 5 presents the main results and Section 6 is the conclusion.

2. - Fiscal imbalances, tax effort and transfers: A short review of literature.

The concepts of tax effort, fiscal imbalances and transfers are subjects that have been analyzed by classic authors as well as contemporaneous ones. In this section each one of these concepts is discussed.

The tax effort or fiscal effort³ is one of the main instruments used by central governments to distribute transfers in order to correct fiscal imbalances (verticals and horizontals). Although the theoretical concept is relatively clear, the empirical definition of fiscal effort is not completely uniform. The definition of tax effort goes back to authors such as Frank (1959), who defines it as the tax burden (ratio of public revenue in relation to gross domestic product) on a proxy for a territory's ability to pay (ratio of the gross domestic product in relation to population). Bhal (1971) defines it as the degree to which a country uses its tax capacity (the quotient of the ratio of collected public revenue on fiscal capacity⁴).

Perhaps one of the most used concepts in the literature is the one presented by the "Advisory Commission of Intergovernmental Relationship" (ACIR) (1986), who estimate tax effort based on the implementation of the national tax burden on the gross domestic product of the state or local level.⁵

The measurement of tax effort in Mexico is not a new topic⁶. Sobarzo (2003) calculates the effective tax rate for each state for each tax; in other words, the ratio between the tax collection and the value of the tax base. While this methodology is quite attractive, it is not necessarily correct if one wants to measure tax effort as defined in Frank (1959) or Bahl (1971). Other documents such as those presented by Sour (2007), Moreno

³ In this investigation the terms tax effort and fiscal effort mean the same thing, because there is no literature on the topic to the municipality government in Mexico, it was necessary to do an empirical study for the local governments of Sinaloa.

⁴ The fiscal capacity definition is not uniform either; Boex and Martinez-Vasquez (1997) establish six ways to define fiscal capacity: fiscal collection in a base year; income per capita, gross regional product, total sources subject to taxes, representative tax system, and representative tax system using a regression analysis.

⁵ Vaillancourt and Bird (2007) explain that the tax capacity of sub-national governments depends on the tax base and the geographical distribution of that base.

⁶ Sobarzo (2003) and e Ibarra (2005) estimate the federal entity level of Mexican states.

(2003), Raich (2004) and Aguilar (2009) examine the tax effort of municipalities, using different methodologies.

However, they have struggled finding some variables, such as the municipal gross domestic product, and have decided to use other alternatives, which are in some cases theoretically incorrect.

It should also be noted that several authors have studied the determinants of tax effort⁷, taking into account such factors as the economic, cultural and institutional aspects, among others.

Fiscal imbalances⁸ are problems that arise within intergovernmental fiscal systems of countries. Because of this, it is necessary to promote fiscal equalization through transfers. The mechanisms of fiscal equalization transfers are essential to encourage reforms related to the finances of local governments around the world. Tax imbalances are generated by two main reasons: i) regional or local governments have different fiscal capacities and abilities to increase revenues, and thus make different efforts to manage them, and ii) local governments can have different spending needs (Boex and Martinez-Vazquez (2007)).

While there are different types of transfers, there is agreement in the literature to classify them as conditional and unconditional. As noted by Rosen (2008), in the case of conditional transfers, it is the central government who specifies the purposes for which the recipient government must use these funds, while in the case of unconditional public funds, also called revenue sharing funds, local governments have the freedom to decide how the funds are used. As suggested by Searle and Martinez-Vazquez (2007), the difference between conditional and unconditional transfers is that for the former, local governments have the obligation to employ it to perform the work or service to which it is intended, while in the case of unconditional transfers, the local government can spend it regardless of local revenues or collected taxes from the residents of their jurisdiction.

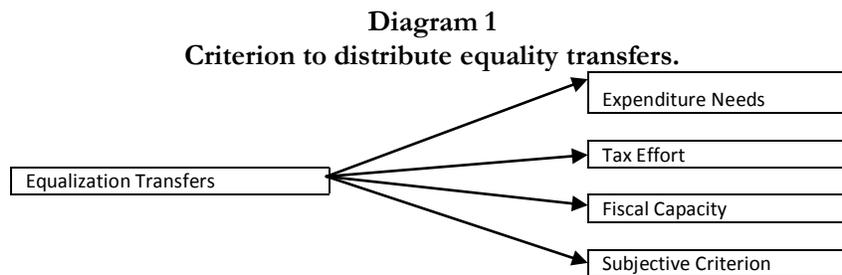
Prud 'Homme (2007) argues that the transfers are necessary to correct vertical imbalances and some horizontal imbalances.

⁷ Gupta (2007) uses variables on agriculture, debts and juridical security, openness, international aid, political and economic stability; Piancastelli (2001) considers cultural factors, institutional and legal restrictions, imports and exports; Eltony (2002) collects information about the political system, government attitudes, quality or laziness of taxes administration, culture and traditions of population; while Bird, Martinez-Vasquez and Torgler (2004) use term information on tax collection, gross domestic product per capita, population grow rate, openness, government quality, political stability, good regulation; indicator on the rule of law. In México Sobarzo (2003); Ibarra (2005); Sour (2007); Raich (2004); Moreno (2003); and Aguilar (2009) presents similar determinants.

⁸ According to Bird and Vaillancourt (2007) there exist vertical and horizontal fiscal imbalances; the first happens when there is a limited capacity of sub national governments respect to their expenditure responsibilities; the second is observed when there is a wide difference on the economic structure between the local governments. Thus, the differences in their fiscal capacity.

He also adds that this should not be the main function of these resources, but that their main objective is to promote local economic development and income distribution between jurisdictions, and not merely the provision of public services.

Given that the objective of transfers is fiscal equalization, it is necessary to determine what the distribution criteria are⁹. In this sense, Figure 1 shows the different criteria generally used, which are: spending needs and the tax effort that local governments make to improve tax collection or fiscal capacity of a region. There are other subjective criteria, which would be harder not to have a reference to distribute these public funds.



Source : Authors

3. The transfer system and fiscal effort in Mexico

Fiscal centralization of revenue collection by the federal government started in Mexico since 1980 and has prompted states and municipalities to be more dependent on conditional and unconditional transfers. Three decades after the beginning of the National System of Fiscal Coordination¹⁰, the need to strengthen fiscal decentralization for various purposes has been raised, but it is most fundamental to reduce the vertical imbalance between own-revenue and public expenditure of municipalities. Like other nations around the world, there are two types of transfers, conditional and unconditional, also known as branch 33 and branch 28, respectively.

The main objective of unconditional transfers is to return to states and municipalities a portion of revenues from taxes and duties that were not received. This function is the responsibility of the federal government.

⁹ We follow Bird and Vaillancourt (2007) classification.

¹⁰ The National System of Fiscal Coordination is an agreement that started in Mexico in 1980 between the three government levels in order to assign the tax burden charge. This tributary charge was mostly concentrated in the federal government of Mexico.

The use of this resource is not tied to a specific expenditure; the only thing established is that all the resources from the municipal development funds will belong to the municipalities, as well as at least 20 percent of the funds that each federal entity receives from general fund shares.¹¹

The federal government of Mexico distributes unconditional transfers with compensatory purposes¹² through the Fiscal Coordination Law (LCF). The two main funds are the General Participation Fund (FG) and the Municipal Development Fund (FFM). To that end, Article 2 of the LCF (2009) states that the FG is distributed according to the following formula:

$$P_{i,t} = P_{i,07} + \Delta FGP_{07,t} (0.6C1_{i,t} + 0.3C2_{i,t} + 0.1C3_{i,t})$$

Where:

$$C1_{i,t} = \frac{\frac{PIB_{i,t-1} n_i}{PIB_{i,t-2}}}{\sum_i \frac{PIB_{i,t-1}}{PIB_{i,t-2}}} n_i \quad C2_{i,t} = \frac{\Delta IE_{i,t} n_i}{\sum_i \Delta IE_{i,t} n_i} \quad \text{where: } \Delta IE_{i,t} = \frac{1}{3} \sum_{j=1}^3 \frac{IE_{i,t-j}}{IE_{i,t-j-1}} \quad C3_{i,t} = \frac{IE_{i,t-1} n_i}{\sum_i IE_{i,t-1} n_i}$$

Where: $C1_{i,t}$, $C2_{i,t}$ and $C3_{i,t}$ are the distribution coefficients of the FGP for the entity i in the year for which the calculation is made. Thus, the first coefficient indicates that 60 percent of the resources are distributed according to state GDP growth, 30 per cent according to increases in local revenue (collection) and 10 percent level according to the level of local revenue.

Also, article 2-A of the LCF, says that the FFM must be distributed according to the formula:

$$F_{i,t} = F_{i,07} + \Delta FFM_{07,t} C_{i,t} \quad \text{Where: } C_{i,t} = \frac{\frac{R_{i,t-1} n_i}{R_{i,t-2}}}{\sum_i \frac{R_{i,t-1} n_i}{R_{i,t-2}}}$$

¹¹ This is established in articles 2 and 2-A of the Mexican Fiscal Coordination Law (2009)

¹² It refers that the resources obtained by sub-national governments will be similar in amount to the ones uncollected by resigning in 1980, in exchange of receiving the unconditional transfers. This is the origin of the formulas to distribute this public funds.

$C_{i,t}$ is the distribution coefficient of the FFM of the entity i for the year in which the calculation is made. This resource is distributed according to the collection property taxes and water rights registered in the municipalities.

Table 1 presents the concepts, percentages and criteria by which the Mexican federal government distributes unconditional transfers to the states,¹³ so that they in turn deliver a portion to their municipalities. In the case of the General Fund, states are required by law to share at least 20 percent of the resources they receive from the federation with their municipalities, while the resources of the municipal development fund are used exclusively for the municipal government.

Table 1
Unconditional Transfers
(Participating Incomes)

Concept	Percent Of RFP Distribute From Federation to States	Distribution Criteria	
General Fund	20%	GIP growing local rights and transfer average of 3 years of tax collection and local rights	At least 20% percent is received by the state will be distributed to Municipalities
Municipal Development Fund	1% the state keeps anything	Property Tax and water rights collection	The 100% of resources are for municipalities

Source: Own elaboration according to the articles 2 and 2-A of Fiscal Coordination Law (2009)

Conditional transfers, which were created in December 1997,¹⁴ are composed of eight funds. Of these, we are only interested in analyzing two: contributions to the Social Infrastructure Fund (FAISM), and contributions to the Strengthening Municipalities Fund (FORTAMUN).¹⁵ These are the conditional transfers that have a direct impact on the municipalities across the country. For FAISM, Article 33 of the law states that they should be applied only "to finance public work, basic social actions/security and investments that directly benefit segments of the population in extreme poverty and with social backwardness." FORTAMUN, in Article 37, establishes that such transfers shall apply "to the satisfaction of their needs, giving priority to fulfilling their financial obligations to pay royalties and fees for water concept and addressing the needs directly linked to public safety of its inhabitants."

¹³ Here we excluded any other kind of conditional transfers that are exclusively deliver for education, health, public security, infrastructure and other topics establish by article 5 of fiscal coordination Law.

¹⁴ A fundamental factor in the creation of this source is that for the first time the "partido revolucionario institucional", PRI, politic force leaded by Ernesto Zedillo, lost the absolute majority of the "Camara de Diputados".

¹⁵ Both FASM and FORTAMUN are distributed with compensatory means.

In Table 2, criteria and percentages are observed regarding RFP. These have been used to assign conditional transfers to municipalities since January 1998.

Table 2
Conditioned Transfers
(Non Central Expense)

Concept	Percentage of RFP distributed by Federations	Distribution Criteria
FAISM	0.303 % State 2.197 % Communities	Income person home Education average level Housing space Drainage disposable Electricity – cooking combustible
FORTAMUN	2.35 % Municipalities 0.2123 % Federal District	Population

Source: Own elaboration enclosing articles 32 and 36 of Coordination Fiscal Law (2009)

In the state of Sinaloa, the State Fiscal Coordination Law was created in 1990. It established the criteria and basis for distributing these public resources to the 18 local public finances. Neither Sinaloa nor its municipalities receive any unconditional transfers of the additional revenue from oil extraction. Only the states of Campeche, Tabasco and Veracruz participate in these resources as well as resources from the hydrocarbon extraction fund. As noted, these funds are linked to the oil industry.

Mexican municipal treasuries, and specifically those of Sinaloa, have a vertical fiscal imbalance because the local taxes and revenues collected, in general, are insufficient to meet their current expenditure and investment responsibilities. For example, in 2009, the Mexican federal government experienced a drop in the shared federal revenue,¹⁶ which worsened the vertical gaps of the municipalities, who received fewer resources in the category of unconditional transfers. Cabrero (2006) shows that while sub-national¹⁷ spending represents 38.6 percent, the revenue collected by local governments is only 8 percent of that total spending.

Regarding fiscal effort estimates from empirical studies on the municipal level, Moreno (2003) indicates that transfers have generated a fiscal substitution effect (crowding-out effect). In other words, local governments prefer to be financed by federal funds instead of increasing their own income, resulting in a reduction of fiscal effort. However, Sour (2007) argues that the conditional and unconditional transfers have reduced the fiscal effort of Mexican municipalities. Raich (2004) takes as its object of study municipalities of Puebla from 1993 to 2000, and evaluates the impact of FAISM transfers on the collection of water rights and property taxes.

¹⁶ The shared federal collection is determined by article two the Fiscal Federal Coordination Law, and includes resources obtained by the Mexican government for all their taxes as well as for the rights to oil extraction and mining, but minus the total returns for the same.

¹⁷ Sub-national expenditure referred to by the authors is related to the expenditures of states and municipalities in Mexico.

Finally, Aguilar (2009), through an adaptation of the methodology developed by Battese and Coelli (1991) that estimates agricultural production functions, estimates the tax capacity of the largest three hundred municipalities in the country.

While it is true that the works of Sour (2007), Moreno (2003), Raich (2004), and Aguilar (2009) apply consistent methodologies and reach important conclusions, they also show some vulnerability as they lack a rigorous estimation of their models. For instance, the first author only uses five variables- three independent variables which are total municipal revenues, conditional transfers and unconditional transfers; the other two variables, the municipal GDP and own income, are used to create the dependent. The author defines the latter concept as "the sum of taxes, fees, goods and exploitation."¹⁸ It is necessary to clarify that fees, products and exploitation, under Mexican tax law, are not tax revenues. Only taxes can be considered in this category. Raich (2004) mentions that "[with respect to] the measurement of own revenue collection, several international studies focus only on the analysis of tax revenues, especially in the property tax." Moreover, he argues, "there are important theoretical differences between taxes and fees."

Unlike previous authors, this research makes more robust econometric estimations of tax effort and moreover, there is a better definition of that term, since as suggested by Raich (2004), only collection of taxes and property taxes is considered. For this article, the hypothesis to be tested is that vertical transfers have affected the local tax effort, taking as evidence the municipalities in the state of Sinaloa in the period 1993 to 2008. In this way, we collect data such as cadastral value, gross value added and property taxes, which are used to estimate a "pure" indicator of tax effort. In addition, applying econometric techniques, we will examine the effect of conditional and unconditional transfers on this indicator.

4.- Methodology and empirical strategy

The first obstacle or difficulty to elaborate about was that there is no literature that has studied the tax effort of municipalities in Mexico; moreover, there was no available information for extended periods of study. Unlike other investigations at the municipal level, our contribution to the literature of local finances is an alternative measurement of the fiscal effort through the collection of taxes, excluding other sources of municipal revenue for concepts of goods, fees and use established in the municipal finance law of the state of

¹⁸ In this article Municipality's tax incomes are the ones generated by charging taxes; that is why we exclude the other income sources as rights, products and uses.

Sinaloa¹⁹. In this sense, an additional contribution to this investigation is the measurement of the fiscal effort using information on municipalities' property taxes.

While the documents examined show interesting results and methodologies, the main weaknesses of previous work are the lack of a rigorous econometric estimation and a proper definition of tax effort. Thus, not only does the methodology presented here provide better estimates than prior research in Mexico, it also improves the definition and identification of the tax effort through taxation and property tax, with the purpose to obtain a clearer measurement of the impact of transfers on it.

The database used consists of information about property taxes, transfers, municipal taxes²⁰, gross domestic product, GDP, value added production²¹, VACB, information collected from the System of Municipal Data Base (SIMBAD) of the National Institute of Statistics and Geography and Informatics (INEGI). The Municipal marginalization/exclusion index was obtained from the National Population Council (CONAPO), while the historical table of the tax base of property tax was obtained from official information from the Cadastral Institute of the State of Sinaloa. In addition, there is progress in relation to the work presented by Sour (2007), Moreno (2002) and Aguilar (2009) with respect to obtaining new information that has not been used before, such as the cadastral value by municipality territory, marginal/exclusion index, property taxes, value added production and municipal taxes.

The information used consists of data from the 18 municipalities in Sinaloa for a period of 16 years with 10 variables.²² Unlike Aguilar (2009), we consider more than five years because tax effort, using techniques of dynamic data panel, is better measured over time when you have a large database and the information is affected by long-term institutional arrangements, such as the coordination of national fiscal system, which is highlighted by Raich (2004). He states that "the quantitative studies of transfers and tax effort can help us

¹⁹Before it was mentioned that Sour (2007) measure this concept including all own income concepts, which introduces some noise to the information. Raich (2005) also made that measure respect to property tax and water rights. He also mentions that in reference to the own income collection, several international studies measures the fiscal effort considering tax incomes, in particular property taxes.

²⁰ The local taxes comprise the ones established by the municipality treasure law, and the incomes law of Sinaloa municipalities. The statistical information considered the following six components: public shows taxes, non judiciary sales, auctions, raffles, lotteries and allowed games, taxes on announces and commercial ads, property and land taxes, mortgage taxes and urban development taxes.

²¹ GDP and VACCB, proxies for fiscal capacity, were taken from SIMBAD INEGI, by doing estimations for years without information, because this information is only available every five years. The GDP (gross domestic product)

following: Sour(2007) was estimated as:
$$PIBM = \frac{pibest}{pobest} \times pomum$$
 were: *pibest* = is the GDP of the Sinaloa of the period, *pobest* = is the Sinaloa State Population of the period *pomum* = is the municipality population in the period.

²² From all the variables shown, three of them have not been used in a period of 16 years. These are property values of municipalities' property tax, census gross added value and the index of margination.

better understand the structural and institutional characteristics of the fiscal decentralization policies in Mexico."

In the tax effort and property tax effort models, their objective is to determine the impact generated by the federal transfer on tax effort that municipalities in Sinaloa perform in order to obtain more revenues from local taxes. In fact, the tax structure in Sinaloa has a small margin for raising revenues, which are low compared to international standards.

The dependent variables used in the models²³ FEFF, REVRAT and REVRAT-VACB were designed as follow:

The fiscal effort to collect property taxes is defined as:

$$EF = \frac{\text{Property Tax Collection}}{\text{Property Value of Counties Properties}} = \frac{\sum_{it} RIP}{\sum_{it} VC}$$

Where *EF* is the proportion of collected revenue for the concept of property taxes respect to the cadastral value; *RIP* is the property tax collection; *VC* is the fiscal value of property value (proxy for the fiscal capacity of this tax).

The tax effort relative to GDP will be defined as the following ratio:

$$REVRAT = \frac{\text{Local Taxes Collection}}{\text{Municipality Gross Domestic Product}} = \frac{\sum_{it} RIM}{\sum_{it} PIBM}$$

Where REVRAT is the proportion of collected local taxes respect to the municipality gross domestic product; RIM is the local collection tax; PIBM is the gross domestic product of the municipality.

Finally, tax effort is defined relative to the value added product as follows:

$$REVRAT - VACB = \frac{\text{Local Taxes Collection}}{\text{Added Gross Value}} = \frac{\sum_{it} RIM}{\sum_{it} VACB}$$

²³ The dependant and non dependant variables, with exception of population and the margination/exclusion index, are express in 1993 constant prices. All variables are available between 1998 and 2008, since they were designed in 1997.

Where REVRAT-VACB is the proportion of collected local taxes respect to the value added production; RIM is defined as above, and VACB is the census gross added value (proxy for the income per capita)

The levels of the tax effort of the municipalities can be represented as a function of several factors that determine it. As part of this document, variables that are considered within these factors include the cadastral value of the municipality (VC), the size of the municipality measured by its municipal population (POP),²⁴ the added value of local production (VA) and marginalization/exclusion index (IM).

In addition to these, the model also includes variables that show the conditional transfers level (TC) and unconditional transfers (IT) that each municipality receives,²⁵ constituting these core variables in our analysis. In addition to the variables described, there can be other factors that capture additional features local and/or random factors that affect the tax effort. For simplicity, these are considered as part of an unsystematic error orthogonal to the explanatory variables.

Under these considerations, the model can be represented as follows:

For simplicity, if we assume that the functions F and G follow an exponential form, the models to be estimated can be written in the following fashion:

Where W represents the explanatory variables (VC, POP, VA, IM) with the exception of transfers that are included in logarithms. Under this specification, the coefficients b_{12} and b_{22} can be interpreted as elasticities between EF and REVRAT with respect to changes in transfers.

In this case, assuming that W, $\log(TC)$ and $\log(IT)$ are orthogonal to the errors, and assuming that there is no problem of endogeneity, omitted variables or specification problems, the coefficients "a" and "b" can be estimated consistently using ordinary least squares (OLS). However, to properly estimate the effect of

²⁴ The pibes and pobest were taken from INEGI and population projections by municipality from CONAPO.

²⁵ The level of transferences is measured as a ratio respect to the total level of income declared by the municipality.

transfers from 1993 to 2008 and evaluate the introduction of the policy of conditional transfers of resources to the municipalities since 1998, we estimate models 3 and 4 under the following specifications:

- Using both transfers sources together ($IT = TC + TI$) and not separately as shown in 3 and 4.
- Using only unconditional transfers.
- Using both types of transfers, but restricting the information to the years after the policy change.
- Using only conditional transfers, but also limiting the information to the years after the policy change.

The problem with the specification above is that it does not consider that there may be specific characteristics (unobserved heterogeneity) that can be correlated with the explanatory variables. If this is the case, the estimates obtained using OLS would not be consistent and the coefficients would be biased because the explanatory variables would be correlated with error, violating one of the main assumptions of OLS.

An alternative to solve this problem is to exploit the structure of the information, using panel data estimation techniques to model these specific effects.

In this sense, models 3 and 4 can be estimated by breaking the error component ϵ_{it} , obtaining the following specification:

Both models are estimated using random (EA) and fixed (EF) effects, considering the same specifications as in the case of OLS. Although the fixed-effects estimation is always consistent, the estimation with random effects, under certain conditions, can be consistent and efficient. Because of this feature, both EA and EF are estimates and are compared using the Hausmann²⁶ specification test.

An additional problem that may arise in estimating models 5 and 6 is that the level of transfers that municipalities receive and the degree of property tax effort (EF) and tax effort (REVRAT) can be defined

²⁶ The Hausman specification test is used to verify if there is any statistical difference between the EF and EA estimates. Under the hypothesis of non-systematic differences, if this cannot be rejected, the model with RE is selected. If rejected, the model with FE is preferred. More details in Wooldridge (2002).

simultaneously. This can cause problems of endogeneity, which in turn can cause the estimates to be inconsistent and biased. This problem cannot be corrected using fixed effects. Under these conditions, it is necessary to use the methodology developed by Arellano-Bond (1991) to deal with the potential risk of endogeneity.

This methodology is based on a similar idea to the use of instrumental variables (IV). Instrumental variables are those that are strongly correlated with variables that have a potential endogeneity problem, but are not correlated with the dependent variable or the original model error. Under the assumption that these variables can be found, they can be used to generate estimations of the variables with endogeneity problems (instrumented) so they are no longer correlated with the error in the main model.

Because finding variables that meet both characteristics is empirically difficult, particularly in panel data, the Arellano-Bond methodology proposes to use lagged values from those variables with potential endogeneity problems as instruments of themselves. In the absence of serial autocorrelation, the lagged values of the variables of interest would not be correlated with the original model errors and would be strongly correlated with their predecessors.

In addition, the model is estimated using first differences in order to eliminate specific effects. In this case, using this methodology, the basic specification of the model would be as follows:

Where Dep represents the dependent variable: EF and REVRAT

Given the structure of the errors, these models must be estimated using the Generalized Method of Moments (GMM). For this methodology, we apply the same considerations as for the basic model.

5. Results

This research allows the construction of models which may possibly contribute to empirical studies conducted in Mexico, because for the first time, the cadastral value of property tax is used for a 16-year series. It was also necessary to create two proxy variables for fiscal capacity—VACB and GDP—as in this country both sets of data are only generated every five years by the INEGI. For this reason, these two data sets were estimated following the methodology applied by Sour (2007).

It is worth mentioning that property represents the largest component of municipal government tax revenue collected in Mexico since 1983, not only in Sinaloa, but for every municipality in the country. It would have been interesting to estimate this model from 1983 to 1997, but the unavailability of information limited this analysis to the period 1993-2008. Given the nature of some of the variables involved, it was necessary to separate the information into two periods²⁷: from 1993 to 1998, since, at that time, municipalities received only unconditional transfers, and from 1998 to 2008, when the conditional transfers started.

Table 3 presents the results of the determinants of property tax. Tables 4 and 5 present the results from considering the measures of tax efforts with respect to GDP and VACB. Each of these Tables shows 15 different specifications.

The equations 1 to 5 are all estimated using OLS estimates, which do not consider the temporal heterogeneity in the estimates. Columns 6 to 10 present the results of the regressions using panel fixed effects²⁸. Finally, given the potential endogeneity in the regression, as discussed in the methodological section, columns 11 to 15 present the results using dynamic panel estimators following Arellano-Bond (1991).

Table 3
Determinants of property tax collection in Sinaloa between 1993-2008
(dependent variable: FEEF= property tax/ fiscal Base)

	(1)	(2)	(3)	(4)	(5)
Total transfers	-1.792*** (0.356)				
Unconditional transfers		-1.578*** (0.414)	-1.071* (0.576)	-0.648 (0.563)	
Conditional transfers			-1.668*** (0.540)		-1.406** (0.562)
	(6)	(7)	(8)	(9)	(10)
Total transfers	-0.410** (0.167)				
Unconditional transfers		-0.359 (0.245)	-0.406 (0.346)	-0.184 (0.319)	
Conditional transfers			-0.705** (0.312)		-0.581* (0.324)
	(11)	(12)	(13)	(14)	(15)
Total transfers	-1.254** (0.519)				
Unconditional transfers		-0.429 (0.420)	-0.310 (0.878)	-0.307 (0.522)	
Conditional transfers			-1.246*** (0.381)		-0.665** (0.299)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: columns(1) to (5) are pooled OLS, (6) to (10) fixed effects chart and (11) to (15) Arellano-Bond.

²⁷ In this sense, the regressions of columns 1, 3, 6, 7, 8, 11, 12 and 13 from each chart correspond to information between 1998-2008

²⁸ According to the Hausman Test, Panel fixed effects is the preferred model.

Results of the estimation²⁹ show, in general, an ambiguous effect of population size. In most models, the effect appears to be significant and positive, while in others it has negative coefficients. One possible explanation for this result is that the effects of population size are nonlinear, and that different models are capturing different sections of the nonlinearity. If the main effect is positive, it supports the hypothesis that controlling income and collecting taxes are easier in municipalities with larger populations. Also, the larger a municipality is, the greater the ability to control taxes.

Table 4
Determinants of property tax collection in Sinaloa between 1993-2008
(Dependent variable: REVRAT = total taxes/PIB proxy.)

	(1)	(2)	(3)	(4)	(5)
Total transfers	-1.242*** (0.297)				
Unconditional transfers		-1.176*** (0.370)	-0.966** (0.487)	-0.640 (0.487)	
Conditional transfers			-1.282*** (0.417)		-1.045** (0.440)
	(6)	(7)	(8)	(9)	(10)
Total transfers	-0.386*** (0.133)				
Unconditional transfers		-0.506** (0.233)	-0.597* (0.311)	-0.493* (0.249)	
Conditional transfers			-0.330 (0.296)		-0.147 (0.237)
	(11)	(12)	(13)	(14)	(15)
Total transfers	-1.028* (0.529)				
Unconditional transfers		-0.766* (0.394)	-1.077 (0.710)	-0.950 (0.568)	
Conditional transfers			-0.849*** (0.322)		-0.685* (0.392)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: columns(1) to (5) are pooled OLS, (6) to (10) fixed effects chart and (11) to (15) Arellano-Bond.

In terms of value-added production, all models, except for the Arellano Bond models, show that its effect on tax effort is positive and significant, with an estimated elasticity of approximately 0.3.

The exclusion index is a summary measure of nine socio-economic indicators³⁰ that measures different forms of social exclusion. It indicates the relative level of deprivation that large groups of the population suffer. A higher index indicates greater social exclusion and poorer socioeconomic indicators. In this sense, all models

²⁹ Full estimations of the models can be found in the appendixes. The tables only shows coefficients corresponding to transfers.

³⁰ The nine indicators according to the National Population Advise (2005) are percents respecting population over 15 years old who are illiterate, population without primary education over 15 years, households without sanitary services, household without electric services, without water or drains, with some levels of overcrowding, people living in houses with ground floors, people leaving in localities with less than 5000 inhabitants, and working people earning less than two minimum salaries.

predict that the higher the level of social exclusion in the municipality, the lower the ability of the municipality to control taxes, which generates a lower tax effort.

Table 5
Determinants of property tax collection in Sinaloa between 1993-2008
(dependent variable: REVRAT-VACB = total taxes/gross added value.)

	(1)	(2)	(3)	(4)	(5)
Total transfers	-1.306*** (0.285)				
Unconditional transfers		-1.151*** (0.358)	-0.941* (0.486)	-0.617 (0.484)	
Conditional transfers			-1.276*** (0.417)		-1.045** (0.442)
	(6)	(7)	(8)	(9)	(10)
Total transfers	-0.359** (0.146)				
Unconditional transfers		-0.448* (0.225)	-0.496* (0.267)	-0.403* (0.213)	
Conditional transfers			-0.297 (0.276)		-0.145 (0.232)
	(11)	(12)	(13)	(14)	(15)
Total transfers	-0.771* (0.460)				
Unconditional transfers		-0.541 (0.336)	-0.591 (0.574)	-0.709 (0.534)	
Conditional transfers			-0.906*** (0.333)		-0.728* (0.413)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: columns(1) to (5) are pooled OLS, (6) to (10) study effects chart and (11) to (15) Arellano-Bond.

The results show that the conditional and unconditional transfers have, in general, a negative impact on municipalities' tax effort municipalities.

The results in Columns 1, 6 and 11 of Tables 3, 4 and 5 show that from 1993 to 2008, total transfers had a significant negative effect in terms of property tax effort and the tax effort. These results indicate that, to the extent that municipalities in Sinaloa received higher percentages of federal revenues, these percentages generated some kind of fiscal laziness. In other words, it was better to finance the needs of public spending using total transfers than by using the public's own taxes.

The fact that total transfers are in the negatives leads to the examination of independent effects of conditional and unconditional transfers. As shown in Regressions 11 to 15, Tables 3, 4 and 5, once we corrected for endogeneity through the estimator proposed by Arellano-Bond (1991), the marginal effect (elasticity) of the transfers is negative, small and not significant for both samples. It should be noted that the estimated impact of unconditional transfers is lower than that of the transfers as a whole. Looking at Columns 13 to 15, it can be observed that the impact of conditional transfers is much deeper with respect to the reduction of tax

effort. In fact, the estimates show elasticities that are slightly more than twice of those for unconditional transfers.

Finally, Columns 13 to 15 of Tables 3, 4 and 5 examine the simultaneous effects of the substitution between unconditional and conditional transfers. These results confirm that the distribution of conditional transfers to the municipalities of Sinaloa, through FORTAMUN and FAIS, have generated fiscal laziness in property tax collection (as well as the collection of other taxes) in the municipalities of Sinaloa. Additionally, in this region of Mexico, members of the legislature have been partially responsible for the negative effect on the collection of such taxes. This is because they approved the lower fees, rates and taxable bases starting in 1998, the same year when the conditional transfers were first distributed.

It is worth noting that when random fixed effects are considered, the estimated elasticities are much smaller than in the ordinary least squares. Nevertheless, the same patterns regarding the magnitude of the impact of transfers can be observed, although less significant. Also, when the models are corrected considering Arellano Bond methodology, the elasticities are slightly higher than those found using fixed and random effects.

Thus, the results, as a whole, indicate the existence of laziness to raise property taxes because Mexican municipalities, and in particular municipalities in Sinaloa, have received conditional transfers since 1998. Also, in the case of tax effort, the estimates of the fourth model are also consistent with the hypothesis of Sour (2007) in the sense that federal transfers discourage the collection of local taxes, although the effect is not significant. In this same model, the explanatory variables, population and municipal taxes, have positive effects, particularly this last variable that is significant at 1 percent of confidence.

The positive and negative findings in this article shall be taken into consideration in future research, to determine more accurately the impact generated by the transfers on the tax effort of the municipalities. The tax structure of the municipalities of Sinaloa gives little scope for the collection of own resources. Relevant aspects such as the structures of tax bases and administrative practices limit municipalities to collect or raise fiscal resources according to their economic potential.

6 . Conclusions:

The main goal of this paper is to estimate the impact of transfers on local tax effort in Mexico, considering the evidence on tax collection for the period 1993-2008 in the municipalities of the state of Sinaloa. The estimates were made by understanding the determinants that stimulate or affect the tax effort as well as affecting the effort to raise property tax.

The use of econometric models for panel data showed that the transfers have adversely affected the tax effort. In line with Moreno (2003), one explanation that can be mentioned regarding this inverse relationship is that local governments prefer to finance their budgets using transfers rather than bear the political cost of raising taxes. Moreover, in line with Morales (2006), the negative impact of conditional transfers is due to the high dependency that these resources have created for local governments.

One situation that cannot be overlooked is that, despite the fact that variables measuring the level of marginalization, population, cadastral values, gross domestic product, census gross value added, conditional and unconditional transfers were included, there could be other factors that affect or stimulate the tax effort of both general taxes as well as the fiscal effort on the collection of property taxes. Among them, we can mention the transparency or opacity in which the public expenditure is implemented, and the quality or negligence of the public services that is provided to citizens. In fact, because of the way local taxes are collected and how public services are offered are usually uncorrelated, it is a situation that discourages citizens to meet their fiscal obligations.

Thinking about institutional variables that can be used to measure the accountability and enforcement, proposed by Bird, Martínez-Vázquez and Torgler (2004), is just a blossoming field in Mexico, so no information is systematized. Developing countries usually have limited high-quality statistical information, something that is not a problem for developed nations. This situation put us at a disadvantage in the context of the frontier of knowledge, to design panel data econometric models that applied to our empirical study. For these reasons, the proposed methodology was designed subject to the data availability, and the design of the variables that were used in the model of tax effort of the municipalities.

We conclude that in Mexico, unlike Brazil and Colombia, there is a high level of compliance with the municipal tax liability. Applying the same kind of tax as applied to property taxes in different countries shows different results. In provinces such as Alberta, Canada, most of the public expenditure budget exercise comes from local tax collection, while in countries like Mexico, vertical imbalances of sub-national governments, to which Bird and Wallace (2007) have been referring, must be supported by central government transfers. Aztec municipalities, particularly the Sinaloa, have weak institutions for the collection of taxes, a situation that adversely impacts the provision of public services. This necessarily raises the need to strengthen their tax systems.

If the municipalities of Sinaloa had more efficient tax systems, they would be able to reduce their vertical fiscal gap and would have more opportunities to provide better public goods and services to their citizens. No wonder Oates (1972) stated that the benefits of fiscal decentralization should bring welfare for people who have a closer government.

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Appendix
Sinaloa State Municipalities

Ahome
El Fuerte
Choix
Guasave
Sinaloa
Angostura
Salvador Alvarado
Mocorito
Badiraguato
Culiacán
Navolato
Elota
Cosalá
San Ignacio
Mazatlán
Concordia
El Rosario
Escuinapa

DETERMINANTS OF FISCAL EFFORT MEASURE BASED ON LOCAL REVENUE IN SINALOA, 1993-2008
DEPENDENT VARIABLE PROPERTY TAX/TAX BASE = FEFF

	(1)	(2)	(3)	(4)	(5)
Total Transfers	-1.792*** (0.356)				
Unconditional Transfers		-1.578*** (0.414)	-1.071* (0.576)	-0.648 (0.563)	
Conditional Transfers			-1.668*** (0.540)		-1.406** (0.562)
Lnvcat	-0.990*** (0.132)	-0.955*** (0.131)	-1.446*** (0.177)	-1.352*** (0.184)	-1.481*** (0.178)
Lnpop	0.0658 (0.0587)	0.0566 (0.0616)	0.141* (0.0720)	0.129* (0.0721)	0.211*** (0.0630)
Lnvapc	0.227** (0.0900)	0.249*** (0.0913)	0.271** (0.134)	0.296** (0.137)	0.299** (0.135)
Margination Index	-0.511*** (0.111)	-0.584*** (0.108)	-0.874*** (0.163)	-0.910*** (0.171)	-0.880*** (0.163)
Constant	3.198** (1.356)	2.869** (1.290)	5.779*** (1.839)	4.339** (1.844)	4.692*** (1.750)
Observations	278	278	188	188	188
R-squared	0.340	0.327	0.369	0.342	0.358
	(6)	(7)	(8)	(9)	(10)
Total Transfers	-0.410** (0.167)				
Unconditional Transfers		-0.359 (0.245)	-0.406 (0.346)	-0.184 (0.319)	
Conditional Transfers			-0.705** (0.312)		-0.581* (0.324)
Lnvcat	-0.835*** (0.167)	-0.841*** (0.156)	-1.036*** (0.132)	-1.036*** (0.134)	-1.028*** (0.137)
Lnpop	-0.170 (0.492)	-0.0967 (0.456)	-1.079* (0.545)	-0.736 (0.522)	-1.030* (0.540)
Lnvapc	0.143** (0.0653)	0.148** (0.0689)	0.271* (0.129)	0.322** (0.133)	0.277** (0.131)
Margination Index	-0.104 (0.0816)	-0.112 (0.0797)	-0.354*** (0.105)	-0.322*** (0.0962)	-0.355*** (0.107)
Constant	3.700 (6.602)	2.911 (6.143)	15.43** (6.868)	11.20 (6.562)	14.57** (6.826)
Observations	278	278	188	188	188
R-squared	0.398	0.396	0.359	0.341	0.353
Number of id	18	18	18	18	18
	(11)	(12)	(13)	(14)	(15)
Total Transfers	-1.254** (0.519)				
Unconditional Transfers		-0.429 (0.420)	-0.310 (0.878)	-0.307 (0.522)	
Conditional Transfers			-1.246*** (0.381)		-0.665** (0.299)
Lnvcat	-1.693 (1.857)	-0.516 (0.959)	0.447 (1.142)	-2.347* (1.154)	-0.307 (1.331)
Lnpop	-1.543 (3.106)	0.0901 (0.233)	1.471 (2.733)	-0.738 (1.395)	0.0102 (1.903)
Lnvapc	0.855 (1.265)	0.205 (0.755)	1.422 (1.562)	1.217 (0.718)	1.453 (2.389)
Margination Index	-0.754* (0.449)	-0.259* (0.129)	-0.248 (0.169)	-0.129 (0.120)	-0.184** (0.0750)
Observations	270	288	180	180	180
Number of id	18	18	18	18	18
Sargant p-v	0.885	0.655	0.276	0.0603	0.250
Hansen p-v	1	1	0.996	1	0.996
Arellano-Bond ar(1)	0.152	0.0600	0.150	0.246	0.238
Arellano-Bond ar(2)	0.559	0.337	0.738	0.988	0.739

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Columns (1) to (5) show pooled OLS regressions, (6) to (10) show panel estimation with fixed effects (11) to (15) Arellano bond

DETERMINANTS OF FISCAL EFFORT MEASURE BASED ON LOCAL REVENUE IN SINALOA, 1993-2008
DEPENDENT VARIABLE TOTAL TAXES/GDP PROXY = FEFF

	(1)	(2)	(3)	(4)	(5)
Total Transfers	-1.242*** (0.297)				
Unconditional Transfers		-1.176*** (0.370)	-0.966** (0.487)	-0.640 (0.487)	
Conditional Transfers			-1.282*** (0.417)		-1.045** (0.440)
Lnvcat	0.313* (0.170)	0.337** (0.167)	-0.281* (0.143)	-0.208 (0.148)	-0.313** (0.144)
Lnpop	0.142** (0.0665)	0.130* (0.0757)	0.159*** (0.0590)	0.149** (0.0600)	0.222*** (0.0539)
Lnvapc	0.116 (0.119)	0.128 (0.117)	0.255** (0.112)	0.274** (0.114)	0.281** (0.112)
Margination Index	-0.416*** (0.120)	-0.469*** (0.116)	-0.809*** (0.140)	-0.837*** (0.146)	-0.815*** (0.140)
Constant	-9.796*** (1.759)	-9.913*** (1.690)	-5.432*** (1.433)	-6.539*** (1.442)	-6.413*** (1.339)
Observations	278	278	188	188	188
R-squared	0.677	0.676	0.763	0.755	0.759
	(6)	(7)	(8)	(9)	(10)
Total Transfers	-0.386*** (0.133)				
Unconditional Transfers		-0.506** (0.233)	-0.597* (0.311)	-0.493* (0.249)	
Conditional Transfers			-0.330 (0.296)		-0.147 (0.237)
Lnvcat	0.572* (0.282)	0.564* (0.280)	-0.266 (0.203)	-0.265 (0.206)	-0.253 (0.209)
Lnpop	0.586 (0.454)	0.707 (0.443)	0.185 (0.482)	0.345 (0.469)	0.257 (0.475)
Lnvapc	0.0826 (0.157)	0.0863 (0.149)	0.449*** (0.153)	0.473*** (0.155)	0.458** (0.163)
Margination Index	-0.0931 (0.126)	-0.111 (0.113)	-0.397*** (0.0970)	-0.382*** (0.0910)	-0.398*** (0.101)
Constant	-17.54** (6.430)	-18.77** (6.528)	-6.381 (5.686)	-8.360 (5.551)	-7.657 (5.466)
Observations	278	278	188	188	188
R-squared	0.236	0.240	0.368	0.364	0.355
Number of id	18	18	18	18	18
	(11)	(12)	(13)	(14)	(15)
Total Transfers	-1.028* (0.529)				
Unconditional Transfers		-0.766* (0.394)	-1.077 (0.710)	-0.950 (0.568)	
Conditional Transfers			-0.849*** (0.322)		-0.685* (0.392)
Lnvcat	0.164 (1.584)	0.548 (1.036)	1.367* (0.783)	-0.676 (0.979)	0.785 (1.121)
Lnpop	-1.351 (2.992)	0.153 (0.244)	1.076 (1.473)	0.677 (1.144)	0.216 (1.767)
Lnvapc	-0.896 (2.442)	0.0630 (0.755)	0.654 (0.950)	0.734 (0.461)	0.922 (2.084)
Margination Index	-0.364 (0.643)	-0.342** (0.147)	-0.212 (0.175)	-0.162 (0.148)	-0.236** (0.116)
Observations	270	288	180	180	180
Number of id	18	18	18	18	18
Sargant p-v	0.830	0.754	0.396	0.242	0.691
Hansen p-v	1	1	0.938	1.000	0.989
Arellano-Bond ar(1)	0.0673	0.0540	0.0724	0.101	0.0905
Arellano-Bond ar(2)	0.240	0.184	0.371	0.504	0.403

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Columns (1) to (5) show pooled OLS regressions, (6) to (10) show panel estimation with fixed effects (11) to (15) Arellano bond

DETERMINANTS OF FISCAL EFFORT MEASURE BASED ON LOCAL REVENUE IN SINALOA, 1993-2008
DEPENDENT VARIABLE TOTAL TAX/AGGREGATE VALUE = REVRAT-VACB

	(1)	(2)	(3)	(4)	(5)
Total Transfers	-1.306*** (0.285)				
Unconditional Transfers		-1.151*** (0.358)	-0.941* (0.486)	-0.617 (0.484)	
Conditional Transfers			-1.276*** (0.417)		-1.045** (0.442)
Lnvcat	0.171 (0.116)	0.196* (0.114)	-0.250* (0.138)	-0.178 (0.143)	-0.282** (0.139)
Lnpop	0.115** (0.0556)	0.108* (0.0620)	0.145** (0.0577)	0.136** (0.0586)	0.207*** (0.0508)
Lnvapc	-0.790*** (0.0813)	-0.774*** (0.0813)	-0.742*** (0.112)	-0.723*** (0.114)	-0.717*** (0.112)
Margination Index	-0.457*** (0.102)	-0.511*** (0.0986)	-0.804*** (0.136)	-0.832*** (0.141)	-0.810*** (0.136)
Constant	1.237 (1.230)	0.998 (1.202)	4.314*** (1.421)	3.213** (1.429)	3.358** (1.327)
Observations	278	278	188	188	188
R-squared	0.711	0.707	0.503	0.485	0.493
	(6)	(7)	(8)	(9)	(10)
Total Transfers	-0.359** (0.146)				
Unconditional Transfers		-0.448* (0.225)	-0.496* (0.267)	-0.403* (0.213)	
Conditional Transfers			-0.297 (0.276)		-0.145 (0.232)
Lnvcat	0.381** (0.179)	0.374* (0.180)	-0.125 (0.174)	-0.125 (0.178)	-0.115 (0.179)
Lnpop	0.577 (0.335)	0.682** (0.308)	0.0487 (0.451)	0.193 (0.426)	0.108 (0.439)
Lnvapc	-0.829*** (0.0498)	-0.826*** (0.0498)	-0.704*** (0.108)	-0.682*** (0.112)	-0.696*** (0.116)
Margination Index	-0.141 (0.0828)	-0.156* (0.0768)	-0.397*** (0.0974)	-0.384*** (0.0909)	-0.398*** (0.100)
Constant	-6.336 (4.791)	-7.408 (4.596)	3.902 (5.548)	2.122 (5.311)	2.841 (5.338)
Observations	278	278	188	188	188
R-squared	0.902	0.902	0.681	0.678	0.675
Number of id	18	18	18	18	18
	(11)	(12)	(13)	(14)	(15)
Total Transfers	-0.771* (0.460)				
Unconditional Transfers		-0.541 (0.336)	-0.591 (0.574)	-0.709 (0.534)	
Conditional Transfers			-0.906*** (0.333)		-0.728* (0.413)
Lnvcat	0.0329 (1.535)	0.791 (0.649)	1.184 (0.826)	-0.920 (0.984)	1.159 (1.009)
Lnpop	-2.673 (2.467)	0.216 (0.238)	0.315 (1.150)	0.727 (1.282)	0.00193 (1.471)
Lnvapc	-3.224 (2.607)	-1.141* (0.546)	-0.663 (1.031)	-0.0532 (0.393)	-0.595 (1.794)
Margination Index	-0.198 (0.943)	-0.310** (0.110)	-0.198 (0.178)	-0.199 (0.158)	-0.219* (0.113)
Observations	270	288	180	180	180
Number of id	18	18	18	18	18
Sargant p-v	0.873	0.238	0.465	0.378	0.653
Hansen p-v	1	1	0.911	1	0.997
Arellano-Bond ar(1)	0.0792	0.0368	0.135	0.171	0.145
Arellano-Bond ar(2)	0.249	0.386	0.273	0.467	0.331

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Columns (1) to (5) show pooled OLS regressions, (6) to (10) show panel estimation with fixed effects (11) to (15) Arellano bond