MUNICIPAL TAX EFFORT IN EL SALVADOR

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ABSTRACT

The measurement of tax effort at the sub-national level has been almost ignored by specialists concerned with municipal tax and finance reform. An important aspect of municipal finance reform has included improving the basis upon which intergovernmental transfers are allocated from central to local government budgets. The academic literature encourages practitioners to include local tax effort as a factor in making these transfer allocations, yet almost no guidance exists as to how such tax effort can practicably be calculated.

This paper presents a methodology applied to a real case, that of local governments in a developing country context, for calculating municipal tax effort. The methodology is based on probablistic or statistical analysis of revenue collections and other indicators to calculate relative tax effort among 200 of El Salvador's 262 municipalities. Four means for applying the general methodology are calculated and compared. Finally, the data and the calculations of relative tax effort are included in an annex.

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INTRODUCTION

This paper presents an analysis of municipal tax effort in the Central American country of El Salvador. The analysis is based, in part, on the international literature of tax effort at the national level, although local tax effort analysis has also been conducted in the United States.

Local tax effort is an import measurement because as countries move toward greater fiscal decentralization, there is a need to more closely monitor the activities of local governments within the context of decentralized systems. Part of the fiscal decentralization taking place over the recent past has included increases in transfers of resources from central to local government. At the same time, local governments have often been granted greater revenue authority. The efforts that local governments make in collecting their own revenues should not be discouraged by these increasing transfers, and analysts and policymakers need to be informed about the relative efforts that local governments make in terms of their own revenue generation. This paper demonstrates a methodology for calculating the relative tax efforts that local governments make in El Salvador.

It is necessary to point out that not all municipal governments are alike. Some are richer with greater tax bases, while others are much poorer with almost no economic basis for tax collections. In the Salvadoran context, as elsewhere, the level of taxation depends on the tax base plus tax effort. Tax effort is related to administrative capacity and the ability and willingness to enforce tax rules.

This paper presents a theoretical basis for municipal tax effort analysis, provides a brief review of the relevant literature, deepens the discussion of various concepts included in the tax effort literature, and adapts and improves the methodologies for municipal government empirical analysis. The methodology applied here, while derived from accepted methodologies applied at the international level, applies information that has not been used for this purpose before. This innovative methodology is applicable in other countries.

THE LITERATURE

The literature about local tax effort is quite sparse, yet there is considerable literature about tax effort at the national level. This section presents a brief review of this literature.

There is no theoretically correct level of taxation for any country. There is neither theory nor proof that one level of taxation should be preferred or considered to be more "correct." Nonetheless, generally, if a country's tax level is particularly "low" but it seeks international grants or loans to close its financing gap, perhaps the country is just not making enough tax effort. At the same time, the advice often given to governments in "high" tax countries faced with fiscal deficits is to cut spending rather than increase taxation.

Clearly, the concepts of "high" or "low" taxation are in need of some discussion. These judgments should result from comparisons of a country's actual tax level (tax revenue to GDP) versus some measurement of its likely tax capacity. The problem is that there is no clear measure of tax capacity. Instead of getting caught up in trying to measure something as elusive as tax capacity, which cannot be measured directly, economists have based their analysis on the concept of "tax handles."[1] Usually, when taxation behavior is compared among countries, a number of economic variables substitute for these tax handles.

The tax effort literature is based entirely on the approach of using cross-country regression analysis applied to variables that represent tax handles. In almost all the literature, the tax ratio is the dependent variable. The explanatory or independent variables, those representing tax handles, have included: GDP per person; the shares of agriculture or mining in GDP; the relative size of the international trade sector (exports plus imports as percentage of GDP); imports as a percentage of GDP; and others.

In a series of studies, income or GDP per capita is consistently used as an explanatory variable. The rationale for this is that the more income a population enjoys, the greater should be its capacity to pay taxes, that is, it can better afford taxation. At the same time, Wagner's Law holds that public goods are luxury goods and, thus, the payment for public goods should rise with incomes. At the same time, these studies show that the greater the share of agriculture in the economy, the lower tax capacity. This is explained by the fact that agriculture is difficult to tax since farms are diverse, are often outside the formal sector, often provide for subsistence farming and are hence outside of the market, and are geographically distant from tax authorities. This is particularly true in developing countries.

Chelliah, Baas, and Kelly (1975) estimated an Ordinary Least Squares (OLS) regression between the tax ratio and per capita income in 53 countries, both developing and industrialized. The R^2 for this regression was 0.41; however, when the data set is segmented into 37 developing and 16 industrialized countries the explanatory power of the regressions declines importantly. For the developing country regression, the R^2 drops to only 0.04, and for the industrialized countries it drops to 0.24. It is obvious that this rather simple methodology is not adequate since these results are far from robust and seem to indicate an irrelevance with respect to developing countries.

Stotsky and Wolde-Mariam (1997) review four empirical studies of tax effort and present an alternative means for estimation.[2] Their study is based on a panel of cross-country, time series observations and applying a "fixed-effects" model. The fixed-effects model holds constant for specific idiosyncratic country experiences. In their review they note that per capita income has had little influence on tax capacity. In a summary table of the various empirical studies, they point out that the most important factors in determining tax capacity are: mining to GDP; imports to GDP; nonmineral exports to GDP; foreign debt to GDP; and international trade to GDP. In three of the four studies the agricultural share of GDP results as a significant and negative factor in tax capacity. Agriculture was not included as a variable in the other study. In two of the studies, a fixed-effects model with a panel of cross-section of time series data is applied. In the other two studies, OLS is applied for cross-country regressions.

Stotsky and Wolde-Mariam present a regression model using OLS with fixed-effects on a panel of cross-country time series data. The data are only for sub Saharan countries. The explanatory variables are: mining, manufacturing, imports, exports, and income per capita. With the expectation of manufacturing and import shares to GDP, all the other variables have estimated coefficients that are significant. It is interesting to note that the R^2 falls from 0.96 to 0.47 when comparing the fixed-effects model to only the cross-country model.[3]

A 1977 study by the U.S. Advisory Commission on Intergovernmental Relations derived a tax "standard" for the 50 individual states by applying an average tax rate to per capita income levels.[4] Then actual revenue levels were compared to the standard level, and fiscal effort was the ratio of "actual" to "standard" revenue collections.[5]

MUNICIPAL REVENUE IN EL SALVADOR

Before discussing the nature of the municipal revenues system of El Salvador, it is worth discussing the taxes that are not collected. Throughout the world, the most important municipal revenue sources are property taxes, sales taxes, and perhaps special business and personal income taxes. None of these "normal" taxes are collected in El Salvador's municipalities.

Despite the fact that Salvadoran law permits a wide variety of municipal taxation, in fact, there is considerable uniformity among the local revenue systems. The most important revenue sources for municipal governments in El Salvador are the fees charged on homes in urban zones, similar to homeowner association fees in U.S. planned communities, and the business tax on net assets. Other sources of revenues are fees for services, such as cemeteries, civil registry, marriage licenses, and other such services. These fees and taxes are almost universally applied throughout the country.

Of course, there are some differences among municipalities. For example, the tax rates on net assets vary somewhat from place to place. In almost all municipalities the net asset tax is regressive, applying a higher effective rate on smaller businesses than that applied on larger businesses. There are also some minor differences in how the tax base is defined.

MODELS OF MUNICIPAL TAX CAPACITY

Municipal tax capacity is both a theoretical and a practical concept. The capacity to collect revenues given a specific tax structure depends on the economic tax base of the municipality as well as the administrative capability and efforts made to collect the revenues. The uniformity of the municipal revenues systems in El Salvador has already been discussed. Given this uniformity, the economic revenues base should be measurable based on specific indicators of poverty or wealth and economic activity.

This paper presents four competing models for tax capacity, where tax capacity is the expected level of tax collection given a specific model's parameters and the specific municipality's variable values. In each of these models, the level of taxation is presented as municipal tax (taxes and property fees) on a per capita basis.

Poverty, Population, and Urbanization

In this model, the level of tax revenue per capita is considered to be a function of poverty, population, and urbanization. It is expected that where there is greater poverty that there will be a smaller relative tax base and ergo less tax capacity. It is also expected that tax capacity should be greater in larger municipalities given economies of scale afforded to tax administrations. The more urbanized municipalities are expected to provide for greater tax capacity since rural areas are essentially outside of the municipal tax system.

Before estimating fiscal capacity it is necessary to define the variables that are used. Poverty is represented by the Index of Unmet Basic Needs (IUBN), which is a composite indicator based on 10 social and public goods indicators that represent the access to basic schooling, the level of literacy, distance to health care, etc. Urbanization is the ratio of urban population to total population in a given municipality. Population is merely the 1998 estimated population of the specific municipality. Population data are extrapolated from the 1992 census and other sampling methods.

Income, Population, and Urbanization

In this second model, the poverty indicator, IUBN, is replaced by per capita incomes as declared on the 1998 central government income tax declarations aggregated for the residents of each municipality. This information was downloaded from the information system of the Ministry of Finance and covers about 166,000 tax filers for 1998.

Tax capacity is expected to be positively related to per capita income, population size, and the degree of urbanization.

Assets, Population, and Urbanization

In this model, total assets of income tax filers are included instead of their income. These data are also from the 166,000 income tax filers with the Ministry of Finance for 1998. Our rationale for including this variable is that given the nature of municipal taxes, perhaps including assets would be useful.

Tax capacity is expected to be positively related to per capita asset levels, population size, and the degree of urbanization.

Assets, Incomes, Population, and Urbanization

This model includes all of the mentioned potential explanatory variables except for poverty. Theoretically, this model is the most complete since incomes should better represent the amount of economic activity taking place in a community, while assets separately provide the basis upon which most of a community pays its taxes in El Salvador.

DESCRIPTION OF THE DATA

This quantitative analysis is based solely on information from 1998, except for population data, which are from the 1992 census.

The data were collected by a team of researchers working for DevTech Systems, Inc., with the full cooperation of the Salvadoran Ministry of Finance. The data that are included in this study are defined in the following manner:

The Index of Unmet Basic Needs: The IUBN is taken from "Focalización, asignación de recursos y criterios," Fondo de Inversión Social para el Desarrollo Local, 1997. This index is composed of 10 indicators of poverty and the lack of access to basic services such as drinking water, schools, and clinics.

Urbanization: The percentage of a municipal population living in rural areas. This information is based on the 1992 national census.

Population: The population of each municipality as estimated in 1998. This estimate comes from the Salvadoran Institute of Municipal Development (ISDEM) .

Tax: The sum of the municipal tax revenues (mainly from the assets tax) and the "fees" that are charged on urban residences. In this exercise taxes and fees as combined taxation are included. There are two specific reasons for this combination: a) both require effort to collect, and b) the database available does not separate one from the other. Future efforts along these lines might include distinguishing between these two revenue sources. Almost all of the data are from ISDEM; however, data for eight municipalities were collected and reported by RTI. These additional eight municipalities' numbers also include other current revenues. Tax and fees data were not available from ISDEM for these eight municipalities. These data are from 1998. *Taxpc*s is actual collection of taxes and fees per municipal resident in 1998.

Income: The sum of declared incomes from income tax returns aggregated for each municipality in 1998. This information covers individuals and corporations. This information was downloaded from the information system of the Ministry of Finance in El Salvador. *Incomepc* are these incomes divided by municipal population.

Assets: These are declared values in 1998 aggregated by municipality. These data are from the income and wealth declaration forms and the information is stored on the information system of the Ministry of Finance. This information covers individuals and corporations. *Assetspc* is the total assets per municipality divided by the population in the municipality.

Table 1 presents the descriptive statistics of these data.

TABLE 1: DESCRIPTIVE STATISTICS

	Population	IUBN	Incomepc	Assetspc	Taxpc
Total	5,908,465				
Average (unweighted)	20,874	45	574	4,202	35
Standard deviation	44,114	11	1,691	23,424	53
Maximum	460,354	69	20,589	320,361	461
Minimum	498	8	9	19	1
Median	10,044	45	283	825	21
Number of Municipalities	262	262	262	257	229

Table 1 demonstrates great variety among Salvadoran municipalities with wide ranges of size, degrees of urbanization, poverty levels, incomepc and assetspc. It should also be pointed out that the database does not cover all of the country's municipalities for all variables. For instance, although there are 262 municipalities in the country, there are assets data for 257 and tax and fees data for only 229.

EMPIRICAL RESULTS

Table 2 presents the regression results for the four tax capacity models.

TABLE 2: RESULTS OF MUNICIPAL TAX CAPACITY MODELS DEPENDENT VARIABLE: MUNICIPAL TAX PER CAPITA

Variable	Model 1	Model 2	Model 3	Model 4
Constant	41.26 (1.79)[1]	9.30 (2.06)[2]	11.34 (2.70)[4]	11.47 (2.75)[3]
IUBN	-0.74 (-1.81)[1]	—	—	—
Incomepc	—	0.02 (11.80)[4]	—	0.006 (2.10)[2]
Assetspc	—	—	0.003 (13.83)[4]	0.002 (5.95)[4]
Population	0.0005 (6.56)[4]	0.0002 (3.48)[4]	0.0002 (3.26)[4]	0.0002 (2.99)[3]
Urbanization	45.86 (2.26)[2]	-12.92 (-0.92)	42.44 (3.68)[4]	0.002 (5.95)[4]
R^2 (adjusted)	.41	.65	.70	.70
Observations	200	200	200	200

T-statistics in parentheses.
[1] Significant at 0.05 (one-tailed test) level of confidence.
[2] Significant at 0.025.
[3] Significant at 0.01.
[4] Significant at 0.005.

Due to the statistical interrelationships among some of the variables in these models, it is worthwhile to present in Table 3 the coefficients of correlation among these variables.

TABLE 3: CORRELATIONS AMONG THE VARIABLES

	Taxpc	IUBN	Urbanization	Population	Incomepc
IUBN	-0.51				
Urbanization	0.49	-0.72			
Population	0.59	-0.54	0.47		
Incomepc	0.79	-0.65	0.63	0.60	
Assetspc	0.80	-0.38	0.38	0.54	0.86

INTERPRETATION OF THE EMPIRICAL RESULTS

The R^2 of Model 1 in Table 2 indicates that 41 percent of the variance in tax and fees collections per capita is explained by the model. The specific estimators for Model 1 indicate:

1. The poorest municipalities tend to have the lowest tax collections per capita. The t-statistic indicates that the estimated coefficient is significantly less than zero, as expected, and, applying a single-tailed test, is significant at the 95 percent or greater level of confidence.[6]
2. The larger municipalities tend to have higher per capita tax collection. In this case, the estimated coefficient is significantly greater than zero at a greater than 97.5 percent level of confidence.
3. The more urbanized municipalities also tend to collect more tax per capita. In this case, the estimated coefficient is significantly greater than zero at a 99 percent or greater level of confidence.

The R^2 in Table 2 indicates that 65 percent of the variance in the dependent variable, tax per capita, can be explained by the Model 2 regression. The estimated coefficients of Model 2 indicate:

1. Those municipalities with the higher per capita declared incomes collect the most municipal tax and fees per capita. The estimated coefficient is significantly greater than zero at a confidence level superior to 99 percent.
2. As in Model 1, the more populated municipalities are able to collect more municipal tax per capita, and the relevant estimated coefficient is significantly superior to zero with a 99 percent level of confidence.
3. Given these two results, there seems to be no demonstrated effect of urbanization on municipal revenues. Here the estimated coefficient is not significantly different from zero. This result is a bit surprising but it likely results from colinearity between urbanization and per capita incomes.

The R^2 in Table 2 indicates that 70 percent of the variance in per capita municipal tax and fees collection can be statistically explained by the Model 3 regression. The Model 3 estimated coefficients indicate:

1. The greater the level of declared assets on a per capita basis, the greater the likely per capita municipal tax collections. For the per capita assets variable, the estimated coefficient is greater than zero with a 99 percent level of confidence.
2. As in Models 1 and 2, the more populated municipalities tend to collect more tax per capita. For the population variable, the estimated coefficient is greater than zero with a 99 percent level of confidence
3. Consistent with Model 1, the more urbanized municipalities tend to collect more tax per capita. For the urbanization variable, the estimated coefficient is greater than zero with a 99 percent level of confidence

The R^2 in Table 2 indicates that 70 percent of the variance in the dependent variable, per capita municipal tax, can be explained by the Model 4 regression. The estimated coefficients indicate:

1. Both incomes and assets positively affect municipal tax collections, with both estimated coefficients significantly superior to zero at a 99 percent confidence level.
2. The more urbanized municipalities tend to collect more tax per capita. For the urbanization variable, the estimated coefficient is greater than zero with a 99 percent level of confidence.
3. The larger municipalities tend to collect more per capita. For the population variable, the estimated coefficient is greater than zero with a 99 percent level of confidence.

Interpreting the "goodness of fit" statistics leads to the conclusion that Models 2 and 3 are superior to Model 1 in terms of explaining the differences in municipal tax and fees collections. Model 4 should be seen as the most complete model, even though its R^2 is not greater than that of Model 3, yet it is more complete conceptually. Given the high correlation between assets and incomes (0.86, see Table 2) it is a bit surprising that the estimated coefficients for both of these indicators are so significant. Despite this recognized multicolinearity, both factors, incomes and assets, seem to be separately important determinants of municipal revenue collection in El Salvador.

What are the factors that explain the other 30 percent variance in per capita municipal tax and fees collections? These include, *inter alia*:

1. Data errors. Perhaps these measures simply are inadequate or not well measured.
2. Differences in the tax structures from municipality to municipality. This topic was already touched upon.[7]
3. Temporary factors. For example, several municipalities were affected by Hurricane Mitch while others were not. Others have suffered effects of too much or too little rain. Future research might include means of accounting for the effects of such conditions.
4. Tax effort. This paper suggests that the main cause of variance beyond that explained in the Model 4 regressions can be attributed to differences in fiscal effort, including administrative capacity.

TAX EFFORT

This is defined as the relation of actual tax collections to the expected tax collection. The expected tax collection in this analysis is that which would derive from the estimated model parameters, as presented in Table 1.

The attached annex presents the calculations of tax effort in percentage terms, i.e., the actual collections as a percentage of the expected collections. The first column contains the names of the individual municipalities and the second contains the departmental names. The third column presents the expected per capita collection in 1998 and the next columns present the tax effort expressed in percentage terms based on the various model results. The right-hand half of the table presents the rankings of tax effort with Model 4 resulting ranks setting the order for the table's presentation.

As already mentioned, Model 4 seems to be the "best" or most complete of the models and, for this reason, the rest of the analysis focuses on this model's results.

According to Model 4, Acajutla has the highest tax effort, generating collections six times that expected. This yield is extremely high, seeming to indicate considerable tax effort. However, it should be kept in mind that Acajutla, a port city, has access to revenues that other municipalities do not. Specifically, Acajutla collects a tonnage tax on all imports entering through its port. This points out the need for analysts to have a clear understanding of the nature of the municipalities in a country before blindly applying the techniques employed here. This framework, however, is useful in helping to pinpoint municipalities that are outside of the norm, make considerable tax effort, or seem to be generating very low levels of their own revenues.

Other high-effort municipalities are:

- Tecoluca, San Vicente (481%),
- Zacatecaluca, La Paz (420%),
- Nueva Guadelupe, San Miguel (364%), and
- Dolores, Cabañas (342%).

San Salvador, the country's capital, enjoys relatively high tax yield according to three of the four models. However, using the results only from Model 3, San Salvador's yield seems a bit low. This results from the fact that residents of the capital hold a high amount of the declared asset values in the country although many of the assets are actually located outside the city. Indeed, comparing asset holding to incomes, it seems that assets are more than expected. This, once again, points up the need for the analyst to know the details of the cases being studied and to not blindly apply the techniques employed here.

The following municipalities are collecting more or less what the models lead one to expect:

- Chalchuapa, Santa Ana (102%),
- El Refugio, Ahuachapan (101%),
- Rosario de Mora, San Salvador (100%),
- San Rafael, Chalatenango (99%),
- Cuscatancingo, San Salvador (99%),
- Jayaque, La Libertad (98%), and
- Oratorio de Concepción, Cuscatlan (98%).

These can be referred to as averag-effort municipalities. There are, of course, many other municipalities that can be classified among this group of average-effort municipalities.

Carolina in the department of San Miguel is classified by all the models as having the lowest tax yield of all. According to Model 4, this municipality is only collecting four percent of its expected value. Model 1 shows Carolina to be only collecting nine percent of its expected tax collections. Certainly, Carolina in San Miguel seems to be a very low tax effort municipality.

Other low-yield municipalities include, among others:

- Candelaria, Cuscatlan (23%),
- Lolotique, San Miguel (22%),
- Monte San Juan, Cuscatlan (21%),
- San Rafael Cedros, La Paz (19%), and
- Santa Cruz Michapa, Cuscatlan (17%).

Without other exogenous factors to explain their low yield, it seems these municipalities should be classified as demonstrating low tax effort.

COMPARING THE MODELS

As has been shown, Model 4 seems to be the most appropriate of the models presented in this paper since its “goodness of fit” statistics are superior and it is conceptually the most complete.

Table 4 presents the correlations among the tax yields generated by the four models, while Table 5 presents the correlations among the rank scores of tax yields from the four models. As is quite sensible, the highest correlations are between the yield percentages and the rank scores for Models 3 and 4, while Models 1 and 4 have the lowest degrees of correlation.

Of interest, however, is that the rank scores of fiscal effort are even more highly correlated across models than are the percentage efforts. In large part, this is because the relative variance among rankings is less. The models are particularly useful and robust when ranking municipal tax effort.

TABLE 4: CORRELATIONS OF TAX EFFORTS FROM THE FOUR MODELS

	Model 1	Model 2	Model 3
Model 2	0.70		
Model 3	0.70	0.78	
Model 4	0.75	0.84	0.96

TABLE 5: CORRELATIONS OF RANKINGS FROM THE FOUR MODELS

	Model 1	Model 2	Model 3
Model 2	0.76		
Model 3	0.81	0.83	
Model 4	0.82	0.89	0.98

ROBUSTNESS

The robustness of the models must be investigated given the great diversity among Salvadoran municipalities. As discussed above in the case of Chelliah, Baas, and Kelly (1975), what had seemed to be a useful set of regression results for a model of tax effort for a group of developing and industrialized countries turned out to have much less explanatory power when the data set was segmented between the two sets of country types.

In El Salvador there is quite a bit of diversity among municipalities, as shown in Table 6. Here, per capita assets range from only C10 in the municipality with the lowest level to C118,327. Similar, although less marked, is the range for income per capita. The top five "richest" municipalities — San Salvador, Antiguo Cuscatlán, Nueva San Salvador, El Rosario, and Soyapango — each has over C10,000 in per capita assets. At the same time, 32 other municipalities have less than C100 in per capita assets. The five "poorest" municipalities — Meanguera, Jicalapa, San Cristobal, Yoloaiquín, and San Lorenzo — have per capita assets ranging from C10 to C16.

TABLE 6: RANGES OF PER CAPITA INCOME AND ASSETS

	Incomepc	Assetspc
Max	18,546	118,327
Min	43	10
Average	1,354	2,645
Std	1,901	11,946

To test for the robustness of the four models, the four model regressions are run excluding the top five richest municipalities. These regression results are presented in Table 7.

TABLE 7: RESULTS OF MUNICIPAL TAX CAPACITY MODELS EXCLUDING THE FIVE RICHEST MUNICIPALITIES DEPENDENT VARIABLE: MUNICIPAL TAX PER CAPITA

Variable	Model 1	Model 2	Model 3	Model 4
Constant	37.38 (2.20)[2]	9.36 (2.06)[2]	9.23 (2.21)[2]	9.13 (2.19)[2]
IUBN	-0.50 (-1.69)[1]	—	—	—
Incomepc	—	0.008 (2.21)[2]	—	0.005 (1.37)
Assetspc	—	—	0.004 (2.67)[3]	0.003 (2.02)[2]
Population	0.0004 (4.67)[4]	0.0003 (4.15)[4]	0.0003 (3.72)[4]	0.0003 (3.19)[4]
Urbanization	30.62 (2.12)[2]	24.31 (1.63)	38.42 (3.27)[4]	25.96 (1.75)[1]
R^2 (adjusted)	.28	.29	.29	.30
Observations	195	195	195	195

T-statistics in parentheses.
[1] Significant at 0.05 (one-tailed test) level of confidence.
[2] Significant at 0.025.
[3] Significant at 0.01.
[4] Significant at 0.005.

Table 8 presents regression results excluding the five richest municipalities and the 32 poorest municipalities, each of which has per capita assets below C100.

TABLE 8: RESULTS OF MUNICIPAL TAX CAPACITY MODELS EXCLUDING THE FIVE RICHEST AND 32 POOREST MUNICIPALITIES DEPENDENT VARIABLE: MUNICIPAL TAX PER CAPITA

Variable	Model 1	Model 2	Model 3	Model 4
Constant	33.92 (1.67)[1]	11.83 (2.31)[2]	11.05 (2.15)[2]	10.94 (2.13)[2]
IUBN	-0.40 (-1.09)	—	—	—
Incomepc	—	0.007 (1.74)[1]	—	0.004 (1.07)
Assetspc	—	—	0.004 (2.20)[2]	0.003 (1.70)[1]
Population	0.0003 (4.14)[4]	0.0003 (3.78)[4]	0.0003 (3.39)[3]	0.0003 (2.97)[4]
Urbanization	33.15 (2.04)[2]	24.21 (1.41)	38.17 (2.84)[4]	26.63 (1.55)
R^2 (adjusted)	.25	.25	.26	.26
Observations	163	163	163	163

T-statistics in parentheses.
[1] Significant at 0.05 (one-tailed test) level of confidence.
[2] Significant at 0.025.
[3] Significant at 0.01.
[4] Significant at 0.005.

The purpose of this test for robustness is to investigate the possibility that extreme absolute deviations among the data set might lead to bias in the estimators. What results, however, is that by first removing the richest municipalities and later by removing also the poorest municipalities, that are no resulting important changes in the values of the estimated coefficients. However, the R^2 (adjusted) falls in both cases compared to those derived in the first set of regressions, presented in Table 2. Since these estimated coefficients do not vary from the unrestricted to the restricted models to any important degree, there is no reason to be concerned that extreme cases of wealth or poverty, as measured by per capita assets, will bias our estimators.[8] Model 4, at least, produces the best linear unbiased estimators (BLUE).

CONCLUSION

Fiscal effort is a determining factor of tax collection at the municipal level.

It has been shown that there are municipalities with relatively high tax receipts while other municipalities with similar economic and population bases collect considerable less. These latter need to take efforts to step up their tax collections, such as by improving their taxpayer roles and asset valuations, improving the collection of late payments, and bringing more taxpayers into the taxpayer net. In addition, municipalities can raise their fiscal effort by improving their administration, strengthening enforcement efforts, and following up on collections of past due taxes. Greater compliance with the law needs to be in terms of not just administrative efforts but also the cajoling and communal and coercive actions of mayors and taxpayers alike.

This analysis shows not only that the major determinants of local tax collection are economic and demographic, but also that effort is an important factor.

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ANNEX

Municipality	Department	Taxpc C$	Effort				Effort Rankings			
			Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Acajutla	**SONSONATE**	267	489%	429%	637%	611%	4	3	1	1
Tecoluca	**SAN VICENTE**	104	528%	468%	335%	481%	3	2	5	2
Zacatecoluca	**LA PAZ**	201	290%	340%	377%	420%	13	5	3	3
Nueva Guadalupe	**SAN MIGUEL**	169	290%	289%	388%	364%	14	9	2	4
Dolores	**CABAÑAS**	68	588%	684%	263%	342%	1	1	9	5
San Luis Talpa	**LA PAZ**	91	304%	268%	260%	338%	11	11	10	6
El Paisnal	**SAN SALVADOR**	69	322%	293%	361%	337%	9	8	4	7
Antiguo Cuscatlán	**LA LIBERTAD**	452	465%	119%	110%	296%	7	57	57	8
Metapán	**SANTA ANA**	113	216%	201%	272%	284%	19	22	7	9
San Julián	**SONSONATE**	69	318%	213%	266%	274%	10	17	8	10
San Francisco Menéndez	**AHUACHAPAN**	57	245%	234%	224%	269%	17	16	12	11
Azacualpa	**CHALATENANGO**	78	172%	357%	219%	256%	26	4	15	12
Sonsonate	**SONSONATE**	149	165%	174%	211%	246%	27	32	16	13
El Porvenir	**SANTA ANA**	49	253%	238%	191%	245%	16	14	21	14
Texistepeque	**SANTA ANA**	48	173%	235%	222%	241%	25	15	13	15
Olocuilta	**LA PAZ**	57	208%	141%	328%	240%	20	46	6	16
Usulután	**USULUTAN**	117	145%	212%	192%	234%	35	18	20	17
San Salvador	**SAN SALVADOR**	461	154%	121%	93%	233%	31	55	71	18
Cuyultitán	**LA PAZ**	80	201%	181%	239%	226%	22	29	11	19
Sacacoyo	**LA LIBERTAD**	58	191%	195%	221%	217%	23	25	14	20
La Unión	**LA UNION**	87	137%	208%	168%	211%	42	19	26	21
El Tánsito	**SAN MIGUEL**	60	158%	244%	179%	206%	30	13	24	22
Ciudad Arce	**LA LIBERTAD**	66	138%	145%	206%	202%	40	43	17	23
San Vicente	**SAN VICENTE**	100	142%	159%	177%	198%	37	36	25	24
Colón	**LA LIBERTAD**	67	127%	113%	188%	198%	44	61	22	25
La Libertad	**LA LIBERTAD**	71	139%	169%	154%	194%	38	33	32	26
San Francisco Gotera	**MORAZAN**	78	146%	179%	166%	188%	34	30	28	27
Corinto	**MORAZAN**	35	292%	253%	167%	187%	12	12	27	28
Sensuntepeque	**CABAÑAS**	66	138%	168%	166%	183%	41	34	29	29
Caluco	**SONSONATE**	33	376%	195%	151%	182%	8	26	35	30
Zaragoza	**LA LIBERTAD**	72	127%	200%	121%	182%	45	23	48	31
Nejapa	**SAN SALVADOR**	49	152%	144%	181%	181%	32	44	23	32
Cojutepeque	**CUSCATLAN**	104	119%	150%	164%	179%	55	40	30	33
Santa Rosa de Lima	**LA UNION**	55	123%	187%	130%	172%	49	28	43	34
Puerto El Triunfo	**USULUTAN**	52	115%	275%	132%	171%	60	10	41	35
Armenia	**SONSONATE**	64	125%	157%	153%	171%	47	37	33	36
Comacarán	**SAN MIGUEL**	34	161%	199%	156%	169%	29	24	31	37
Cinquera	**CABAÑAS**	49	473%	112%	204%	168%	5	62	18	38
Quezaltepeque	**LA LIBERTAD**	76	115%	129%	152%	166%	62	50	34	39
Tonacatepeque	**SAN SALVADOR**	55	123%	103%	197%	164%	50	68	19	40
Aguilares	**SAN SALVADOR**	77	115%	179%	136%	162%	61	31	38	41
El Congo	**SANTA ANA**	53	120%	126%	124%	154%	52	51	46	42
San Miguel	**SAN MIGUEL**	121	76%	121%	125%	151%	105	54	45	43
Tepetitán	**SAN VICENTE**	41	125%	153%	121%	150%	46	38	49	44
San Juan Opico	**LA LIBERTAD**	49	104%	95%	111%	147%	68	80	56	45
Quelepa	**SAN MIGUEL**	30	142%	125%	112%	146%	36	53	52	46
Yoloaiquín	**MORAZAN**	28	230%	207%	130%	145%	18	20	44	47
San Ignacio	**CHALATENANGO**	30	163%	148%	141%	142%	28	42	37	48
Masahuat	**SANTA ANA**	23	471%	187%	123%	139%	6	27	47	49
San Bartolomé Perulapía	**CUSCATLAN**	55	120%	114%	146%	139%	53	59	36	50
San Antonio Pajonal	**SANTA ANA**	33	97%	339%	105%	137%	74	6	61	51

Municipality	Department	Taxpc C$	Effort				Effort Rankings			
			Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Dulce Nombre de María	**CHALATENANGO**	37	138%	139%	131%	135%	39	47	42	52
Santa Ana	**SANTA ANA**	118	70%	88%	112%	129%	118	87	53	53
Sociedad	**MORAZAN**	23	188%	149%	118%	126%	24	41	50	54
Nueva San Salvador	**LA LIBERTAD**	152	110%	60%	92%	124%	64	134	73	55
San Martín	**SAN SALVADOR**	60	68%	118%	112%	123%	122	58	51	56
Jocoro	**MORAZAN**	40	118%	85%	136%	121%	56	91	39	57
Atiquizaya	**AHUACHAPAN**	46	110%	72%	135%	120%	63	109	40	58
Jiquilisco	**USULUTAN**	14	95%	107%	109%	120%	76	65	58	59
Concepción Batres	**USULUTAN**	26	122%	119%	97%	119%	51	56	67	60
Juayúa	**SONSONATE**	50	119%	69%	97%	118%	54	113	68	61
Santa Clara	**SAN VICENTE**	23	131%	203%	100%	117%	43	21	63	62
Izalco	**SONSONATE**	43	81%	85%	66%	112%	96	90	116	63
Uluazapa	**SAN MIGUEL**	26	83%	164%	96%	112%	93	35	69	64
Nahuizalco	**SONSONATE**	30	98%	88%	107%	109%	73	84	59	65
Tepecoyo	**LA LIBERTAD**	28	105%	126%	94%	108%	67	52	70	66
Sonzacate	**SONSONATE**	57	81%	99%	88%	108%	97	70	76	67
San Francisco Lempa	**CHALATENANGO**	47	100%	98%	106%	107%	70	73	60	68
Chalchuapa	**SANTA ANA**	50	70%	69%	98%	102%	116	112	65	69
El Refugio	**AHUACHAPAN**	31	87%	75%	87%	101%	87	104	77	70
Rosario de Mora	**SAN SALVADOR**	29	90%	142%	86%	100%	80	45	79	71
San Rafael	**CHALATENANGO**	28	77%	151%	81%	99%	101	39	86	72
Cuscatancingo	**SAN SALVADOR**	53	55%	83%	99%	99%	145	92	64	73
Jayaque	**LA LIBERTAD**	27	85%	88%	62%	98%	88	85	124	74
Oratorio de Concepción	**CUSCATLAN**	26	109%	105%	93%	98%	66	67	72	75
Nahulingo	**SONSONATE**	25	88%	109%	76%	97%	84	64	91	76
Nueva Concepción	**CHALATENANGO**	27	81%	99%	82%	97%	95	69	84	77
San Luis La Herradura	**LA PAZ**	24	80%	139%	73%	96%	98	48	94	78
Santiago Texacuangos	**SAN SALVADOR**	25	89%	75%	102%	95%	82	101	62	79
Turín	**AHUACHAPAN**	39	90%	65%	111%	94%	81	117	55	80
Santa Elena	**USULUTAN**	31	88%	64%	111%	93%	85	120	54	81
San Sebastián Salitrillo	**SANTA ANA**	19	96%	75%	98%	92%	75	105	66	82
La Palma	**CHALATENANGO**	23	99%	93%	84%	92%	72	81	81	83
Ilopango	**SAN SALVADOR**	69	55%	65%	81%	90%	146	118	85	84
Apopa	**SAN SALVADOR**	63	48%	78%	73%	89%	161	98	93	85
Ahuacahpán	**AHUACHAPAN**	43	56%	60%	70%	88%	143	135	106	86
El Divisadero	**MORAZAN**	18	84%	88%	84%	87%	90	88	80	87
San Esteban Catarina	**SAN VICENTE**	33	67%	136%	71%	87%	123	49	101	88
El Triunfo	**USULUTAN**	29	70%	111%	69%	87%	119	63	107	89
Apaneca	**AHUACHAPAN**	38	115%	52%	90%	86%	59	151	74	90
Suchitoto	**CUSCATLAN**	23	72%	86%	70%	83%	111	89	105	91
San Pablo Tacachico	**LA LIBERTAD**	18	75%	80%	79%	82%	106	95	88	92
San Isidro	**CABAÑAS**	17	83%	97%	69%	79%	94	75	108	93
Ilobasco	**CABAÑAS**	28	52%	78%	72%	79%	154	99	99	94
Ozatlán	**USULUTAN**	20	63%	98%	71%	79%	131	72	100	95
Agua Caliente	**CHALATENANGO**	17	87%	96%	67%	78%	86	77	110	96
Tamanique	**LA LIBERTAD**	15	75%	88%	72%	77%	107	86	98	97
Nueva Granada	**USULUTAN**	15	117%	113%	66%	77%	57	60	115	98
San Rafael Obrajuelo	**LA PAZ**	24	65%	68%	73%	77%	129	114	95	99
Yamabal	**MORAZAN**	15	201%	62%	86%	76%	21	125	78	100
Salcoatitán	**SONSONATE**	24	89%	59%	83%	76%	83	138	83	101
Santo Tomás	**SAN SALVADOR**	30	57%	70%	70%	76%	142	111	104	102
Candelaria de la Frontera	**SANTA ANA**	20	58%	67%	72%	76%	139	115	97	103
San Lorenzo	**SAN VICENTE**	16	73%	97%	69%	75%	110	74	109	104

Municipality	Department	Taxpc C$	Effort				Effort Rankings			
			Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
San Juan Nonualco	**LA PAZ**	26	71%	53%	83%	75%	114	146	82	105
Mercedes Umaña	**USULUTAN**	13	69%	76%	73%	75%	120	100	96	106
San Pedro Masahuat	**LA PAZ**	17	61%	62%	59%	74%	136	126	128	107
Citalá	**CHALATENANGO**	18	71%	97%	65%	74%	113	76	118	108
San Antonio del Monte	**SONSONATE**	23	54%	78%	67%	74%	150	96	111	109
Chalatenango	**CHALATENANGO**	34	58%	51%	79%	74%	140	153	89	110
San José Guayabal	**CUSCATLAN**	19	77%	96%	65%	73%	102	78	117	111
Concepción de Ataco	**AHUACHAPAN**	25	66%	62%	64%	72%	126	130	121	112
El Rosario	**LA PAZ**	25	61%	60%	30%	72%	134	133	182	113
Victoria	**CABAÑAS**	13	117%	81%	67%	71%	58	93	114	114
San Lorenzo	**AHUACHAPAN**	15	84%	56%	79%	71%	91	142	87	115
Moncagua	**SAN MIGUEL**	14	54%	63%	71%	70%	148	122	102	116
San Ramón	**CUSCATLAN**	18	72%	59%	74%	70%	112	137	92	117
Potonico	**CHALATENANGO**	21	44%	329%	50%	69%	164	7	140	118
Soyapango	**SAN SALVADOR**	79	37%	48%	58%	68%	174	156	131	119
Osicala	**MORAZAN**	21	124%	40%	78%	68%	48	172	90	120
San Ildefonso	**SAN VICENTE**	15	101%	67%	63%	67%	69	116	122	121
San Cayetano Istepeque	**SAN VICENTE**	17	74%	74%	63%	66%	109	106	123	122
Santo Domingo Guzman	**SONSONATE**	14	91%	89%	57%	66%	78	83	132	123
San Pedro Perulapán	**CUSCATLAN**	17	79%	40%	90%	66%	100	170	75	124
San Sabastián	**SAN VICENTE**	23	55%	56%	67%	66%	147	141	113	125
Santa Rita	**CHALATENANGO**	14	66%	53%	71%	65%	125	149	103	126
La Reina	**CHALATENANGO**	16	70%	73%	59%	65%	117	107	127	127
San Juan Talpa	**LA PAZ**	21	52%	62%	60%	64%	152	128	125	128
Santiago Nonualco	**LA PAZ**	18	45%	53%	58%	63%	163	150	130	129
Guacotecti	**CABAÑAS**	12	76%	65%	64%	63%	103	119	120	130
Concepción Quezaltepeque	**CHALATENANGO**	18	62%	81%	53%	63%	132	94	137	131
Chirilagua	**SAN MIGUEL**	14	52%	98%	42%	63%	153	71	156	132
San Matías	**LA LIBERTAD**	13	61%	89%	53%	63%	133	82	138	133
Talnique	**LA LIBERTAD**	15	63%	45%	67%	62%	130	160	112	134
Santiago de la Frontera	**SANTA ANA**	12	57%	95%	54%	62%	141	79	136	135
Mejicanos	**SAN SALVADOR**	59	37%	39%	65%	61%	175	173	119	136
San Marcos	**SAN SALVADOR**	36	39%	44%	58%	60%	172	163	129	137
Ciudad Delgado	**SAN SALVADOR**	36	30%	46%	55%	59%	183	157	134	138
Comasagua	**LA LIBERTAD**	19	79%	35%	59%	58%	99	179	126	139
San Luis del Carmen	**CHALATENANGO**	13	58%	62%	56%	58%	138	129	133	140
Santa Isabel Ishuatán	**SONSONATE**	11	83%	56%	54%	57%	92	143	135	141
Santa Catarina Masahuat	**SONSONATE**	14	60%	75%	49%	56%	137	102	145	142
Teotepeque	**LA LIBERTAD**	11	76%	60%	50%	55%	104	132	141	143
Nuevo Cuscatlán	**LA LIBERTAD**	34	49%	41%	44%	55%	157	169	152	144
Guazapa	**SAN SALVADOR**	17	37%	61%	47%	53%	176	131	149	145
San Rafael Oriente	**SAN MIGUEL**	18	46%	53%	50%	53%	162	147	142	146
Perquín	**MORAZAN**	10	93%	58%	49%	51%	77	139	143	147
San Juan Tepezontes	**LA PAZ**	15	41%	70%	44%	50%	169	110	151	148
Jerusalén	**LA PAZ**	13	65%	44%	49%	50%	127	164	146	149

Municipality	Department	Taxpc C$	Effort				Effort Rankings			
			Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
San Pedro Puxtla	**AHUACHAPAN**	13	61%	45%	49%	50%	135	162	144	150
Santa Rosa Guachipilín	**SANTA ANA**	8	49%	78%	42%	49%	159	97	155	151
Coatepeque	**SANTA ANA**	13	36%	37%	48%	48%	179	177	147	152
Chinameca	**SAN MIGUEL**	16	40%	34%	53%	47%	170	183	139	153
Sensembra	**MORAZAN**	9	91%	106%	37%	47%	79	66	168	154
San Cristobal	**CUSCATLAN**	10	66%	45%	48%	47%	124	161	148	155
San Francisco Morazán	**CHALATENANGO**	11	53%	73%	40%	46%	151	108	160	156
Chiltiupán	**LA LIBERTAD**	9	75%	52%	41%	46%	108	152	157	157
Santa Cruz Analquito	**CUSCATLAN**	15	42%	75%	39%	46%	167	103	162	158
Jucuapa	**USULUTAN**	18	36%	38%	43%	46%	178	174	154	159
San Dionisio	**USULUTAN**	7	100%	62%	34%	45%	71	123	174	160
Tacuba	**AHUACHAPAN**	11	51%	41%	41%	45%	155	166	159	161
Tapalhuaca	**LA PAZ**	11	41%	46%	45%	45%	168	158	150	162
Tejutepeque	**CABAÑAS**	11	50%	53%	38%	43%	156	145	163	163
Sesori	**SAN MIGUEL**	7	109%	55%	39%	43%	65	144	161	164
San Luis de la Reina	**SAN MIGUEL**	7	558%	62%	38%	42%	2	124	166	165
San Antonio Masahuat	**LA PAZ**	12	38%	53%	38%	42%	173	148	164	166
Delicias de Concepción	**MORAZAN**	11	36%	62%	36%	42%	177	127	170	167
Panchimalco	**SAN SALVADOR**	11	33%	34%	41%	41%	181	184	158	168
San Alejo	**LA UNION**	9	29%	46%	37%	41%	184	159	167	169
Lislique	**LA UNION**	6	287%	51%	38%	41%	15	155	165	170
Santa María Ostuma	**LA PAZ**	9	42%	41%	37%	39%	166	168	169	171
San Carlos	**MORAZAN**	10	54%	29%	43%	39%	149	187	153	172
San Gerardo	**SAN MIGUEL**	7	85%	59%	34%	38%	89	136	176	173
San José Villanueva	**LA LIBERTAD**	11	40%	43%	35%	37%	171	165	172	174
Chilanga	**MORAZAN**	7	48%	51%	33%	37%	160	154	177	175
San Pedro Nonualco	**LA PAZ**	10	29%	40%	33%	37%	185	171	180	176
Cuisnahuat	**SONSONATE**	7	49%	58%	30%	36%	158	140	184	177
Tenancingo	**CUSCATLAN**	7	55%	38%	33%	36%	144	175	178	178
Tecapán	**USULUTAN**	8	34%	35%	36%	36%	180	180	171	179
Berlín	**USULUTAN**	13	31%	32%	31%	35%	182	185	181	180
Santo Domingo	**SAN VICENTE**	11	27%	36%	33%	34%	187	178	179	181
Meanguera	**MORAZAN**	5	149%	35%	34%	34%	33	181	173	182
Apastepeque	**SAN VICENTE**	9	44%	29%	34%	33%	165	186	175	183
San Miguel Tepezontes	**LA PAZ**	10	23%	63%	25%	31%	189	121	189	184
Huizucar	**LA LIBERTAD**	7	16%	28%	30%	31%	198	188	183	185
Yucuaiquín	**LA UNION**	6	28%	37%	27%	30%	186	176	185	186
Verapaz	**SAN VICENTE**	7	22%	34%	26%	29%	192	182	186	187
Guaymango	**AHUACHAPAN**	5	68%	27%	26%	26%	121	189	187	188
Jicalapa	**LA LIBERTAD**	5	71%	41%	22%	25%	115	167	195	189
El Paraíso	**CHALATENANGO**	7	20%	27%	23%	25%	194	190	193	190
Ayutuxtepeque	**SAN SALVADOR**	17	20%	14%	26%	24%	195	199	188	191
Candelaria	**CUSCATLAN**	5	21%	22%	24%	23%	193	192	190	192
Lolotique	**SAN MIGUEL**	5	24%	20%	24%	22%	188	193	191	193
Guadalupe	**SAN VICENTE**	8	23%	16%	23%	22%	190	197	192	194
Jujutla	**AHUACHAPAN**	4	23%	20%	21%	22%	191	194	196	195
Monte San Juan	**CUSCATLAN**	4	65%	19%	22%	21%	128	195	194	196
San Rafael Cedros	**CUSCATLAN**	6	16%	14%	20%	19%	199	198	197	197
San Francisco Chinameca	**LA PAZ**	5	18%	22%	17%	19%	197	191	199	198
Santa Cruz Michapa	**CUSCATLAN**	4	18%	16%	18%	17%	196	196	198	199
Carolina	**SAN MIGUEL**	1	9%	7%	4%	4%	200	200	200	200

NOTES

[1] See Musgrave and Musgrave (1992), p. 152.

[2] The following studies are reviewed: Chelliah, Baas y Kelly (1979), Tait, Gratz y Eichengreen (1979), Tanzi (1992), Leuthold (1991), and the U.S. Advisory Commission on Intergovernmental Relations (1977).

[3] Models based on panels of cross-country and time series data usually demonstrate higher R2 than those based solely on cross-country data sets.

[4] In El Salvador, the municipal tax and fee system is almost standard or uniform throughout the country. This standardization in El Salvador is much more profound than among the 50 American states.

[5] See Musgrave and Musgrave (1992), pp. 602–3.

[6] Throughout this paper two-tailed tests of significance are applied, although single-tailed tests would also be appropriate.

[7] See the later discussion of the port tonnage tax collected in the Municipality of Acajutla.

[8] See Kmenta (1986) pp. 262–7 for "minimizing the sum of absolute deviations" (MAD estimation), nonnormality, and testing for normality.