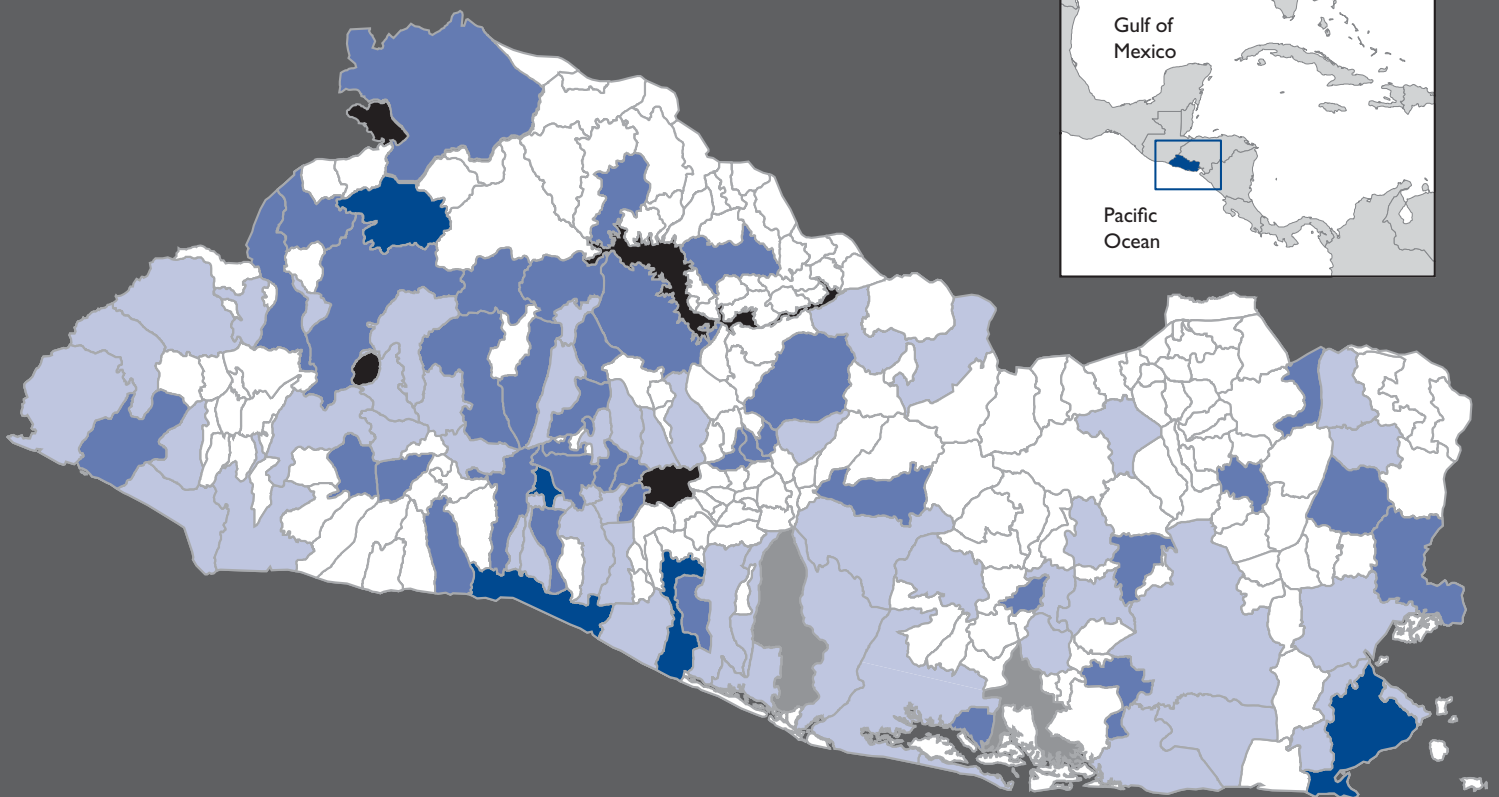




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# Full Appendix: Methodological Aspects of the El Salvador Municipal Competitiveness Index (MCI) 2009



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RTI's Chief of Party Dr. Carlos Carcach led the development of the Municipal Competitiveness Index research methodology and the presentation of its analytical findings. Ms. Jennifer Bartlett managed the overall effort, with Mr. Aldo Miranda serving as the key advisor on municipal government and Ms. Ashley Whittredge assisting with project coordination. Also supporting Dr. Carcach in the research effort was ESEN's Economic Research Group faculty. Dr. Edmund Malesky of the University of California, San Diego, the architect of the methodology, which has been employed throughout Asia, oversaw the development of the MCI study and served as a key reviewer.

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## Preface

The U.S. Agency for International Development (USAID), through its Promoting Economic Opportunities Program, supports a research effort called the Municipal Competitiveness Index (MCI) project. Its primary task is to gather baseline data on the business environment at the local level in El Salvador, and conduct an analysis of the results with the goal of identifying administrative and regulatory constraints to private sector development. Additionally, by ranking municipalities against each other, the project aims to create a beneficial spirit of competition to remove the identified impediments. A supportive business environment will enable local governments to attract and retain local and foreign investment, promote trade, take advantage of opportunities from free-trade agreements, and increase economic growth and local employment. The core methodology used to develop the rankings has been employed previously in Asia, where it has proven to be a valuable way to promote dialogue and healthy competition regarding subnational private sector development. RTI International (RTI) leads the MCI project together with Salvadoran research partner Escuela Superior de Economía y Negocios (ESEN). The project began in January 2009; was carried out during the municipal, legislative, and presidential elections; and will conclude in August 2009 following the transition of government.

This document is the appendix to *The El Salvador Municipal Competitiveness Index 2009: Measuring Local Economic Governance to Create a Better Business Environment*, which is the main report summarizing the MCI project and its findings. The appendix is an accompanying document explaining in detail the study's methodology. Both of these documents and additional information about the 2009 MCI and future MCI initiatives can be found at [www.municipalindexelsalvador.com](http://www.municipalindexelsalvador.com) or [www.indicemunicipalelsalvador.com](http://www.indicemunicipalelsalvador.com).





## 1. Information Sources

The data used to construct the MCI and component sub-indices were collected through two surveys. The first was a sample survey of fixed-location establishments in each of the 100 municipalities included in the study. The second was a survey of mayors and officers across the 100 municipalities. Other sources of municipal data were the *Diario Oficial*, municipality Web sites, and reports published by government agencies, in particular the Instituto Salvadoreño para el Desarrollo Municipal (ISDEM), the Fondo de Inversión para el Desarrollo Local (FISDL), and the Corporación de Municipalidades de El Salvador (COMURES).

## 2. Survey Methodology

### 2.1 Business Survey

#### 2.1.1 Survey Design

The business survey was designed as a two-stage sample within each of the 100 municipalities included in the study. The first stage consisted of the selection of a systematic sample of blocks within a municipality, with probability proportional to the block distance from the main business district, usually downtown. The second stage consisted of the systematic selection of business establishments within selected blocks, with probability proportional to the number of establishments within blocks. This sample design resulted in a clustered sample of establishments within each municipality.

#### 2.1.2 Survey Population

The business survey population consisted of all 165,319 establishments with a fixed location in the 100 project municipalities recorded by the Economic Census conducted by the National Statistical Office in 2005.<sup>1</sup>

#### 2.1.3 Sample Size and Sample Distribution

The total sample size was set at 4,000 establishments across the 100 municipalities included in the study, representing a full sampling fraction of 2.4%. The minimum sample size within each municipality was preset at 40 establishments.<sup>2</sup> For a cluster sample of establishments, the overall sample size was enough to estimate a proportion with a relative standard error of 3.1% for any single characteristic that was present among 30.0% of the establishments in the study. Within a municipality, a sample of 40 establishments enabled the estimation of a proportion with a relative standard error of 24.2%.

In order to minimize the impact of closed businesses and nonresponses to the survey, a sample of 14,402 fixed-location establishments was selected with a probability proportional to the number of establishments within each selected block. Within each municipality, the number of establishments initially selected in a sample varied between a minimum of 92 and a maximum of 192. Such an inflated sample size was designed to attain the effective sample size of 40 establishments. The final effective sample was 3,898 establishments.<sup>3</sup>

Table 1 shows the distribution of businesses according to number of employees, and whether they keep formal accounting (based on data from the MCI business survey and data from the 2005 Economic Census). The data in this table show that in the sample, microenterprises are overrepresented by 2%, while small, medium, and large businesses are underrepresented by 42%, 14%, and 25%, respectively. This occurred because the sample size was determined in advance at 40 establishments per municipality. An extra sample of 40 businesses with 50 or more employees was selected in the municipalities of San Salvador, Santa Ana, and San Miguel.

<sup>1</sup> Dirección General de Estadística y Censos (DIGESTYC), Ministerio de Economía, El Salvador.

<sup>2</sup> This sample size was enough to derive reasonably narrow confidence intervals around individual indicators and precise estimates for a factor analysis conducted on up to 400 variables.

<sup>3</sup> The following municipalities recorded sample sizes that were below the desired number of 40 establishments: El Paisnal (17), El Carmen (Cuscatlán) (17), and El Rosario (La Paz) (14). For the remaining municipalities, sample sizes varied between a minimum of 35 and a maximum of 50 establishments.

**Table 1. Businesses by Number of Employees and Percent Keeping Formal Accounts**

	Percent		Over/Under-Representation
	Census	Sample	
Micro (less than 10 employees)	95.55	97.23	1.02
Small (10 to 49 employees)	3.61	2.10	0.58
Medium (50 to 99 employees)	0.42	0.36	0.86
Large (100 employees or more)	0.41	0.31	0.75
Keeping formal accounts	17.94	34.86	1.94
<b>Number of businesses</b>	<b>165,319</b>	<b>3,898</b>	

Table 1 also shows that businesses that kept formal accounts were oversampled by 94%. According to the 2005 Economic Census, only 17.9% of establishments kept formal accounts in 2005. The survey suggests that by April 2009, the percentage of establishments keeping formal accounts had increased to 34.9%. Businesses with less than 10 employees (microenterprises) had the highest oversampling rate among the businesses that kept formal accounts. In 2005, only 14.5% of microenterprises kept formal accounts, according to the Economic Census. The MCI business survey conducted in 2009 found that 33.0% of microenterprises kept formal accounts. This increase does not necessarily mean that operating microenterprises has become more complex. Instead, it is the result of administrative reforms implemented by the Ministry of Finance over the last five years aimed at reducing tax avoidance. In this sense, such an overrepresentation does not have a major impact on the analysis.

#### 2.1.4 Sampling Frame

The sampling frame consisted of a list of area blocks specially developed for the study. In most municipalities, blocks consisted of groups of urban squares well delimited by streets starting from the geographical center, normally the central park. In San Salvador and other large municipalities, the city was divided into known business districts and blocks were formed starting from a previously defined geographical center. A systematic sample of blocks was selected with probability proportional to the distance from the center. Field staff counted the number of establishments with a fixed location within each selected block. The sampling frame

consisted of the list of selected blocks together with the count of establishments within each of them.

## 2.2 Municipality Survey

The municipality survey was conducted in the same 100 municipalities through interviews with mayors and other municipal officials. Data collection from the municipal government was hampered by the transition process following the January 2009 municipal elections. Problems occurred with eight municipalities which were reluctant to participate in the survey, or whose mayors and officers did not have time to provide the data because they were in the middle of preparing documentation for the transition to a newly elected local government.

## 2.3 Survey Questionnaire Development and Testing

Both survey questionnaires were developed by MCI project staff. Extensive desk research was conducted on the municipal business environment in El Salvador, with additional information gathered through regional stakeholder meetings with the business community, mayors, and other key government officials. The draft questionnaires were validated using focus groups that were held with business owners in San Salvador and Santa Tecla, and with municipal officers in Santa Tecla, Sonsonate, and Sonzacate. Simultaneously, the first training session held with the field staff who would conduct the interviews was used to test the tone, level, and accuracy of the language of the questions included in the first versions of the survey questionnaires. Adjustments were made to the survey forms and pilot tests were conducted with a sample of establishments and with municipal officers in Santa Tecla and Zaragoza. These pilot tests provided useful data to develop the final versions of the survey questionnaires and to test the field procedures.

## 2.4 Data Collection

Data were collected from March 30 to April 24, 2009, by a team of 36 interviewers organized into six groups, each under the leadership of one field supervisor. The six supervisors reported directly to a Head of Operations. Field staff were trained over four sessions to ensure their full understanding of the survey questions and

the structure of the survey form, the cartography, and the field procedures for the selection of establishments. Interviewers were selected from a pool of applicants with demonstrated experience in collecting data for business surveys.

## 2.5 Quality Control

The field supervisors reviewed the full set of questionnaires completed by their interviewers and returned those forms that contained errors to the respective interviewers. These interviewers then revisited the establishments and the municipal government offices to obtain the correct data. The supervisors then returned the completed survey forms to the Head of Operations, who conducted quality checks on a 20% sample of business survey forms and on each of the municipality forms. In case of errors, a team of 6 interviewers beyond the 36 interviewers previously engaged was used to recover data from the relevant establishments and the municipal governments.

## 2.6 Data Entry, Processing, and Production of Clean Files

SPSS Data Entry Builder™ was used to develop a customized data entry and editing program to capture and manage the data from the survey forms. Clean files were produced in SPSS format.

## 2.7 Approaches to Dealing with Missing Data

### 2.7.1 “Mystery Shopper” Approach

The transition that followed the January 2009 municipal elections made it impossible to gather survey data from mayors and municipal officers for the following municipalities:

- Armenia
- Ayutuxtepeque
- Metapán
- San Julián
- San Martín
- San Salvador
- Santo Tomás
- Tecoluca

To gather the missing information, the research team decided to collect data on the main survey variables from these municipalities through a “mystery shopper” approach. Sometimes known as an audit, this approach entails sending an individual to a municipality to engage in normal business registration and regulatory activities. The idea is to ascertain, through direct observation, how long and how burdensome such activities are, as well as the receptiveness of municipal officials.

As an alternative, mystery shopper visits were conducted to collect data on the following key survey variables (the numbers in the parentheses correspond to question numbers in the surveys):

- Documents required to initiate the process of registering a business in a municipality, for both firms and individuals (RGB002A, RGB002B, and RGB002C)
- Time elapsed to first inspection by municipality (RGB003)
- Time elapsed to issue the permit for operation (RGB004)
- Payments business needed to make to obtain the permit to operate (RGB005)
- Documents required to obtain a construction permit (RGC002A and RGB002C)
- Time elapsed to first inspection by municipality (RGC003)
- Time elapsed to issue the construction permit (RGC004)
- Payments business needed to make to obtain the construction permit (RGB005)
- Criteria the municipality used to determine the taxes and rates a business must pay (FIN004)
- Municipal rates (FIN008)

Because the mystery shoppers were only used for a subset of the municipalities, the research team decided to test the validity of the method by comparing answers from municipalities that had already provided complete information with the results obtained by the mystery shopper.

Mystery shopper visits were conducted in the following municipalities that also provided complete data in the survey:

- Ahuachapán
- Antiguo Cuscatlán
- Santa Ana
- Santa Tecla
- Soyapango<sup>4</sup>

The results from this study showed that the information gathered through the mystery shopper approach and the municipal survey was nearly identical. This result was expected because the municipal survey interview asked municipal officers to produce documented evidence

for each of the aspects on which data were collected. Interviewers requested and obtained documented evidence, including forms to be filled in by businesses, from municipal officers to validate their responses to the survey questions. The data in Table 2 show that for all the variables, the differences between the mean from the municipality survey and the mystery shopper were not statistically significant.

## 2.8 Weighting Procedures

Survey weights were computed following a two-stage process. In the first stage, selection weights were calculated as the product of two factors. The first

**Table 2. Means and Number of Cases Obtained Through Municipal Survey Data and Mystery Shopper Data**

	Survey		Mystery Shopper		p value
	Cases	Mean	Cases	Mean	
Number of documents to be presented to apply to register a business in this municipality (incorporated business)	5	5.60	5	5.80	0.78
Number of documents to be presented to apply to register a business in this municipality (personal business)	5	4.00	5	4.20	0.80
Number of additional documents required to obtain permit to operate	5	1.80	5	2.20	0.64
Days elapsed between date qualification is requested and date of inspection	5	3.00	5	3.40	0.81
Days elapsed between date of inspection and date municipality notifies business of decision	5	4.60	5	4.40	0.96
Fee for paperwork related to qualification	5	0.48	5	0.52	0.95
<b>Municipal Rates</b>					
Garbage collection–Industry (\$US)	4	1.11	5	1.39	0.86
Garbage collection–Commerce (\$US)	4	1.11	5	1.39	0.86
Garbage collection–Services (\$US)	4	1.10	5	1.38	0.86
Lighting–Industry (\$US)	4	0.25	5	0.32	0.52
Lighting–Commerce (\$US)	4	0.25	5	0.32	0.52
Lighting–Services (\$US)	4	0.25	5	0.32	0.52
Solid waste disposal–Industry (\$US)	4	3.34	5	4.02	0.81
Solid waste disposal–Commerce (\$US)	4	3.34	5	4.02	0.81
Solid waste disposal–Services(\$US)	4	3.34	5	4.02	0.81
Paving–Industry (\$US)	4	0.09	5	0.12	0.75
Paving–Commerce (\$US)	4	0.09	5	0.12	0.75
Paving–Services (\$US)	4	0.09	5	0.12	0.75

<sup>4</sup> For Soyapango, data on the variables of interest for the validation of the mystery shopper study had been collected through the municipality survey. This municipality did not provide data for the remaining topics in the survey questionnaire (municipal finance, proactivity, human capital, transparency, conflict resolution, and public safety).

factor was the ratio of the number of blocks within a municipality to the number of blocks effectively selected in the sample. This factor was multiplied by the ratio of the number of businesses within each selected block according to the Economic Census to the number of businesses selected in a sample. The second stage was a post-stratification weighting aimed at ensuring that the distribution of the number of businesses selected in a sample conformed to the distribution of businesses in the census according to whether they kept formal accounts. Post-stratification helps to mitigate problems with coverage bias and nonresponse bias.

### 2.8.1 Budget Information

Only 70 municipalities provided data on the amount of their budget and on their expenditures on public services for 2008. For these municipalities, the per capita budget was strongly correlated with the number of businesses, according to the 2005 Economic Census.<sup>5</sup> These municipalities were classified into five groups by the number of workers per business. The boundaries for these groups were as follows: (1) less than 160; (2) 161 to 269; (3) 270 to 626; (4) 627 to 1,393; (5) 1,394 to 2,860; and (6) more than 2,861. These groups were used as imputation classes. Average values for population size, total budget, and municipal expenditure in public works, education and vocational training, assistance to local businesses, public safety, solid waste management, and urban street maintenance were computed within each of these groups. This procedure resulted in a 0.99 correlation between the reported budget and the imputed budget within the 70 municipalities with data on this variable. Predicted quantities were converted to a per capita basis and then used for imputation in the 30 municipalities with missing data. In the case of San Salvador, budget and public expenditure data were obtained from the municipality Web site; this information was official at the time of data collection.

Imputation of budget and expenditure data did not have a significant impact on the MCI ranking. There were some minor changes in the relative positions of some municipalities when the MCI was computed with no imputation of budget data compared to the MCI ranking obtained using imputed data. However, the

municipality groupings shown in Figure 1 of the *El Salvador Municipal Competitiveness Index 2009* report did not change. A Kendall's rank correlation test showed significant agreement between the ranking with imputation and the ranking with no imputation (Kendall's tau = 0.951,  $p$  value < 0.01).

## 3. An Overview of the Process for Constructing the MCI

The MCI construction process consisted of the following stages:

- Indicators were selected for the variables included as part of the sub-indices. Data for these indicators were gathered through the business and municipality surveys.
- Indicator values were transformed to a scale ranging from 1 to 10, where 1 represented the lowest value and 10 the highest value of the characteristic they represented.
- Unweighted MCI scores were obtained from the sum of the sub-index values. The unweighted MCI could take on a maximum value of 90 for a municipality with a perfect score for all the sub-indices.
- A simple total of the sub-index scores is not sufficient to measure the municipalities' level of competitiveness. This is because some sub-indices are highly correlated with business success and therefore contribute more to the MCI. The specific weights for each sub-index were obtained via regression analysis of two measures of business performance: scores derived from a factor analysis of the sub-indices, and three measures of municipal structural conditions.<sup>6</sup>
- The final MCI was obtained as the weighted sum of the sub-indices. See Table 3 below for an overview of the 2009 MCI scores by sub-index.

<sup>5</sup> Correlation coefficient of 0.74.

<sup>6</sup> Human Development Index (United Nations Development Programme, 2006), number of telephones per 100 households (National Census of Population and Housing, 2007) and distance from San Salvador (in kilometers).

**Table 3. Municipal Competitiveness Index Overview**

Municipality (Department)	MCI	Transparency	Municipal Services	Proactivity	Informal Payments	Public Safety	Time to Compliance	Rates and Taxes	Entry Costs	Municipal Regulations
Antiguo Cuscatlán (LLB)	7.94	7.44	9.50	7.10	10.00	8.07	5.95	5.35	9.04	8.82
La Libertad (LLB)	7.32	6.36	6.39	8.31	9.50	6.57	6.15	5.79	8.94	8.74
Texistepeque (STA)	7.19	7.54	4.28	8.18	9.28	8.66	5.46	5.38	7.97	9.13
San Pedro Masahuat (LPA)	6.92	7.63	4.21	8.26	9.65	7.26	4.56	4.56	8.64	7.97
Conchagua (LAU)	6.90	7.97	5.73	7.81	8.46	8.87	5.67	3.23	8.79	3.70
Tepecoyo (LLB)	6.63	7.11	5.20	6.83	9.45	6.77	3.98	6.09	7.64	5.49
Santa Tecla (LLB)	6.62	6.40	4.95	6.81	8.56	6.90	5.84	4.96	8.53	8.37
El Carmen (CUS)	6.60	5.91	4.13	6.44	10.00	7.68	4.15	5.26	8.48	9.98
El Rosario (LPA)	6.58	6.92	3.51	6.57	9.60	6.06	4.86	5.24	9.48	10.00
San Pablo Tacachico (LLB)	6.56	6.83	4.56	7.17	9.25	7.72	4.39	3.97	7.31	8.47
San Francisco Gotera (MOR)	6.53	7.32	2.80	6.71	9.48	7.16	5.52	4.80	8.17	8.54
Cuscatancingo (SAN)	6.53	6.68	3.42	6.50	9.30	6.03	6.00	5.50	7.93	9.84
Chalchuapa (STA)	6.43	6.81	4.78	6.16	9.32	5.92	5.75	3.38	7.77	9.44
Pasaquina (LAU)	6.40	6.28	4.99	5.73	8.29	7.39	4.77	5.73	8.97	7.47
Moncagua (SMI)	6.38	7.12	5.03	5.41	8.68	6.00	5.11	5.38	8.11	7.64
Nahuizalco (SON)	6.33	5.78	3.77	6.62	8.99	7.09	5.72	4.22	8.61	8.34
Quezaltepeque (LLB)	6.32	6.19	3.02	6.26	9.25	6.11	5.00	6.18	8.20	9.33
Tejutla (CHA)	6.31	5.79	3.16	6.35	10.00	7.54	4.59	4.37	7.50	9.72
El Tránsito (SMI)	6.30	6.50	2.83	6.85	8.90	7.38	5.26	4.93	9.01	6.62
Santiago Texacuangos (SAN)	6.27	7.07	4.17	4.55	8.99	5.89	5.35	6.14	7.49	9.14
Chalatenango (CHA)	6.25	6.66	3.28	7.05	8.29	7.29	5.49	4.31	8.60	6.40
Mejicanos (SAN)	6.16	5.79	3.17	6.92	8.19	7.10	5.16	5.22	8.24	7.78
Guazapa (SAN)	6.15	6.60	3.90	5.51	8.17	6.60	5.39	4.47	8.32	9.40
Ilopango (SAN)	6.15	6.92	3.22	5.81	5.36	7.14	6.94	6.93	7.97	9.07
El Paisnal (SAN)	6.15	6.25	2.72	5.90	9.74	6.90	4.86	3.95	8.31	9.39
San Salvador (SAN)	6.14	6.32	3.95	6.10	9.51	6.39	5.25	3.63	7.91	6.73
San Antonio del Monte (SON)	6.13	7.37	3.82	5.86	7.95	6.31	5.40	3.93	7.21	8.90
San Rafael Cedros (CUS)	6.10	6.33	2.31	5.33	9.82	6.84	5.07	4.68	8.71	8.71
Soyapango (SAN)	6.08	5.97	3.36	6.50	7.82	6.80	4.67	4.35	9.07	9.89
Puerto El Triunfo (USU)	6.07	6.45	3.99	3.97	9.71	4.97	5.94	5.13	8.42	8.76
Ilobasco (CAB)	6.07	5.53	3.07	6.03	9.16	6.56	5.87	3.87	8.99	8.42
Jujutla (AHU)	6.06	5.71	3.46	4.94	9.31	7.04	5.32	4.87	6.60	9.83
San Juan Opico (LLB)	6.05	6.43	2.95	4.52	9.30	6.08	6.08	4.82	7.40	10.00
Suchitoto (CUS)	6.04	5.55	6.02	5.03	8.01	7.35	2.99	4.28	9.20	8.65
Huizúcar (LLB)	6.02	6.30	3.15	4.62	8.56	7.27	5.19	5.49	8.71	7.85
Santa Rosa de Lima (LAU)	6.02	5.69	7.45	4.17	6.20	6.96	4.79	3.89	9.02	9.55
Santiago de María (USU)	6.01	4.68	3.12	6.86	8.70	7.30	6.24	2.93	9.06	8.32
Santa Ana (STA)	6.01	3.78	2.69	6.44	8.86	5.01	6.62	7.53	6.61	9.90
Metapán (STA)	6.00	5.24	3.53	6.68	8.26	6.86	5.04	3.07	8.97	9.84
Apopa (SAN)	5.98	6.13	4.12	7.03	7.33	5.33	4.15	5.58	8.06	7.53

**Department codes:** AHU (Ahuachapán), CAB (Cabañas), CHA (Chalatenango), CUS (Cuscatlán), LAU (La Unión), LLB (La Libertad), LPA (La Paz), MOR (Morazán), SAN (San Salvador), SMI (San Miguel), SON (Sonsonate), STA (Santa Ana), SVI (San Vicente), USU (Usulután)

**Table 3. Municipal Competitiveness Index Overview** (continued)

Municipality (Department)	MCI	Transparency	Municipal Services	Proactivity	Informal Payments	Public Safety	Time to Compliance	Rates and Taxes	Entry Costs	Municipal Regulations
Apastepeque (SVI)	5.97	5.80	4.05	4.49	8.97	7.27	5.20	4.59	7.01	8.35
Juayúa (SON)	5.93	5.32	4.74	4.83	9.84	5.75	4.26	3.55	8.20	9.09
Cojutepeque (CUS)	5.92	4.96	4.32	3.63	9.44	6.19	5.62	5.18	8.13	9.13
Corinto (MOR)	5.91	6.32	2.57	5.81	8.76	5.99	4.54	4.29	9.19	9.03
San Julián (SON)	5.89	6.59	1.93	5.64	9.25	7.06	4.34	3.24	8.90	9.52
Candelaria de la Frontera (STA)	5.87	6.23	3.54	5.22	7.10	5.87	5.96	6.15	8.34	6.77
Tamanique (LLB)	5.80	6.55	3.20	6.68	7.54	6.61	3.94	3.61	7.47	8.34
Ayutuxtepeque (SAN)	5.77	6.27	3.23	6.20	8.15	5.58	4.72	3.16	8.67	8.18
San Marcos (SAN)	5.75	6.18	2.66	6.13	7.57	6.73	4.20	3.78	8.87	9.03
Tecoluca (SVI)	5.74	5.34	4.30	5.81	7.62	6.50	4.70	2.67	8.62	9.48
Chirilagua (SMI)	5.74	5.86	3.99	3.45	7.66	6.73	5.79	4.58	9.14	8.73
Atiquizaya (AHU)	5.73	4.70	3.26	5.06	8.56	7.32	4.63	4.37	7.80	9.47
Jiquilisco (USU)	5.73	5.58	2.60	5.70	7.61	6.87	5.02	5.35	9.23	6.42
Lolotique (SMI)	5.71	4.77	2.92	5.78	9.89	6.20	4.06	3.23	7.69	9.47
Sensuntepeque (CAB)	5.68	5.41	3.45	5.64	7.28	5.77	5.02	3.71	9.26	10.00
Aguilares (SAN)	5.68	5.75	3.63	6.10	7.80	5.73	4.94	3.93	8.46	6.07
Lislique (LAU)	5.61	5.85	2.77	5.44	8.41	6.10	4.72	3.42	8.25	8.10
Guaymango (AHU)	5.59	5.15	3.02	5.42	7.65	7.92	5.19	3.00	7.31	8.55
Colón (LLB)	5.57	4.92	2.49	5.80	8.20	6.38	4.64	3.93	7.52	9.85
Anamorós (LAU)	5.56	5.19	2.80	5.30	7.92	6.84	4.93	3.53	8.16	8.88
Santa Elena (USU)	5.55	5.51	2.43	4.51	9.84	5.41	4.61	3.83	7.73	8.50
San Miguel (SMI)	5.54	6.22	4.29	4.90	7.36	4.84	5.04	4.34	7.56	6.50
Delgado (SAN)	5.53	5.63	2.54	5.59	6.75	6.39	4.74	6.08	7.09	7.57
Olocuilta (LPA)	5.53	5.34	2.75	5.73	7.78	5.75	5.00	4.32	7.96	7.67
Santiago Nonualco (LPA)	5.52	5.81	2.92	6.30	6.24	6.64	5.32	2.82	8.92	8.07
San Juan Nonualco (LPA)	5.50	5.21	2.21	5.62	8.25	7.17	4.38	3.19	7.65	9.69
San Pedro Perulapán (CUS)	5.50	5.55	2.14	4.30	7.45	6.16	5.37	7.28	7.51	6.46
Izalco (SON)	5.46	4.65	1.59	3.86	9.82	6.41	4.77	5.38	7.27	9.13
San Alejo (LAU)	5.46	4.77	3.11	6.19	6.60	6.84	4.50	4.30	7.36	8.45
Zaragoza (LLB)	5.45	5.38	2.75	5.26	7.87	6.72	4.61	3.33	7.82	8.53
Nejapa (SAN)	5.42	5.55	3.28	5.28	7.51	5.66	4.41	3.32	8.62	8.17
Nueva Concepción (CHA)	5.42	4.61	2.43	5.45	7.05	6.43	5.04	5.69	8.44	6.92
Ciudad Barrios (SMI)	5.40	5.10	1.99	5.59	9.30	6.01	4.39	2.07	8.61	8.66
Jucuarán (USU)	5.39	4.58	2.26	5.43	7.67	7.44	4.24	3.18	8.60	10.00
San Sebastián (SVI)	5.38	5.28	1.98	4.16	9.30	5.32	5.11	3.99	9.54	7.17
Sonzacate (SON)	5.36	3.90	2.18	3.95	9.40	6.35	4.98	4.08	8.07	9.92
Sonsonate (SON)	5.36	6.23	2.33	5.13	6.51	7.46	4.26	2.78	7.55	9.90
Jucuapa (USU)	5.34	3.92	1.66	4.90	7.95	6.33	4.80	5.12	9.45	9.50
San José Villanueva (LLB)	5.31	4.94	1.94	5.08	7.45	7.42	4.66	3.88	6.98	8.76
Armenia (SON)	5.30	5.31	2.72	5.51	5.38	7.43	4.85	3.32	9.05	8.94

**Department codes:** AHU (Ahuachapán), CAB (Cabañas), CHA (Chalatenango), CUS (Cuscatlán), LAU (La Unión), LLB (La Libertad), LPA (La Paz), MOR (Morazán), SAN (San Salvador), SMI (San Miguel), SON (Sonsonate), STA (Santa Ana), SVI (San Vicente), USU (Usulután)

**Table 3. Municipal Competitiveness Index Overview** (continued)

Municipality (Department)	MCI	Transparency	Municipal Services	Proactivity	Informal Payments	Public Safety	Time to Compliance	Rates and Taxes	Entry Costs	Municipal Regulations
San Luis Talpa (LPA)	5.28	5.24	1.44	4.34	9.43	5.73	3.99	3.75	8.41	8.85
Tonacatepeque (SAN)	5.22	5.41	1.85	3.04	8.12	7.10	5.34	4.43	7.34	8.02
San Luis La Herradura (LPA)	5.22	5.03	1.66	5.31	5.65	6.98	4.67	5.09	8.52	9.57
San Martín (SAN)	5.21	6.05	2.10	6.10	7.38	3.66	5.46	3.04	9.03	5.89
San Sebastián Salitrillo (STA)	5.20	5.36	2.66	5.11	6.89	5.05	4.49	4.55	7.46	8.11
Berlín (USU)	5.18	4.94	2.11	5.03	7.25	7.08	4.46	2.16	8.94	9.49
Tacuba (AHU)	5.18	4.98	2.18	4.71	6.84	6.76	3.78	5.75	6.00	8.74
San Vicente (SVI)	5.15	4.77	2.27	5.70	6.39	5.29	4.07	4.58	8.33	9.45
Acajutla (SON)	5.07	4.48	2.82	4.13	6.61	5.38	5.13	5.97	8.73	5.56
Ahuachapán (AHU)	5.04	4.64	2.08	4.51	7.41	6.17	4.64	3.50	8.31	7.96
La Unión (LAU)	5.03	4.62	2.16	4.66	7.26	5.68	4.03	3.08	9.23	9.61
Coatepeque (STA)	4.99	4.27	2.88	4.75	6.50	6.10	5.26	3.35	7.11	7.90
San Francisco Menéndez (AHU)	4.98	5.31	2.07	5.42	6.25	6.64	5.45	3.01	6.42	5.91
Panchimalco (SAN)	4.97	4.17	1.77	4.89	7.49	5.73	4.28	3.54	9.39	7.97
Chinameca (SMI)	4.93	4.30	2.30	4.17	5.80	6.78	5.29	3.52	8.27	9.59
El Congo (STA)	4.91	4.39	2.69	4.18	6.67	5.93	4.98	2.66	8.10	9.08
Santo Tomás (SAN)	4.84	4.82	2.79	3.48	7.15	4.50	5.55	2.63	7.97	8.90
Ciudad Arce (LLB)	4.82	5.09	2.12	4.45	6.39	5.80	4.35	3.24	8.60	6.80
Usulután (USU)	4.58	3.99	2.33	4.63	4.66	6.21	3.90	4.30	7.86	7.95
Zacatecoluca (LPA)	4.48	3.69	2.05	4.37	6.01	5.06	5.12	3.16	8.67	5.80

**Department codes:** AHU (Ahuachapán), CAB (Cabañas), CHA (Chalatenango), CUS (Cuscatlán), LAU (La Unión), LLB (La Libertad), LPA (La Paz), MOR (Morazán), SAN (San Salvador), SMI (San Miguel), SON (Sonsonate), STA (Santa Ana), SVI (San Vicente), USU (Usulután)

## 4. Details of the MCI Construction Process

### 4.1 Transformation of Indicator Values

In this study, the higher the value of a sub-index, the better a municipality's performance. The indicators used to calculate each sub-index were rescaled to take on values between 1 and 10. Two expressions were used to perform the transformation:

$$T1 = 11 - \left[ \frac{9 \times (x_{ki} - \min(X_k))}{(\max(X_i) - \min(X_k))} + 1 \right], \text{ and} \quad (A1)$$

$$T2 = 9 \times \left[ \frac{(x_{ki} - \min(X_k))}{(\max(X_k) - \min(X_k))} + 1 \right], \quad (A2)$$

where,  $x_{ki}$  represented the survey value of the  $k$ -th indicator in the  $i$ -th municipality; and  $\min(X_k)$  and  $\max(X_k)$  represented the minimum and maximum values of the  $k$ -th indicator across the 100 municipalities, respectively.

Transformation T1 produces a higher value in the 1-to-10 scale as the value of an indicator increases. Therefore, T1 was used to transform values of variables associated with positive attributes, such as the percentage of businesses that feel informal payments are not a common problem in a municipality. On the other hand, T2 produces a lower transformed value as the value of an indicator decreases. This transformation is useful for indicators associated with negative attributes, such as the percentage of firms in a municipality that feel the number of municipal inspections of businesses is above average.



## 4.2 Indicators

### 4.2.1 Transparency

Table 4 details the indicators used to construct the Transparency Sub-Index and their summary statistics, together with references to the survey questions.<sup>7</sup>

**Table 4. Variables Used to Construct the Transparency Sub-Index**

Indicator	Business Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses not affected by municipal support to informal sector	PRO001E	39.39	88.56	86.44	100.00	10.43	12.06
% Businesses think municipality does not favor businesses owned by people belonging to the mayor's party	PRO001F	35.08	73.09	72.12	99.55	14.08	19.52
% Businesses think municipality does not favor large businesses and does not discriminate against small businesses	PRO001G	57.21	84.44	82.39	100.00	9.72	11.80
% Businesses knowing about the existence of processes for filing complaints or making recommendations	TRA010	2.27	42.05	40.67	78.86	17.43	42.86
% Businesses knowing about the existence of processes for informing citizens about local issues	TRA009	15.32	48.48	49.02	88.55	17.84	36.38
% Businesses perceiving that municipal policies are applied in a consistent manner	PRO001A	3.32	51.79	51.22	88.64	16.22	31.66
% Businesses perceiving that relationships are important for gaining access to documents and/or obtaining permits/licenses	TRA005, TRA013	16.49	43.75	45.23	94.16	14.12	31.22
% Businesses gaining easy access to local documents	TRA003A, TRA003B, TRA003C, TRA003D, TRA003E, TRA003F	0.00	79.17	64.33	100.00	39.45	61.32
% Businesses perceiving that changes to rates/taxes and regulations are predictable	TRA012	0.00	22.52	23.33	65.43	10.93	46.85
% Businesses perceiving municipal tenders as transparent	COS006	0.00	0.00	7.69	78.52	14.25	185.34

<sup>7</sup> Transparency Sub-Index performance category ranges are: Excellent (6.96 and over), High (5.96 to 6.95), Average (4.96 to 5.95), Low (3.96 to 4.95), and Very Low (less than 3.96).

## 4.2.2 Municipal Services

Table 5 details the indicators used to construct the Municipal Services Sub-Index and their summary statistics, together with references to the survey questions.<sup>8</sup>

**Table 5. Variables Used to Construct the Municipal Services Sub-Index**

Indicator	Business Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses qualifying municipality as good at controlling informal commerce	INF007B1	0.97	24.62	25.61	84.45	14.71	57.43
% Businesses qualifying municipality as good at doing public works during 2007–2008	INF007B2	0.40	30.92	34.15	92.10	18.04	52.83
% Businesses qualifying municipality as good at providing facilities for administrative procedures	INF007B3	0.82	29.64	30.91	80.50	18.61	60.21
% Businesses qualifying municipality as good at providing facilities for tax payments	INF007B4	11.19	45.04	48.72	89.29	18.26	37.48
% Businesses qualifying municipality as good at crime prevention and control	INF007B5	0.00	18.20	21.79	88.40	18.40	84.42
% Businesses qualifying municipality as good at developing labor and entrepreneurship programs	INF007B6	0.00	12.54	16.80	52.94	14.27	84.95
% Businesses qualifying municipality as good at promoting tourism	INF007B7	0.00	13.43	18.80	85.23	18.91	100.61
% Businesses qualifying municipality as good at promoting business opportunities	INF007B8	0.00	9.19	12.10	64.95	12.84	106.10
% Businesses qualifying municipality as good at promoting and supporting local business associations	INF007B9	0.00	5.27	8.24	57.29	9.61	116.55
% Businesses qualifying municipality as good at providing services to attract investors and clients	INF007B10	0.00	3.23	5.89	53.59	8.62	146.38
% Businesses qualifying municipality as good at providing services to facilitate access to credit by local business	INF007B11	0.00	4.29	5.99	45.69	7.62	127.16
% Businesses qualifying municipality as good at export promotion	INF007B12	0.00	0.10	3.12	32.38	5.78	185.21

<sup>8</sup> Municipal Services Sub-Index performance category ranges are: Excellent (6.70 and over), High (5.20 to 6.69), Average (4.20 to 5.19), Low (3.20 to 4.19), and Very Low (less than 3.20).

### 4.2.3 Proactivity

Table 6 details the indicators used to construct the Proactivity Sub-Index and their summary statistics, together with references to the survey questions.<sup>9</sup>

### 4.2.4 Informal Payments

Table 7 details the indicators used to construct the Informal Payments Sub-Index and their summary statistics, together with references to the survey questions.<sup>10</sup>

**Table 6. Variables Used to Construct the Proactivity Sub-Index**

Indicator	Business Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses perceiving that municipality works actively to solve business problems	PRO001B	11.48	47.82	49.10	92.34	17.81	36.28
% Businesses perceiving that municipality has good initiatives, but these are blocked by central government	PRO001C	0.00	21.78	23.31	58.24	13.54	58.07
% Businesses perceiving that not all private-sector related policies come from the central government	PRO001D	24.17	71.50	70.07	95.13	13.65	19.48

**Table 7. Variables Used to Construct the Informal Payments Sub-Index**

Indicator	Business Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses feeling informal payments are a common occurrence	COS001	0.00	13.43	13.49	39.15	8.70	64.44
% Businesses think informal payments do help in gaining access to municipal documents or in obtaining permits/licenses	COS004	0.00	0.00	16.87	94.06	22.53	133.53
% Businesses feeling tenders are fair	COS006	0.00	0.00	7.69	78.52	14.25	185.34
% Businesses perceiving extra tax payments are a common occurrence in the municipality	TAX002	0.00	5.05	5.88	24.03	5.57	94.77
% Businesses have made extra payments to fix municipal tax problems	TAX003	0.00	0.00	1.74	9.23	2.44	139.76

<sup>9</sup> Proactivity Sub-Index performance category ranges are: Excellent (7.30 and over), High (6.30 to 7.29), Average (5.30 to 6.29), Low (4.30 to 5.29), and Very Low (less than 4.30).

<sup>10</sup> Informal Payments Sub-Index performance category ranges are: Excellent (8.99 and over), High (7.99 to 8.98), Average (6.99 to 7.98), Low (5.99 to 5.98), and Very Low (less than 5.99).

### 4.2.5 Public Safety

Table 8 details the indicators used to construct the Public Safety Sub-Index and their summary statistics, together with references to the survey questions.<sup>11</sup>

### 4.2.6 Time to Compliance

Table 9 details the indicators used to construct the Time to Compliance Sub-Index and their summary statistics, together with references to the survey questions.<sup>12</sup>

**Table 8. Variables Used to Construct the Public Safety Sub-Index**

Indicator	Business Survey Questions	Municipal Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses saying that crime was higher in 2008 compared to 2007	CRM002		0.00	25.31	27.48	76.78	18.03	65.60
% Businesses perceiving that crime has increased due to bad municipality work	CRM003		0.00	6.76	8.10	44.21	8.03	99.16
% Businesses perceiving that crime has decreased due to good municipality work	CRM003		0.00	6.22	8.52	44.63	9.03	105.98
Municipal spending on public safety per capita (US\$)		FIN002A, FIN002M	0.10	0.75	1.69	5.00	1.78	105.73
% Businesses victimized during 2008—robbery or theft	CRM004A, CRM004B		0.00	16.28	17.32	44.21	10.38	59.91
% Businesses perceiving that local crime is higher than in neighboring municipalities	CRM001		0.87	27.41	28.13	63.20	14.16	50.32
Cost of crime to businesses per US\$1,000 sale increase in 2008	EST005, CRM004		0.00	36.74	98.65	1012.84	162.55	164.78
% Businesses victimized during 2008—extortion or kidnapping	CRM004C, CRM004D		0.00	4.41	6.49	37.54	6.85	105.52

**Table 9. Variables Used to Construct the Time to Compliance Sub-Index**

Indicator	Business Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses feeling informal payments are a common occurrence	REG011	2.23	20.32	21.03	61.91	10.67	50.72
% Businesses think informal payments do help in gaining access to municipal documents or in obtaining permits/licenses	REG012	0.45	26.20	31.40	164.25	25.24	80.38
% Businesses feeling tenders are fair	REG014	0.00	0.00	2.88	54.56	7.22	250.50
% Businesses perceiving extra tax payments are a common occurrence in the municipality	REG015	2.23	19.47	20.37	61.26	10.37	50.94
% Businesses have made extra payments to fix municipal tax problems	REG010	0.00	12.86	15.69	52.91	12.10	77.15

<sup>11</sup> Public Safety Sub-Index performance category ranges are: Excellent (7.86 and over), High (6.86 to 7.85), Average (5.86 to 6.85), Low (4.86 to 5.85), and Very Low (less than 4.86).

<sup>12</sup> Time to Compliance Sub-Index performance category ranges are: Excellent (5.93 and over), High (4.93 to 5.92), Average (3.93 to 4.92), Low (2.93 to 3.92), and Very Low (less than 2.93).

## 4.2.7 Rates and Taxes

Table 10 details the indicators used to construct the Rates and Taxes Sub-Index and their summary statistics, together with references to the survey questions.<sup>13</sup>

### Deriving the Standardized Tax Indicator

Tax revenue and public service expenditures varied across municipalities. The correlation coefficient between tax revenue and total population was 0.80, which confirms the fact that the larger a municipality, the higher its tax revenue. Gross public service expenditure increases with total population but per capita public service expenditure decreases. The correlation coefficient between per capita

public service expenditure and total population was -0.37 (see Table 11).

Among other factors, such a negative correlation is the result of economies of scale in providing municipal public services, but also suggests that tax efficacy could vary across municipalities. A measure for tax efficacy was derived from the residuals of a regression of public service expenditures on tax revenue and a dummy variable for the municipality of San Salvador. The results from this regression, which are shown in Table 12, indicate that 75% of the total variation in public service expenditures across municipalities is explained by tax revenue.

**Table 10. Variables Used to Construct the Rates and Taxes Sub-Index**

Indicator	Business Survey Questions	Municipal Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Business feeling that local taxes are higher than in neighboring municipalities	TAX004		0.00	19.12	21.06	61.69	12.52	59.44
Number of incentives per 100 businesses		FIN006	0.00	0.12	0.42	8.89	1.22	292.25
Municipality offers tax advantages		FIN005	0.44	0.64	0.62	0.98	0.18	28.52
Tax revenue standardized by municipal services		FIN002D, FIN002F, FIN002G, FIN002H, FIN002K, FIN002P, FIN002Q	-51.75	-6.05	-6.22	53.56	21.74	-349.46

**Table 11. Bivariate Correlations**

Tax Revenue, Public Services <sup>a</sup> Expenditure, and Total Population					
Sub-Index	1	2	3	4	5
1. Tax revenue	1.00				
2. Public services expenditure	0.75*	1.00			
3. Tax revenue per capita	0.69*	0.56*	1.00		
4. Public services expenditure per capita	-0.17*	0.01	0.03	1.00	
5. Total population	0.80*	0.81*	0.46*	-0.37*	1.00

<sup>a</sup> Expenditures on public works, education and vocational training, assistance to local businesses, solid waste management, and street maintenance in urban areas.

\* Significant to the 5% level.

<sup>13</sup> Rates and Taxes Sub-Index performance category ranges are: Excellent (6.50 and over), High (5.50 to 6.49), Average (4.50 to 5.49), Low (3.50 to 4.49), and Very Low (less than 3.50).

The residuals from this regression, expressed on a per capita basis, were used as a proxy for municipal tax efficacy. A negative residual meant that after controlling for tax revenue, the current expenditure on public services by a municipality was lower than expected; therefore, the collected tax dollars had a lower efficacy level than in a municipality that recorded a positive residual.

**Table 12. Linear Regression: Public Expenditures and Tax Revenue**

	Coefficient
Tax revenue	0.51*
Dummy for San Salvador	-13,195,711
Constant	757,168
Observations	100
R-squared	0.75

\* Significant to the 5% level.

### 4.2.8 Entry Costs

Table 13 details the indicators used to construct the Entry Costs Sub-Index and their summary statistics, together with references to the survey questions.<sup>14</sup>

**Table 13. Variables Used to Construct the Entry Costs Sub-Index**

Indicator	Business Survey Questions	Municipal Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
Effective wait for business premises (days)	REG004B, REG004D		7.09	59.05	94.71	668.65	101.05	106.70
Length of other business-related permits (days)	REG004C		6.68	69.37	103.44	648.61	101.06	97.70
% Businesses waiting over ONE month to obtain permits to start operations	REG001A		0.02	6.30	9.96	71.90	12.48	125.26
% Businesses waiting over THREE months to obtain permits to start operations	REG001A		0.01	0.45	5.00	30.96	7.94	158.73
% Businesses having problems with obtaining permits/licenses to start operations	REG002A, REG005B, REG005C, REG005D		0.03	17.68	18.54	70.10	16.82	90.71
% Businesses finding it difficult to obtain information on necessary procedures/ documents	TRA003B, TRA003C, TRA003D, TRA003E		0.01	0.26	2.04	29.98	3.79	185.85
Total number of documents required to obtain permit for operations		RGB003, RGB004	2.00	5.00	5.67	10.00	1.74	30.76
Time to issue permits to operate (days)		RGB002A, RGB002B, RGB002C	0.00	7.00	8.83	40.00	7.40	83.85

<sup>14</sup> Entry Costs Sub-Index performance category ranges are: Excellent (8.50 and over), High (7.50 to 8.49), Average (6.50 to 7.49), Low (less than 6.50).

### 4.2.9 Municipal Regulations

Table 14 details the indicators used to construct the Municipal Regulations Sub-Index and their summary statistics, together with references to the survey questions.<sup>15</sup>

**Table 14. Variables Used to Construct the Municipal Regulations Sub-Index**

Indicator	Business Survey Questions	Minimum	Median	Mean	Maximum	Standard Deviation	Coefficient of Variation
% Businesses that feel the number of municipal regulations increased during 2008	REG007	0.00	6.51	9.50	42.31	9.13	96.12
% Businesses that feel the number of municipal regulations is above normal, compared to neighboring municipalities	REG009	0.00	0.18	2.59	21.15	3.67	141.46

### 4.3 Municipal Resource Endowments

Some municipalities enjoy greater economic development because of better infrastructure, a higher level of human development, and closer proximity to major markets. The MCI aims to measure a municipality's competitiveness independent of its resource endowments. The purpose of this study is to construct an index that focuses on what local governments can do in the short and medium term to improve the business climate for private sector companies. A proper assessment of the impact of good economic governance, as approximated from the sub-indices discussed in the previous section, requires controlling for the effect of initial resource endowments.

The impact of resource endowments on economic growth was assessed from their influence on two variables: (1) average sales increase in 2008 relative to 2007 in thousands of U.S. dollars; and (2) tax revenue per capita. Each of these variables was regressed on the resource endowments index obtained from the sum of the individual indices of distance from San Salvador, Human Development Index, and phones per 100 households. The results indicate that resource

endowments account for 10% of the total variability in average sales increase and 5.3% of the total variability in number of businesses registered (see Table 15).

These findings suggest that given municipalities' resource endowments, there are broad opportunities for local governments to promote private sector growth by addressing issues related to economic governance.

The data in Figure 1 show the total business environment was measured by the sum of the index of resource endowments and the weighted MCI, both transformed to a scale from 0 to 100. Municipalities are sorted in descending order by their weighted MCI. These data make clear that economic governance has the potential to operate beyond initial endowments. For instance, Texistepeque, which ranked 49th according to its index of resource endowments, was third based on its weighted MCI.

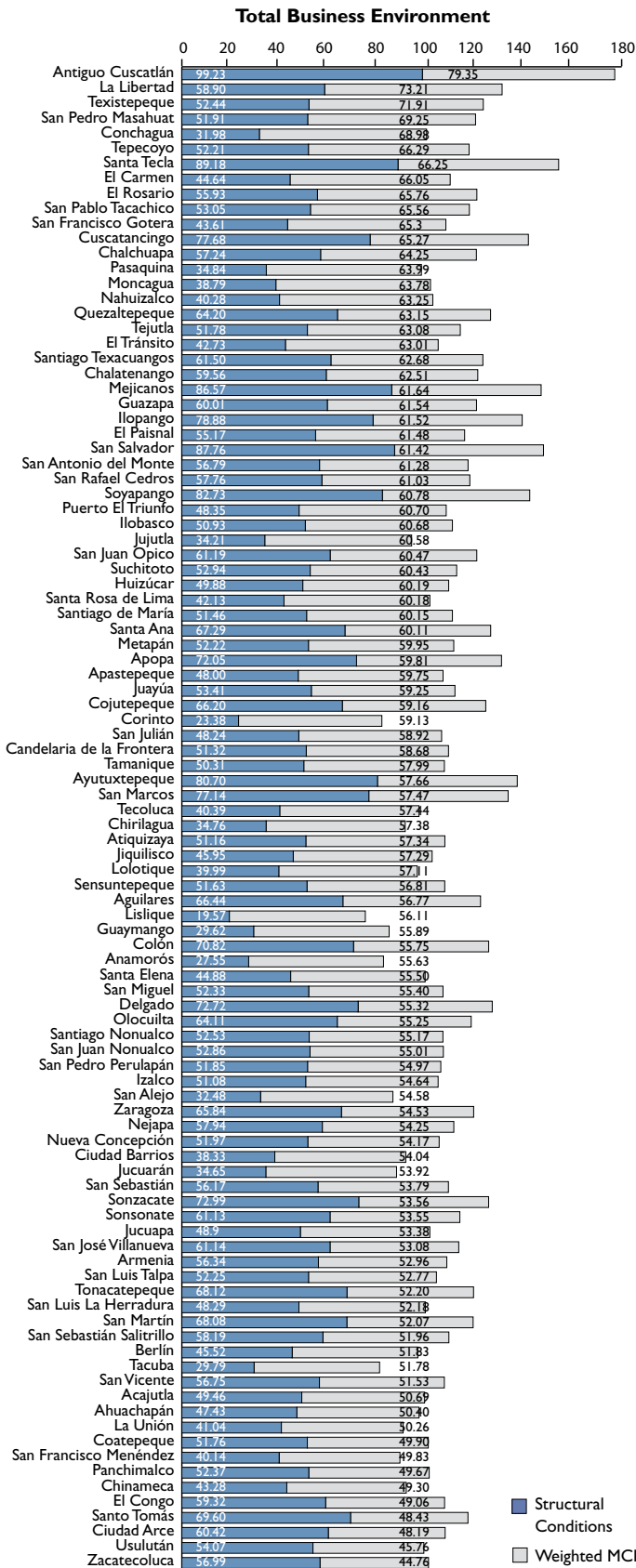
**Table 15. Average Sales Increase and Number of Registered Businesses**

Outcome Variable	Coefficient Structural Conditions	R <sup>2</sup>
Natural logarithm of sales increase	0.026*	10.0
Natural logarithm of the number of registered businesses	0.975*	5.3

\* Significant to the 5% level.

<sup>15</sup> Municipal Regulations Sub-Index performance category ranges are: Excellent (8.97 and over), High (7.97 to 8.96), Average (6.97 to 7.96), Low (5.97 to 6.96), and Very Low (less than 5.97).

**Figure I. Total Business Environment: Resource Endowments Plus Weighted MCI**



## 4.4 Developing a Weighted Composite Index

A composite index was derived from the contribution from unweighted sub-indices to explain variation in two outcome measures after we had adjusted for the effect of initial resource endowments. This was done to ensure that the MCI reflected the relative contribution of each sub-index to total competitiveness. The two outcome measures were derived from the business survey conducted as part of the MCI study and are proxies for measures of business success. The two outcome measures were:

1. Number of businesses registered in the municipality as of December 2008, and
2. Average sales increase per business in 2008 relative to 2007.

The data in Table 16 indicate that the sub-indices are highly correlated, in particular Transparency, Municipal Services, Informal Payments, Public Safety, Time to Compliance, and Rates and Taxes. Such high correlations would cause the problem known as co-linearity when the outcome measures were regressed on the sub-indices.

To solve this problem, a factor analysis was conducted on the nine sub-indices. This exercise resulted in the extraction of three uncorrelated factors. Table 17 shows the factor loadings, eigenvalues, and proportion of total variance explained by each of the three factors.

The three factors account for 57.6% of the between-indicator variance. Factor 1, which explains 27.8% of total variance, is composed of the Transparency, Municipal Services, Proactivity, Informal Payments, and Public Safety sub-indices. The first four components relate to the post-entry environment for businesses and, together with Public Safety, reflect those aspects that cause the most concern, not only for private investors, but also for the population at large: corruption and crime. In addition, the Transparency, Proactivity, and Municipal Services sub-indices promote the confidence of the private sector and give it a sense that the local government cares about the businesses located within the municipality.



**Table 16. Bivariate Correlation Between Sub-Indices**

Sub-Index	1	2	3	4	5	6	7	8	9
1. Transparency	1.000								
2. Municipal Services	0.544*	1.000							
3. Proactivity	0.549*	0.379*	1.000						
4. Informal Payments	0.407*	0.279*	0.272*	1.000					
5. Public Safety	0.310*	0.284*	0.380*	0.141	1.000				
6. Time to Compliance	0.240*	0.210*	0.110	0.123	-0.008	1.000			
7. Rates and Taxes	0.242*	0.209*	0.106	0.157	0.019	0.306	1.000		
8. Entry Costs	0.058	0.120	0.106	0.028	0.010	0.007	-0.206*	1.000	
9. Municipal Regulations	-0.144	-0.053	-0.092	0.191*	0.118	-0.099	-0.082	-0.050	1.000

\* Significant to the 5% level.

**Table 17. Factor Analysis on the Components of the MCI, Factor Loadings<sup>a</sup>**

Sub-Index	Factor 1	Factor 2	Factor 3
Transparency	0.80	0.24	-0.12
Municipal Services	0.71	0.17	-0.11
Proactivity	0.77	-0.02	-0.09
Informal Payments	0.54	0.20	0.39
Public Safety	0.60	-0.17	0.28
Time to Compliance	0.14	0.80	0.00
Rates and Taxes	0.19	0.60	-0.26
Entry Costs	0.27	-0.24	0.41
Municipal Regulations	-0.01	-0.13	0.84
Eigenvalue	2.64	1.35	1.19
Cumulative variance (%)	27.8	44.1	57.6

<sup>a</sup> Bivariate correlation of each sub-index with the underlying factor.

Extraction method: Principal component analysis.

Rotation method: Varimax.

Factor 2, which explains about 16% of total variance, is related to the actual costs to businesses of operating within a municipality. It is composed of the Time to Compliance and Rates and Taxes sub-indices.

Factor 3, with a contribution of about 13% to total variance, has to do with the pre-entry environment for businesses. It is composed of Entry Costs and the number of Municipal Regulations to establish and operate businesses.

The next step in the development of a composite index consisted of deriving weights to reflect the contribution of the sub-indices to improvements in outcomes. Each of the three derived factors was run in a series of two regressions on the two outcome variables. The results from these regressions controlling for structural conditions are shown in Tables 18 and 19.

**Table 18. Linear Regression of Average Sales Increase in 2008 (thousands of US\$)**

	Models			Standardized Coefficient
	1	2	3	
Distance from San Salvador in kilometers	0.12*	0.02*	0.02*	0.256
Human Development Index	154.26*	18.98*	19.24	0.320
Dummy for San Salvador	27.66*	8.08*	7.98*	0.246
Sum of nine sub-indices		0.13*		
Factor Score 1			0.43*	0.132
Factor Score 2			0.28	0.086
Factor Score 3			0.18	0.055
Constant	-90.61*	-16.56*	-9.77*	
Observations	100	100	100	
R-squared	0.48	0.47	0.49	

\* Significant to the 5% level.

**Table 19. Linear Regression of Natural Logarithm of Number of Businesses Registered in 2008**

	Models			Standardized Beta
	1	2	3	
Distance from San Salvador in kilometers	-0.005*	-0.005		
Phones per 100 households	0.032*	0.034*	0.033*	0.611
Dummy for San Salvador	1.531	1.480*	1.733*	0.153
Sum of nine sub-indices		0.029*		
Factor Score 1			0.181*	0.159
Factor Score 2			0.101*	0.089
Factor Score 3			0.061	0.054
Constant	3.805	5.323*	3.462*	
Observations	100.000	100.000	100.000	
R-squared	0.484	0.472	0.493	

\* Significant to the 5% level.

The standardized coefficients were used to compute the impact of a one-point standard deviation increase on the respective outcome measure. For instance, the data in Table 20 indicate that a one-point standard deviation increase in Factor 1 would lead to an average US\$13,160 annual increase in sales per business. The same data indicate that a one-point standard deviation increase in Factor 2 would result in an average US\$8,650 annual increase in sales per business; and a one-point standard deviation increase in Factor 3 would increase average annual sales by US\$5,520. Taken together, the governance improvements on all three factors would account for an annual increase in sales of US\$27,000. Factors 1, 2, and 3 account for 48.2%, 31.6%, and 20.2% of that increase, respectively (see Table 20).

**Table 20. Factor Contributions to Outcome Measures**

Outcome Variable	Factor 1	Factor 2	Factor 3	Total
Sales increase per business, in thousands of U.S. dollars	13.16	8.65	5.52	27.33
Weight 1: Contribution to sales increase, in thousands of U.S. dollars	48.16	31.63	20.20	100.00
Natural log of number of businesses in 2008	17.27	9.32	5.54	32.13
Weight 2: Contribution to number of businesses in 2008 (%)	53.76	29.00	17.25	100.00
<b>Total factor contribution (%)</b>	<b>50.96</b>	<b>30.31</b>	<b>18.73</b>	<b>100.00</b>

Similarly, the data in Table 20 indicate that a one-point standard deviation increase in Factor 1 would lead to a 17.3% increase in the number of businesses established in the municipality; the same increase in Factor 2 would result in a 9.3% increase in the number of businesses; and a one-point standard deviation increase in Factor 3 would lead to a 5.5% increase in the number of local businesses. The cumulative effect of governance improvements accounts for an average 32.1% increase in the number of businesses established in a municipality. Factors 1, 2 and 3 account for 53.8%, 29.0%, and 17.2% of that increase, respectively (see Table 20).

Table 20 shows the contribution of each factor to the two outcome measures. The last row of this table gives the total factor contributions which correspond to the final weights, which were 51.0% for Factor 1, 30.3% for Factor 2, and 18.7% for Factor 3.

The final step consisted of computing the weights for each sub-index. These weights represented the relative contribution of each sub-index to municipal competitiveness. Weights were computed according to the following procedure:

- Sub-index contributions were computed as a weighted sum of the factor loadings with weights corresponding to the total factor contributions in the last row of Table 20.
- The final sub-index weight was calculated from the percentage of total contribution they represented.
- Weights were rounded and used in the computation of the final MCI. As in other studies, the use of rounded weights allows for replicability over time.

Table 21 summarizes this procedure.

**Table 21. Derivation of Individual Sub-Index Contributions**

	Factor 1	Factor 2	Factor 3	Contribution	Final Weight (%)	Rounded (%)
Transparency	40.845	7.359	-2.336	45.9	16.8	15
Municipal Services	36.358	5.217	-2.115	39.5	14.5	15
Proactivity	39.002	-0.729	-1.751	36.5	13.4	15
Informal Payments	27.304	6.133	7.363	40.8	15.0	15
Public Safety	30.389	-5.248	5.176	30.3	11.1	10
Time to Compliance	9.741	18.207	-4.945	23.0	8.4	10
Rates and Taxes	7.179	24.205	-0.085	31.3	11.5	10
Entry Costs	13.509	-7.198	7.621	13.9	5.1	5
Municipal Regulations	-0.325	-3.972	15.754	11.5	4.2	5
<b>Total</b>				<b>272.7</b>	<b>100.0</b>	<b>100.00</b>

## 5. Assessing the Benefits of Economic Governance

This section assesses the impact of governance improvements on average sales increases and number of businesses established in a municipality after we controlled for the effect of initial resource endowments. Regressions of each of the outcome measures on the MCI and an index of resource endowments were run. Table 22 shows the results from these regressions.

The data in Table 22 indicate that a one-point increase in the MCI score is estimated to lead to an average sales increase of US\$1,147 per business, and to a 22% increase in the number of businesses registered in a municipality.<sup>16</sup>

The impact of governance on living standards was assessed by regressing the natural logarithm of per capita gross domestic product (GDP) on the MCI and the resource endowments index. Two separate models were fit to the data. The first model included the municipalities with a value of the MCI below the median. The second was fit to data from municipalities with an above-median value for the MCI. Table 23 shows the results from these regressions.

These data indicate that municipalities with high scores on the MCI have a higher standard of living at every level of resource endowments than those with low MCI scores. A one-point increase in the MCI generates a differential of 7% in per capita GDP in favor of high-performing municipalities after initial resource endowments are controlled for.

**Table 22. Linear Regression of Average Sales Increase in 2008 and of Natural Logarithm of Number of Businesses Registered in 2008**

	Coefficients	
	Average Sales Increase in 2008 (US\$000s)	Natural Logarithm of Number of Registered Businesses in 2008
Index of resource endowments (100-point scale)	0.037*	0.052*
MCI	1.147*	0.199*
Constant	-4.234	4.944
Observations	100	100
R-squared	0.46	0.45

\* Significant to the 5% level.

**Table 23. Linear Regression of Natural Logarithm of Per Capita GDP**

	Coefficients	
	Municipalities with MCI Below the Median	Municipalities with MCI On or Above the Median
Index of resource endowments (100-point scale)	0.019*	0.021*
MCI	0.069*	0.140*
Constant	-0.693	-0.678
Observations	100	100
R-squared	0.64	0.69

\* Significant to the 5% level.

<sup>16</sup> Exponential of the regression coefficient.







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