USAID
FROM THE AMERICAN PEOPLE

DETERMINANTS OF MIGRATION

AND PROJECT OBJECTIVES

For the Creating Economic Opportunities Project

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I. INTRODUCTION

The analysis herein aims to identify the determinants of migration from Guatemala at the department and municipality level and illustrates the direct links between those determinants of migration and the objectives of the USAID Guatemala Creating Economic Opportunities project. The determinants of migration are generally well known, but they have not been analyzed at the Department/Municipality level, particularly those Departments which are the focus of the CEO project. The Project is designed to enhance economic activity, generating jobs, attracting FDI and providing financing for new ventures in and beyond Guatemala's capital city, thereby lessening the likelihood of immigration of Guatemalans to the US. Five Departments in the Altiplano region, Quetzaltenango, Huehuetenango, Totonicapan, San Marcos and Quiche, and Guatemala (CEO6, hereinafter) are the focus of the Project and this analysis. Using an innovative technique to create a proxy for unobservable illegal migration, and a newly constructed database on municipality level determinants, the data reveals, and we conclude, that the CEO Project objectives are focused on the single most important determinant of migration: enhancing economic opportunity, as measured by municipal income per capita.[1]

The phenomenon of irregular migration analyzed in this report is of particular relevance to Guatemala's foreign policy and its social and economic relationships with the United States. Migration is not a recent event, but rather has evolved during the past 20 years, but at a much faster rate in the past five years. There has been extensive academic and scholarly research, journalistic reports, surveys, editorials and opinion columns on migration from the Northern Triangle of Central America northwards through Mexico. Most research has been based on national level aggregate data or national or international level surveys.[2] They identify several common determinants and uniformly argue that the decision to migrate is complex and evolves over time. Nevertheless, it is common that conclusions are often highly qualified by the lack of high-quality data. Case studies may not be uniformly applicable, and surveys are a temporally irregular snapshot, often quickly out of date. Anecdotal evidence is often added to support their conclusions.

Therefore, the initial task of the analysis is to construct a robust department and municipal level database. From this, the determinants of migration in Guatemala can be described not only at the country level, but at the municipal level where conditions may vary significantly. This research is the first effort that seeks to identify the fundamental causes of migration from publicly available data at the municipality level. The analysis identifies the "revealed" determinants of migration, rather than impressionistic responses to survey questions or case studies. With this level of information, it is also possible to apply more sophisticated statistical and econometric techniques. In addition, using official, publicly available data provides for the possibility of replication or further analysis without the need to incur considerable costs of collecting first-hand information. An additional benefit of explaining the phenomenon of migration from official information, is that there is a more direct, clearer link between the determinants of migration, potential solutions and the measurable impact of public policies on specific determinants.

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[1] Note that estimated municipal income per capita is calculated approximately the same way that GDP is calculated but using municipal level data: the sum of consumption expenditures, investment, government expenditures and net exports of goods and service from the municipality to other regions. Project objectives focus heavily on investment, income through jobs creation, increasing labor productivity and financial education. Other determinants of migration are controlled for in the models below, for example violence, drought, and nutrition, but are not the focus of the Project's objectives.

[2] Also note that most research has been on migration of Mexicans. Three long standing annual surveys are the Mexican Migration Project (MMP), a binational household survey by Princeton University and the University of Guadalajara (Mexico), Mexican Migration Field Research Program (MMFRP), and the binational household head survey by the University of California – San Diego, Survey of Migration at Mexico's Northern Border (EMIF, by its Spanish acronym), sponsored by the Mexican government and the College of the Northern Border. The EMIF survey also includes northern triangle countries since 2012, but as with other surveys suffer from sample selection bias and response bias.

II. CHALLENGE: Building a Country with Opportunities for all

What are the costs and benefits considered by Guatemalans when they decide to migrate? Following the expression of deep concerns about the increase in unaccompanied minors attempting to migrate from Guatemala, the Government of the United States implemented an aggressive initiative to reduce the flow of Guatemalans northward, known as the "Plan of the Alliance for Prosperity in the Northern Triangle of Central America". The commitment made by the Governments of Guatemala, Honduras and El Salvador requires improvement, as soon as possible, in the economic and security conditions that lead people to migrate from their place of birth and residence.

After extensive fieldwork in those departments and municipalities in Guatemala from which most migrants originate, researchers focused on the cost-benefit analysis subconsciously made by individuals when they decide to migrate. This decision-making process involves the rough quantification of costs (e.g., loss of home property, distance from family, actual transportation and smuggling costs and expected insecurity at the place of arrival) and benefits (e.g., opportunities for more education, or potential acquisition of new competencies, substantial increment in income associated with more job opportunities, and overall improvement in living conditions). When the expected benefits exceed the expected costs, migration is undertaken, usually from rural and very impoverished areas to more urban and developed areas. This process does not stop when people migrate to major cities in Guatemala. Instead, the decision-making process is repeated, considering a broader set of opportunities including those outside the country, and not surprisingly, they consider the US as a feasible option.

The analysis below demonstrates that migrations from Guatemala will decrease as improvements in economic opportunities and income increases, thereby changing the benefit-cost ratio. Thus, CEO interventions emphasizing job creation, increasing local income and wealth, moving individuals into the formal sector of the economy and improving financial literacy, are most appropriate.

III. CONTEXT

While illegal migration to the United States from Mexico and Central America has been a long-standing issue, in the last five years or so the home country composition of the potential illegal migrants has changed rather dramatically. We assume that "pull factors" (i.e., conditions in the US that makes migration attractive) are constant across home country groups. If border enforcement efforts are assumed to be independent of country of origin of those apprehended, then apprehensions provide a clear indication of how the composition has changed.

Table 1 below illustrates the changes. From 2009 to 2018 apprehensions from Mexico and the Northern Triangle (NT) fell from 545,290 to 381,024, or about 30%. Apprehensions from Mexico fell much more: from 503,386 to 155,452, or about 69%. On the other hand, apprehensions from Guatemala have skyrocketed from 2009 to 2018: increasing from 15,583 to 116,808, or over 650%.

Note that early Rand Corporation studies suggested that only one in three border crossing attempts were successful, and this implies that for 2009 there were 23,374 attempts, 15,583 apprehensions and 7,791 successful crossings. Using the same likelihood of success in 2018 there would be 175,212 attempts with 116,808 apprehensions and 58,404 successes. This later calculation is not quite appropriate though since with greater border security the success rate would be expected to be substantially lower and many more attempts to migrate are amnesty applications and not between ports of entry attempted illegal crossings. The actual number of illegal crossings may not be as clearly related to apprehensions as a result. Further, note that there is no information, at this moment, about the exact location, department or municipality, from which the individuals apprehended originate.

Table 1: *Border Apprehensions (source: US Border Patrol)*

	GUATEMALA		MEXICO		EL SALVADOR + HONDURAS		MEX + NORTHERN TRIANGLE		GLOBAL
	# people	% of global	# people	% of global	# people	% of global	# people	% of global	# people
2018	116,808	28.90%	155,452	38.46%	108,764	26.91%	381,024	94.28%	404,142
2017	66,807	21.51%	130,454	42.01%	97,911	31.53%	295,172	95.05%	310,531
2016	75,246	18.10%	192,969	46.41%	125,420	30.16%	393,635	94.67%	415,816
2015	57,160	16.96%	188,122	55.80%	77,412	22.96%	322,694	95.72%	337,117
2014	81,116	16.67%	229,178	47.09%	158,113	32.49%	468,407	96.25%	486,651
2013	54,692	13.00%	267,734	63.63%	83,834	19.92%	406,260	96.55%	420,789
2012	35,204	9.65%	265,755	72.86%	53,111	14.56%	354,070	97.07%	364,768
2011	19,061	5.60%	286,154	84.10%	23,071	6.78%	328,286	96.48%	340,252
2010	18,406	3.97%	404,365	87.26%	27,303	5.89%	450,074	97.13%	463,382
2009	15,583	2.80%	503,386	90.53%	26,321	4.73%	545,290	98.07%	556,041

IV. OBJECTIVE OF THE ANALYSIS

A natural question is what is causing the sudden upsurge in the flow of potential migrants from Guatemala. Below the general determinants of migration are discussed and these are well known. It is also believed that the six Departments that are the focus of the CEO project are the origin of a larger number of the potential migrants, primarily because of high levels of poverty, overall low standard of living and lack of new business and jobs, but without ignoring exogenous conditions such as drought, low enrollment rates at elementary school, and poor health status, including malnutrition. The CEO project is designed to enhance economic opportunity in general, thereby giving potential migrants in-country options to improve their economic conditions.

Herein, we identified the general determinants of migration with municipal level data to establish links between CEO interventions and potential irregular migration. Because irregular migration is not directly observable, we must first construct proxy measures of migration. Figure 1 below, discussed in detail in section 5 on methodology, outlines the exact problem relating observed determinants and proxies with the unobserved level of migration.

We used two measures. The first is a novel approach using principal component analysis to construct a synthetic measure of irregular migrants. The other is the estimated number of irregular migrants calculated by Manuel Orozco.[3]

Note that for each measure, the actual number of migrants remains unobservable and we are using proxies. In this line of ideas, the main task was to identify available municipal level data for variables or proxies for the general determinants known to be associated with migration. Then, we estimated a range of regression models to test for the existence and significance of these linkages.

[3] We would like to thank **Manuel Orozco** for sharing his estimates of migration. These are preliminary and not yet published. Contact the Inter-American Dialogue (see references) for further details. All errors of interpretation and further analysis herein remain ours.

V. DETERMINANTS OF MIGRATION: "PUSH FACTORS"

Different studies consistently have identified four broad categories of determinants of migration, so called "push factors":

1. economic opportunity
2. health/nutrition
3. violence
4. climate (we used specific measures related to drought conditions in Guatemala – precipitation and temperature –, which are simply local weather conditions rather than climate, *per se*).[4]

To these we also add social capital (civil engagement), and population characteristics (urban and population density). It is well established that lack of economic opportunity (i.e., basic employment, income growth and accumulation of even modest wealth) naturally leads individuals to areas where opportunities are greater. Health (i.e. malnutrition) is an extreme reflection of poor economic conditions and is associated with regions of high migration. Levels of violence is a social condition that is also associated with economic conditions but accentuated by lack of effective legal and judicial systems to deter criminal behavior. If these systems are dysfunctional, migration to avoid violence is certainly an option.

Climate or weather conditions are most important to agricultural regions and for subsistence or near subsistence farmers. In this kind of territories, drought, significant changes in precipitation or temperature may eliminate people livelihoods, naturally leading to migration. We also examined the role of social capital, the sense of identification with community, and population or demographic characteristics that may influence the decision to migrate. Table 2 below provides a complete list of variables that describe each of these broad categories.

Finally, given the decision to migrate, the question of "to where" must be answered. We argue that destinations with desirable economic conditions and greater economic opportunity are the most likely destination. Immigrants see the US as their best option (perhaps the only real option) until domestic economic opportunities improve.

[4] For more detailed discussion of determinants and references to the literature see the first preliminary report and addendum to that report presented to CEO Project and USAID Guatemala.

VI. ANALYTICAL PROBLEM, DATA AND METHODOLOGY

A. ANALYTICAL PROBLEM

Total immigration from a source country to United States may be divided into two components. First, regular and legal migration, that which is recorded via issuance of visas and temporary and permanent resident status and amnesty applications. Second, which is irregular or illegal, which is measurable via visa overstays, irregular crossings at ports of entry, and illegal border crossings, which is not clearly measured or observable.

The primary difficulty then is that the dependent variable of interest contains a large component that is not observable, neither at the national level, nor at the department/municipality level. The best estimates for irregular or illegal immigration are for the country level and are not contemporary. Thus, we need a reasonable proxy for municipal level migration for the most recent time period available. As mentioned above, Manuel Orozco's work is a relevant effort to has estimates using survey data and the characteristics of migrants from many countries. We constructed a proxy using principal components analysis as discussed below in the Methodology section.

B. AVAILABLE DATA

The analysis is greatly constrained by availability of data. The database consists of **31 variables** associated with migration determinants for **22 Departments** and **340 municipalities**. While observations are annual, they are not available consistently for all variables for all years. These variables are defined and documented in Appendix 1. Tables 2 and 3 display relevant categories of available national and municipal level data and the potential links to variables we wish to determine, essentially measures of irregular migration or relevant proxies, and the CEO project interventions designed to reduce migration.

The major problem we faced is simply that irregular migration is very difficult, if not impossible, to measure accurately. The best analyses are by the Department of Homeland Security Office of Immigration Statistics, Pew Research Center and the Center for Migration Studies. However, while the methodologies are rigorous and based on well documented more reliable US data, these estimates are for countries as a whole and not disaggregated at sub-nations level, with the latest estimates for 2015, prior to the recent surge from Central America.

Estimates by other researchers of migration by department may be useful, but the underlying assumptions made to construct the estimates limit their usefulness and they are not yet published. Rather than estimate migrants directly, we employed roughly the same available data on remittances and returnees, which are highly correlated with migrants, to construct an alternative measure using factor analysis, or principal components. This is then the proxy for the unobserved irregular migration variable that we analyzed. As a robustness check, we also perform the same analysis for estimates of this unobserved migration using Orozco's estimates.

Regarding the general determinants of migration described above the individual variables are identified, but the availability over time is severely limited (further demographic variables that may be helpful are not available until completion and publication of the current census in Guatemala). As a result, the data we employed is one cross section, for **2018 or the latest available year**, for 31 variables across 22 departments and 340 municipalities. Table 4 presents the variables and the connection to CEO Project Objectives. Appendix 1 provides more detailed descriptions and sources of each variable.

C. METHODOLOGY

We proceeded in two steps. First, we constructed a proxy for migration and then use this proxy as the dependent variable in standard regression models. We know that remittances and returnees are highly correlated with migrants in the US and we have good measures of these variables at the municipality level, so we can use these to construct a proxy for migrants (Orozco's technique also uses these variables coupled with survey response data from migrants to construct an estimate of migrants, including illegal, from data on remittances and returnees).

The result was a proxy, a synthetic variable, the first principal component of remittances and returnees. Technical details are available upon request, but the intuition is straightforward. Typical regression models relate a well-measured dependent variable to several well-measured independent variables, or correlates. We know the values of each of these variables and estimate the coefficients of each, typically in a linear regression model. If values of the dependent variable are unobservable, regression models cannot be employed. However, principal components analysis finds a linear combination of the independent variables, a composite variable, which by itself explains the maximum share of the total variation of that set of variables.[5] This new variable, a linear combination of all or selected key correlates, may be interpreted as a new dependent variable or proxy for migration, which can then be used as the dependent variable in a new set of regressions.

We have two variables, remittances and returnees, which are highly correlated with migrants and we may calculate two principal components (the maximum number is the number of variables available). The first principal component is an equally weighted (.707) linear combination of remittances and returnees and it alone explains 79% of the variation. The second principal component is a linear combination orthogonal to the first and it explains the remainder of the variation. We use the first principal component as a proxy for migration. Details are provided separately in the technical Appendix.

The next tables illustrate how the available variables were arranged to estimate the models used to explain the determinants of migration in Guatemala:

Table 2: Guatemala factors – National Level

PUSH FACTORS (migrants to US)	National Level Conditions	
MEASURES OF MIGRATION	Observed Data	
	• Visas Issued • Visa Overstays • Apprehensions • Remittances • Returnees	
Synthetic Measure of Migration to US	Observed Data	Unobserved and Unknown
	• Regular Migration • Illegal Migration • Visa Overstays	• Illegal Migrants

[5] See, e.g., Kennedy (2006), Chpt. 12.

Table 3: *Guatemala factors – Municipal Level*

MEASURES OF MIGRATION	Observed Data
	• Remittances • Returnees
Synthetic Measure of Migration to US	First principal component as proxy for observed migrants

MUNICIPAL LEVEL CONDITIONS	Observed or Proxies	
	• Econ opportunity Income • Econ opportunity Wealth • Health Status • Violence • Civic Engagement	• Drought • Population characteristics (urban, high school grads) • Migration network • 6 Departments of CEO

Table 4: *Potential Determinants of Migration (list of Variables)*

DETERMINANTS OF MIGRATION	PUSH FACTORS – 7 groups of variables
Economic Opportunity - INCOME	• Municipal Income per capita • Poverty Rate • Labor Force • Secondary School Graduates • Cellphone Users
Economic Opportunity - WEALTH	• Deposit accounts: number of accounts • Deposit accounts: value of accounts • Savings accounts: number of accounts • Savings accounts: value of accounts • Housing: Quantitative deficit • Housing: Qualitative deficit • Electrification Rate
Health Status	• Social Security Affiliates • Public Expenditure on Health • Chronic Malnutrition • Water access (households) • Sanitation access (households)
Violence	• Homicides per 100,000 people • Extortions per 100,000 people • Intra-family violence against Female • Intra-family violence against Male

Civil Engagement	• Agro-related Protests and Conflicts • Voters registration
Drought	• Deviation from long-run average Precipitation • Deviation from long-run average Temperature
Population Characteristics	• Urban Population • Population Density • Secondary School Graduates

CEO Project (fixed effects)		CEO Project Components
	• Guatemala • Quetzaltenango • Totonicapan • San Marcos • Huehuetenango • Quiche	• Promote Trade and Investment • Upgrade Productive Infrastructure • Mobilize Financial Resources • Increase Businesses Competitiveness

VII. RESULTS OF THE ANALYSIS

In Appendix 2, numerous regression models and principal component analyses are reported. Of many estimated regressions, four specifications are summarized in Table 5 below. The dependent variable is as described before: synthetic measure of Migration to US. Independent variables in the final specifications are described in Table 6 below, with further detail and sources provided in The Appendix 1.

In each specification, coefficient estimates and p-values are reported and those that are statistically significant at the five percent level or less are highlighted in yellow. The first two specifications use our proxy for migration and CEO Department dummy variables, in which the dummy for a particular department is assigned a value of 1 if the municipality is in the department, and 0 otherwise (DGC = Guatemala, DQUET = Quetzaltenango, DHUE = Huehuetenango, DQUI = Quiche, DSAN = San Marcos, DTOT = Totonicapan). These dummy variables account for fixed effects or department level idiosyncrasies that affect migration that are not accounted for by the other variables. For all departments except Guatemala, there are unique features of the department that contribute to migration other than that of the other departments in Guatemala.

The third specification presents a similar model but using Orozco's estimate of migration (dependent variable), without department dummy variables, due to multi-collinearity. Notably, the basic results are similar at first sight.

Finally, the fourth specification is for a sample of only the CEO6 Departments (and therefore no dummy variables). The results are similar, with the exception of the health care expenditures anomaly, which likely reflects poor economic conditions rather than health status.

With regard to the variables individual, we found that our measures of drought (DR_PC1[6] and DR_PRECIPDEV, the deviation of department level rainfall from the national average relative to the national average) and health status/malnutrition (HS_EXPHEALTH18 or HSTATPC1) have little if any effect on migration. Additionally, population characteristics (DR_PC1, the first principal component of urban population and population density) are not significant.

Importantly, several measures of economic opportunity (income and wealth measures) have the expected effects and are statistically significant. Economic opportunity, as measured by **municipal income per capita** (ECOI_GDPPERCAPITA17) has a negative effect on migration for every specification, indicating that higher levels of municipal income deters or provides alternatives to migration.

The number of cell phone accounts in the municipality was included because it is often mentioned in other research and may be an indicator of economic wellbeing, either in terms of income or wealth, or perhaps a tool that makes migration easier. In some specifications, it increases migration, but in the sample limited to only CEO departments, it is negatively related to migration. The first principal component of variables relating to wealth is negatively related to migration in specification 3 using Orozco's migration estimate as the dependent variable.

Violence (VIOLENCE_PC1) has a positive effect on migration. In addition, our measure of civic engagement consists of voter registration and agricultural protests (CIC_AGROCONFLICTS17) and CIVIC_PC1 is the first principal component of these and is dominated by the agricultural protest variable. In regions with high levels of agricultural protests, migration is higher.

[6] Here and below PC1 refers to the first principal component of the set of variables of that group of determinants.

We also constructed a measure of the strength of the family migration network. This variable is simply the difference between the number of returnees in a particular department and the median level for all departments, relative to the median number of returnees. We argue the larger this variable the stronger the migration network in a municipality. It is positive and statistically significant in specifications 2 and 3. However, it must be noted that this variable is based on returnees, which is a major component of the dependent variable (i.e., migration), regardless of how it is constructed. As a result, this conclusion may be a mathematical rather than behavioral relationship and other measures of the strength of family migration network may be considered.

Table 5: *Dependent Variable MIGRATION_PC1 or MO_MIGRANT_18F*

Variable Coefficient P value				
Dependent variable	Spec. 1: eqnA3	Spec. 2: eqnA4	Spec 3: eqnB1	Spec. 4: eqnC1
	Migrat_PC1	Migrat_PC1	MO_MIG_18F	Migrat_PC1 CEO Depts Only
C			4685.992	0.762312
			0.0000*	0.0011*
CEOINCLUDED			-321.7301	
			0.2974	
DGC	-0.82797	0.481587		
	0.7275	0.0001*		
DQUET	0.506743	0.042801		
	0.0022*	0.5586		
DHUE	0.747487	-0.368768		
	0.0000*	0.0000*		
DTOT	0.5039359	-0.184184		
	0.0611	0.1241		
DSAN	0.923388	-0.125308		
	0.0000*	0.0837		
DQUI	0.398673	-0.334013		
	0.0206**	0.0000*		
ECOI_CELLPHONES17	1.03E-06	2.98E-06	0.027511	-1.29E-06
	0.1275	0.0000*	0.000*	0.0110*
ECOI_GDPPERCAPITA17	-5.50E-05	-8.07E-05	-0.599844	-0.000165
	0.0000*	0.0000*	0.0000*	0.0010*
ECOW1			-627.7010	
			0.0045*	
HS_EXPHEALTH18	-2.87E-10			4.44E-09
	0.5997			0.0416**
HSTAT1			3172.938	
			0.0000*	
VIOLENCE_PC1	0.338325	0.100807	1247.066	0.667357
	0.0000*	0.0000*	0.0045*	0.0000*
CIVIC_PC1	0.447676	0.209019		0.360782
	0.0000*	0.0000*		0.0000*
CIC_AGROCONFLICTS17			17.16720	
			0.1076	
DR_PRECIPDEV	-0.55548			0.129033
	0.4754			0.2758

Variable Coefficient P value				
Dependent variable	Spec. 1: eqnA3	Spec. 2: eqnA4	Spec 3: eqnB1	Spec. 4: eqnC1
	Migrat_PC1	Migrat_PC1	MO_MIG_18F	Migrat_PC1 CEO Depts Only
CL_PC1		-0.031726	193.1587	
		0.0859	0.1263	
POP_PC1	-0.073914			0.062705
	0.0843			0.4738
FAM_MIG_NET_Median		0.362733	520.0116	
		0.0000*	0.0000*	
N	333	333	333	131
Adjusted R-squared	0.651860	0.931750	0.925320	0.683793

NOTE: * statistically significant at the 1% level and ** at the 5% level.

Table 6: *Definitions of Independent Variables included in Table 5 Regressions*
(see Table 1 of the Appendix for additional details and original sources)

VARIABLE	DESCRIPTION
CEOINCLUDED	1 if municipality is in a CEO Department, 0 otherwise
DGC	1 if municipality is in Guatemala, 0 otherwise
DQUET	1 if municipality is in Quetzaltenenago, 0 otherwise
DHUE	1 if municipality is in Huehuetenanago, 0 otherwise
DTOT	1 if municipality is in Totonicapan, 0 otherwise
DSAN	1 if municipality is in San Marcos, 0 otherwise
DQUI	1 if municipality is in Quiche, 0 otherwise
ECOI_CELLPHONES17	Number of cell phone users, 2017
ECOI_GDPPERCAPITA17	Municipal income per capita, US dollars, 2017
ECOWI	First principal component of seven variables associated with wealth. Category EconOppWealth in Table 1 of the appendix.
HS_EXPHEALTH18	Expenditures on public health as reported in national budget, 2018

HSTAT1	First principal component of five variables associated with health status, Category HealthStatus in Table 1 of the appendix.
VIOLENCE_PC1	First principal component of four measures of violence, Category Violence in Table 1 of the appendix.
CIVIC_PC1	First principal component of two measures of civic involvement, Category CivilInvolvement in Table 1 of the appendix.
CIC_AGROCONFLICTS17	Number of conflicts registered related to agricultural issues, 2017
DR_PRECIPDEV	Difference in current precipitation from long term average relative to long term average
CL_PC1	First principal component of relative deviation from long-term average precipitation and temperature. Calculated as above.
POP_PC1	First principal component of share of total population in urban area and population density (number of inhabitants per square kilometer).
FAM_MIG_NET_Median	Difference in returnees from the national median number of returnees relative to national median (returnees as reported by IOM)

VIII. FINDINGS, IMPLICATIONS & LINKS TO CEO PROJECT

After a rigorous analysis applying the fundamental econometric principles and criteria to support any policy conclusion, this section aims to contribute with the identification of the needed actions to positively impact in the understanding of migration determinants. Given the dataset listing and description and methodology, the statistical significance of the results and their robustness across specifications lead us to note the following findings:

1. Because pull factors are essentially given, modifying the push factors as discussed previously addresses the root causes of migration, not only for Guatemala, but for the countries in the Northern Triangle of Central America.

2. The most significant determinant directly related to migration is municipal income per capita, or simply individual income. Specification No. 3 in Table 5 uses Manuel Orozco's estimate of migrants as the dependent variable. Using the municipal income coefficient estimate, we calculate the elasticity of migration with respect to income for the country, as a whole to be -0.9. Thus, a 1% increase in municipal income per capita reduces migration by 0.9%. However, this relationship may not be linear since some threshold level of income is necessary to migrate abroad, which is much higher than the level of income required to migrate internally.

3. Internal migration from areas of high levels of poverty to within-country areas of higher economic opportunity may be a better option than migration abroad because the costs of doing so are lower. If urban conditions are unsatisfactory, however, higher levels of income and wealth may then lead to migration abroad. Thus, new levels of income must be higher than this second threshold to provide enough economic well-being to develop local community attachment and deter migration abroad. Exact threshold effects cannot be identified with data currently in hand, but census data on municipal level income strata may be employed do so and may be explored later.

4. Migration is sensitive to changes in income and increases in labor productivity are a key determinant of income growth. Improving health status and human capital increases labor productivity but means of doing so will vary depending on the initial level in the municipality and the specific economic activity or sector. Any kind of intervention must be carefully tailored to meet sectoral differences, particularly agriculture/rural versus manufacturing and services/urban.[7]

5. Migration may be reduced by creating jobs in the formal sector, promoting financial education and bankability (savings such as wealth accumulation) and access to credit (the possibility of improving productive activity).

6. As a corollary, in spite of recent literature which refers to the effects of climate change in rural areas on migration our measures of drought (variations in temperature or rainfall across departments in one given year) were generally not significant *per se*, or were captured by the effects of drought on incomes.

7. It is interesting to note that increases in the number of conflicts associated with agricultural economic activity is positively related to (rural) migration. This may also simply reflect poor economic conditions in rural areas. Additionally, housing deficit is positively related to migration and hence may lead to direct migration to the US from urban areas and rural areas as well (rather than first to urban areas with higher economic opportunity). Or, there may be a threshold effect, as mentioned above, that

[7] Measuring labor productivity changes in agriculture is particularly difficult for the case of Guatemala because much of production takes place in the informal economy.

once in an urban area migration may be undertaken after accumulation of wealth enough to migrate, but not enough to afford quality housing.

8. The above points emphasize the weight that improved economic conditions have in reducing migration. The effect of personal security conditions was also important. However, for domestic violence, homicides and extortion, only extortions showed a consistent effect on migration, presumably from urban areas since rural areas generally have low levels of violence and criminality.

9. While all of the above conclusions are relevant determinants of migration, we also find that health conditions, climate/weather and population characteristics are less important. Most likely, municipal income per capita indirectly captures the effects of these determinants. The following table illustrates the relation between the factors analyzed and the change in migration to US.

▲	Municipal Income per capita	➡	▼	Migration to US
▲	Labor Productivity	➡	▼	Migration to US
▲	Financial Education	➡	▼	Migration to US
▲	Bankability	➡	▼	Migration to US
▲	Access to Credit	➡	▼	Migration to US
▼	Agro conflicts/protests	➡	▼	Migration to US
▼	Housing Deficit	➡	▼	Migration to US
▼	Extortions (personal security)	➡	▼	Migration to US
▼	Chronic Mulnutrition (health)	➡	=	Migration to US
▲▼	Drought	➡	=	Migration to US
▲▼	Climate/weather variations	➡	=	Migration to US
▲▼	Population characteristics	➡	=	Migration to US

These findings are based upon a single cross section of municipality level data and reveal the differences in determinants of migration across departments and municipalities at a specific point in time. As a result, any intervention should be tailored to the varying conditions of individual territories. National level policies may have significant impacts, but it may be much more effective to address problems at a more specific, targeted municipal level.

CEO Project interventions are aimed at the most important determinants of migration: increasing incomes via foreign and domestic investment, training and educational programs to increase labor productivity, creating jobs in the formal sector, thereby increasing "bankability" and financial education. Investment and job creation activities are focused on public sector productive infrastructure, as well as private sector jobs. In addition, to the extent that individuals enter formal sector jobs, accumulate modest amounts of savings and have access to credit, more opportunities for creation of medium and small businesses arise. Attachment to neighborhood and community then increase and incentives to migrate are reduced.

To reiterate the implications for CEO Project activities:

- In the short term, activities that most quickly contribute to a reduction in irregular migration to the US are related to the creation of formal employment, mainly in more urban areas.

- An even greater impact can be had if job creation programs are accompanied by concrete actions favoring banking, for wealth accumulation (increased savings), access to other financial services and credit (e.g., for housing or small business).

- Investments in job creation in the formal sector, particularly in the private sector, not only generates higher levels of income and therefore lower migration, increases tax collections while providing access to social security and health services, but also ultimately reduces dependency on governmental assistance programs.

- Improved health and investment in human capital improve employability, increase productivity, increase incomes and reduce migration. This task should be addressed by organizations in charge of promoting Human Capital development in the country.

- Other determinants, like violence, should be addressed by public efforts to address issues of insecurity, with success measured by a reduction in all measures of violence, but more specifically extortions in urban areas and agro conflicts in rural areas.

- The sustainability of actions will be enhanced if people's behavior is permanently affected. Employment should be in the formal sector to develop strong individual banking relationships and participation in national health and social security programs. Economic and financial education provides an understanding of the value of these activities and increases attachment to community.

- Analysis at the municipality level makes it possible to design municipality specific interventions that could address local needs. The municipalities that may be targeted by CEO Project are not only those of the Guatemalan western highlands, but perhaps areas like Alta Verapaz and the border zone between Jutiapa and El Salvador, and between Zacapa and Honduras. Official data indicate these regions also show a significant number of migrants in relation to their population.

IX. NEXT STEPS FOR ANALYSIS

The analysis above presents robust relationships between migration and municipal income per capita and measures of wealth, which are within the scope of the USAID | CEO project. There are also relationships between migration and violence, health status, and strength of family migration network, which may call for interventions beyond the scope of the CEO Project.

Concerning other variables that are under the scope of other projects financed by USAID, there is little evidence of direct effects of drought, *per se*, and variables related with climate change. The data employed is limited and there are likely significant demographic characteristics and income distribution data at the municipal level that are important and that would allow more careful targeting of interventions.

It will very important to revisit the availability of update and official data at municipal level. Some of this data will be available later this year when the Government of Guatemala releases the final datasets of the national Census. In addition, we are constrained to one cross section of data for 2018. Additional years of data, both for the recent past, 2016 and 2017 and for this year, 2019, for the variables we have in hand may allow us to examine the dynamic relations between the determinants already identified and changes in migration over time. Particularly, how changes in conditions at the municipality level over time effect changes in migration patterns.

Finally, it will be relevant to evaluate at the end of the CEO Project if the interventions oriented to improve economic opportunities contributed to reduce migration to US. Our analysis is limited in terms of estimating the precise impact that the CEO Project could have in the reduction of the number of irregular migrants, however a more accurate understanding of the determinants of migrations will be the basis to define a counterfactual against which further measurements of migrations could be contrasted.

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XI. APPENDIX I: DATA DESCRIPTION

Description of the variables used for this report:

CATEGORY	LABEL	VARIABLE	METRICS	DESCRIPTION	YEARS	SOURCE
CONTROL	CEOAttended	CEO Attended	binary	Dummy: 1 = Attended, 0 = Not Attended	2019	CEO Project
SyntheticMIGRANTS	Returnees18	Returnees	people	Number of returnees documented by IOM	2018	International Organization for Migration
SyntheticMIGRANTS	Remittances18	Remittances	US dollars	Amount of Remittances registered by the Bank of Guatemala	2018	Bank of Guatemala
EconOppIncome	GDPperCapita17	GDP per capita	US dollars	GDP per capita, calculated as US dollars a year (PPP, 2012 numbers)	2017	FUNDESA
EconOppIncome	Poverty14	Poverty Rate	percentage	Share of population living under the National Poverty line	2014	National Institute for Statistics
EconOppIncome	LaborForce18	Labor Force	people	Number of working population in the age range from 15 to 64	2018	National Institute for Statistics
EconOppIncome	Graduates18	Graduates	percentage	Secondary Level Graduates as share of the Population in Secondary Level Age	2018	Ministry of Education
EconOppIncome	CellPhones18	Cell Phone Users	units	Number of active Cell Phone Users	2017	Superintendence of Telecomunications
EconOppWealth	DepositsAcc18	Deposits Accounts	units	Number of deposits accounts reported by the SIB	2018	Superintendence of Banks
EconOppWealth	DepositsAm18	Depostis Ammount	US dollars (thousands)	Amount of money reported as Deposits by the SIB	2018	Superintendence of Banks
EconOppWealth	SavingsAcc18	Savings Accounts	units	Number of savings accounts reported by the SIB	2018	Superintendence of Banks
EconOppWealth	SavingsAm18	Savings Ammount	US dollars (thousands)	Amount of money reported as Savings by the SIB	2018	Superintendence of Banks
EconOppWealth	QuantiHousing18	Housing Quantitative Deficit	percentage	Number of Households with Quantitative Deficit as share of Total Households	2018	National Institute for Statistics
EconOppWealth	QualiHousing18	Housing Qualitative Deficit	percentage	Number of Households with Qualitative Deficit as share of Total Households	2018	National Institute for Statistics
EconOppWealth	Electrific18	Electrification	percentage	Number of Households with Electificaton Connection as share of Total Households	2016	Ministry of Energy
HealthStatus	SSAffiliates17	Social Security Affiliates	people	Number of workers that contribute to Social Security	2017	Guatemalan Institute for Social Security

CATEGORY	LABEL	VARIABLE	METRICS	DESCRIPTION	YEARS	SOURCE
HealthStatus	ExpHealth18	Public Expenditure in Health	GT Quetzales	Amount of Money registered in the Nation´s Budget as Public Expenditure in Health	2018	Ministry of Finance
HealthStatus	ChronicMal15	Chronic Malnutrition	percentage	Share of children under 5 years old that not meet potential Height for the actual Age	2015	Ministry of Health
HealthStatus	Water14	Water Coverage	percentage	Number of Households with access to Water as share of Total Households	2014	National Institute for Statistics
HealthStatus	Sanitation14	Sanitation Coverage	percentage	Number of Households with access to Sanitation as share of Total Households	2014	National Institute for Statistics
Violence	Homicides18	Homicides	units	Number of homicides reported by the National Police Force	2018	National Police Force
Violence	Extortions18	Extortions	units	Number of extortions reported by the National Police Force	2018	National Police Force
Violence	InFamVioMale17	Intrafamiliar Violence Male	people	Number of intrafamiliar violence cases reported, Male victim	2017	National Institute for Statistics
Violence	InFamVioFem17	Intrafamiliar Violence Female	people	Number of intrafamiliar violence cases reported, Female victim	2017	National Institute for Statistics
CivilInvolvement	AgroConflicts17	Agro Conflicts	units	Number of conflicts registered that are related with Agricultural issues	2017	Agricultre Affairs Secretary
CivilInvolvement	Voters18	Voters	people	Number of people registered to vote	2018	Electoral Supreme Tribunal
Climate	PreciptAvg	Average Precipitation	milimeters	Precipitation accumulated during the year, average 2010 to 2018	2018	INSIVUMEH
Climate	Precipt18	Precipitation	milimeters	Precipitation accumulated during the year, 2018	2018	INSIVUMEH
Climate	TempAvg	Average Temperature	Celsius degrees	Average Temperature registered during the year, average 2010 to 2018	2018	INSIVUMEH
Climate	Temp18	Temperature	Celsius degrees	Average Temperature registered during the year, 2018	2018	INSIVUMEH
Climate	UrbanPop18	Urban Population	percentage	Share of total population living in urban areas	2018	National Institute for Statistics
Climate	PopDensity18	Population Density	habitants per km2	Number of Habitants per square kilometer of surface	2018	National Institute for Statistics

XII. APPENDIX 2: ANALYSIS

Regression Results. Note: in all tables the p-values are reported and if significant at the 10% level or less they are hi-lighted in yellow.

A. Group: ALL - Specification including selected variables from all groups, with migration proxy (note: not including fammig net)

1. EQ01_all_selected_best

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/08/19 Time: 12:08
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.663933	0.085412	7.773280	0.0000
ECOI_CELLPHONES17	9.78E-07	6.60E-07	1.482290	0.1392
ECOI_GDPPERCAPITA17	-5.48E-05	1.22E-05	-4.486158	0.0000
HS_EXPHEALTH18	-2.88E-10	5.43E-10	-0.531004	0.5958
VIOLENCE_PC1	0.343816	0.060426	5.689902	0.0000
CIVIC_PC1	0.437717	0.054853	7.979863	0.0000
DR_PRECIPDEV	-0.070210	0.076120	-0.922352	0.3570
POP_PC1	-0.085851	0.041668	-2.060346	0.0402

R-squared	0.656055	Mean dependent var	3.80E-16
Adjusted R-squared	0.648647	S.D. dependent var	1.260467
S.E. of regression	0.747143	Akaike info criterion	2.278609
Sum squared resid	181.4221	Schwarz criterion	2.370096
Log likelihood	-371.3884	Hannan-Quinn criter.	2.315090
Durbin-Watson stat	1.717455		

2. EQ01_all_selected_best_dept_dummies

DGC = Guatemala, DQUET = Quetzaltenango, DHUE = Huehuetenango, DQUET = Quetzaltenango, DQUI = Quiche, DSAN = San Marcos, DTOT = Totonicapan

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/13/19 Time: 16:59
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.033068	0.218746	0.151169	0.8799
DGC	-0.057687	0.290057	-0.198881	0.8425
DQUET	0.503664	0.165808	3.037639	0.0026
DHUE	0.738791	0.153626	4.809037	0.0000
DTOT	0.494112	0.276359	1.787933	0.0747
DSAN	0.919176	0.151014	6.086680	0.0000
DQUI	0.387515	0.186808	2.074403	0.0388
ECOI_CELLPHONES17	1.04E-06	6.81E-07	1.531355	0.1267
ECOI_GDPPERCAPITA17	-6.24E-05	5.09E-05	-1.227664	0.2205
HS_EXPHEALTH18	-2.85E-10	5.48E-10	-0.519852	0.6035
VIOLENCE_PC1	0.338772	0.060839	5.568323	0.0000
CIVIC_PC1	0.446273	0.055817	7.995314	0.0000
DR_PRECIPDEV	-0.055890	0.077885	-0.717589	0.4735
POP_PC1	-0.070006	0.049962	-1.401196	0.1621

R-squared	0.664468	Mean dependent var	3.80E-16
Adjusted R-squared	0.650794	S.D. dependent var	1.260467
S.E. of regression	0.744856	Akaike info criterion	2.289881
Sum squared resid	176.9846	Schwarz criterion	2.449983
Log likelihood	-367.2652	Hannan-Quinn criter.	2.353723
F-statistic	48.59451	Durbin-Watson stat	1.747456
Prob(F-statistic)	0.000000		

3. EQ01_all_selected_best_dept_dummies, no constant

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/16/19 Time: 10:34
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGC	-0.082797	0.237422	-0.348733	0.7275
DHUE	0.747487	0.142230	5.255463	0.0000
DQUET	0.506743	0.164300	3.084259	0.0022
DQUI	0.398673	0.171346	2.326712	0.0206
DSAN	0.923388	0.148195	6.230911	0.0000
DTOT	0.503959	0.268161	1.879313	0.0611
ECOI_CELLPHONES17	1.03E-06	6.72E-07	1.528036	0.1275
ECOI_GDPPERCAPITA17	-5.50E-05	1.33E-05	-4.134942	0.0000
HS_EXPHEALTH18	-2.87E-10	5.47E-10	-0.525354	0.5997
VIOLENCE_PC1	0.338325	0.060674	5.576074	0.0000
CIVIC_PC1	0.447676	0.054955	8.146238	0.0000
DR_PRECIPDEV	-0.055548	0.077733	-0.714596	0.4754
POP_PC1	-0.073914	0.042690	-1.731398	0.0843

R-squared	0.664444	Mean dependent var	3.80E-16
Adjusted R-squared	0.651860	S.D. dependent var	1.260467
S.E. of regression	0.743718	Akaike info criterion	2.283947
Sum squared resid	176.9972	Schwarz criterion	2.432613
Log likelihood	-367.2771	Hannan-Quinn criter.	2.343228
Durbin-Watson stat	1.750014		

4. EViews workfile: GUATMIG 7-13-2019 DEPTS EQ01_ALL_Selected_Best_best_fam_mig

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/21/19 Time: 12:48
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGC	0.481587	0.119968	4.014311	0.0001
DHUE	-0.368768	0.071107	-5.186062	0.0000
DQUET	-0.042801	0.073093	-0.585577	0.5586
DQUI	-0.334013	0.077599	-4.304344	0.0000
DSAN	-0.125308	0.072231	-1.734827	0.0837
DTOT	-0.184184	0.119472	-1.541647	0.1241
ECOI_CELLPHONES17	2.98E-06	3.95E-07	7.539123	0.0000
ECOI_GDPPERCAPITA17	-8.07E-05	5.47E-06	-14.75196	0.0000
ECOW_DEPOSITSAM18	-1.12E-07	3.99E-08	-2.820162	0.0051
VIOLENCE_PC1	0.100807	0.022392	4.501902	0.0000
CIVIC_PC1	0.209019	0.025012	8.356664	0.0000
DR_PC1	-0.031726	0.018417	-1.722650	0.0859
FAM_MIG_NET_MEDIAN	0.362733	0.010002	36.26732	0.0000

R-squared	0.934217	Mean dependent var	3.80E-16
Adjusted R-squared	0.931750	S.D. dependent var	1.260467
S.E. of regression	0.329293	Akaike info criterion	0.654517
Sum squared resid	34.69878	Schwarz criterion	0.803183
Log likelihood	-95.97709	Hannan-Quinn criter.	0.713799
Durbin-Watson stat	1.592981		

B. Group: ALL - Specification including selected variables from all groups, with Inter-American Dialogue migration estimate

1. EViews Woekfile GUATMIG 7-13-2019 DEPTS, EQ01_ceo_in_fam_mig_best (note: fam_mig_net = (mig_returnees18 – median_returnees)/median_returnees).

Dependent Variable: MO_MIGRANT18
Method: Least Squares
Date: 07/21/19 Time: 11:49
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4685.992	538.9269	8.695042	0.0000
CEOINCLUDED	-321.7301	308.2566	-1.043709	0.2974
ECOI_GDPPERCAPITA17	-0.599844	0.114423	-5.242326	0.0000
ECOI_CELLPHONES17	0.027511	0.002946	9.337299	0.0000
ECOW1	-627.7010	219.2285	-2.863227	0.0045
VIOLENCE_PC1	1247.066	177.1728	7.038700	0.0000
CIV_AGROCONFLICTS17	17.16720	10.63909	1.613597	0.1076
DR_PC1	193.1587	126.0024	1.532977	0.1263
HSTAT1	3172.938	192.8719	16.45101	0.0000
FAM_MIG_NET_MEDIAN	520.0116	70.14414	7.413472	0.0000

R-squared	0.927345	Mean dependent var	3294.682
Adjusted R-squared	0.925320	S.D. dependent var	8636.877
S.E. of regression	2360.248	Akaike info criterion	18.40049
Sum squared resid	1.80E+09	Schwarz criterion	18.51485
Log likelihood	-3053.682	Hannan-Quinn criter.	18.44609
F-statistic	458.0733	Durbin-Watson stat	1.615622
Prob(F-statistic)	0.000000		

2. EViews workfile GUATMIG 7-13-2019 DEPTS_Orozco EQ01_MO_CEO_NOT_Best

Dependent Variable: MO_MIGRANT18
Method: Least Squares
Date: 07/21/19 Time: 11:34
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4587.653	530.6997	8.644536	0.0000
ECOI_GDPPERCAPITA17	-0.599431	0.114438	-5.238031	0.0000
ECOI_CELLPHONES17	0.027417	0.002945	9.308367	0.0000
ECOW1	-669.9822	215.4828	-3.109215	0.0020
VIOLENCE_PC1	1302.859	168.9394	7.711987	0.0000
CIV_AGROCONFLICTS17	17.81329	10.62253	1.676935	0.0945
DR_PC1	191.9197	126.0141	1.523001	0.1287
HSTAT1	3180.555	192.7603	16.50005	0.0000
FAM_MIG_NET_MEDIAN	488.8431	63.47831	7.700946	0.0000

R-squared	0.927100	Mean dependent var	3294.682
Adjusted R-squared	0.925300	S.D. dependent var	8636.877
S.E. of regression	2360.573	Akaike info criterion	18.39785
Sum squared resid	1.81E+09	Schwarz criterion	18.50077
Log likelihood	-3054.242	Hannan-Quinn criter.	18.43889
F-statistic	515.0543	Durbin-Watson stat	1.609389
Prob(F-statistic)	0.000000		

3. EViews Workfile GUATMIG 7-13-2019 DEPTS EQ01_MO_DEPT_FAM_MIG

Dependent Variable: MO_MIGRANT18
Method: Least Squares
Date: 07/21/19 Time: 12:52
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGC	-6568.036	1098.273	-5.980331	0.0000
DHUE	-555.9472	650.9708	-0.854028	0.3937
DQUET	500.1669	669.1443	0.747472	0.4553
DQUI	1117.134	710.4003	1.572541	0.1168
DSAN	-803.6535	661.2531	-1.215349	0.2251
DTOT	2693.814	1093.736	2.462948	0.0143
ECOI_CELLPHONES17	0.010412	0.003616	2.878967	0.0043
ECOI_GDPPERCAPITA17	0.552231	0.050057	11.03212	0.0000
ECOW_DEPOSITSAM18	0.001277	0.000365	3.500139	0.0005
VIOLENCE_PC1	2233.146	204.9934	10.89374	0.0000
CIVIC_PC1	628.6813	228.9810	2.745561	0.0064
DR_PC1	294.8578	168.6019	1.748841	0.0813
FAM_MIG_NET_MEDIAN	689.9515	91.56242	7.535313	0.0000

R-squared	0.882576	Mean dependent var	3294.682
Adjusted R-squared	0.878173	S.D. dependent var	8636.877
S.E. of regression	3014.590	Akaike info criterion	18.89857
Sum squared resid	2.91E+09	Schwarz criterion	19.04724
Log likelihood	-3133.612	Hannan-Quinn criter.	18.95785
Durbin-Watson stat	1.616759		

C. Regression Results, CEO Departments only

1. Eviews workfile Guat CEO Depts Only, Eqo1_ceo_depts_best

Dependent Variable: MIG_PC1
Method: Least Squares
Date: 07/20/19 Time: 12:32
Sample: 1 133
Included observations: 131

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.762312	0.227362	3.352861	0.0011
ECOI_CELLPHONES17	-1.29E-06	5.00E-07	-2.583343	0.0110
ECOI_GDPPERCAPITA17	-0.000165	4.88E-05	-3.379892	0.0010
HS_EXPHEALTH18	4.44E-09	2.16E-09	2.059003	0.0416
VIOLENCE_PC1	0.667357	0.115581	5.773933	0.0000
CIV_PC1	0.360782	0.085533	4.218027	0.0000
DR_PRECIP_DEV	0.129033	0.117875	1.094664	0.2758
POP_PC1	0.062705	0.087275	0.718472	0.4738

R-squared	0.700819	Mean dependent var	6.27E-17
Adjusted R-squared	0.683793	S.D. dependent var	1.258679
S.E. of regression	0.707784	Akaike info criterion	2.205769
Sum squared resid	61.61787	Schwarz criterion	2.381354
Log likelihood	-136.4779	Hannan-Quinn criter.	2.277117
F-statistic	41.16040	Durbin-Watson stat	1.713836
Prob(F-statistic)	0.000000		

2. EViews workfile GUAT_ceo_depts_only EQ01_CEO_DEPTS_no_health

Dependent Variable: MIG_PC1
Method: Least Squares
Date: 07/20/19 Time: 12:52
Sample: 1 133
Included observations: 131

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.828230	0.228018	3.632303	0.0004
ECOI_CELLPHONES17	-3.19E-07	1.66E-07	-1.918242	0.0574
ECOI_GDPPERCAPITA17	-0.000179	4.89E-05	-3.666939	0.0004
VIOLENCE_PC1	0.649616	0.116755	5.563913	0.0000
CIV_PC1	0.362284	0.086640	4.181466	0.0001
DR_PRECIP_DEV	0.111546	0.119094	0.936620	0.3508
POP_PC1	0.042019	0.087820	0.478469	0.6332

R-squared	0.690507	Mean dependent var	6.27E-17
Adjusted R-squared	0.675532	S.D. dependent var	1.258679
S.E. of regression	0.716970	Akaike info criterion	2.224389
Sum squared resid	63.74168	Schwarz criterion	2.378025
Log likelihood	-138.6975	Hannan-Quinn criter.	2.286818
F-statistic	46.10928	Durbin-Watson stat	1.698344
Prob(F-statistic)	0.000000		

3. EViews Workfile GUAT_CEO_DEPTS_ONLY eqn01_CEO_DEPTS_FAM_MIG_REMIT

Dependent Variable: MIG_PC1
Method: Least Squares
Date: 07/24/19 Time: 13:47
Sample: 1 133
Included observations: 131

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.246215	0.146163	-1.684522	0.0946
ECOI_CELLPHONES17	-7.22E-07	3.01E-07	-2.403936	0.0177
ECOI_GDPPERCAPITA17	-5.17E-05	3.01E-05	-1.718338	0.0882
HS_EXPHEALTH18	5.53E-09	1.29E-09	4.272362	0.0000
VIOLENCE_PC1	-0.320099	0.094600	-3.383729	0.0010
POP_PC1	-0.124903	0.052254	-2.390311	0.0183
FAM_MIG_NET_REMIT_MEDIAN	0.761596	0.045653	16.68216	0.0000

R-squared	0.891552	Mean dependent var	6.27E-17
Adjusted R-squared	0.886305	S.D. dependent var	1.258679
S.E. of regression	0.424410	Akaike info criterion	1.175721
Sum squared resid	22.33535	Schwarz criterion	1.329357
Log likelihood	-70.00971	Hannan-Quinn criter.	1.238150
F-statistic	169.9017	Durbin-Watson stat	1.481121
Prob(F-statistic)	0.000000		

D. Regression Results by individual Department (when possible)

CEO Department 1, DGUA = Guatemala

Dependent Variable: MO_MIGRANT18
Method: Least Squares
Date: 07/24/19 Time: 13:59
Sample: 1 133
Included observations: 130

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECOI_CELLPHONES17	0.015014	0.002738	5.483796	0.0000
ECOI_GDPPERCAPITA17	0.503609	0.089540	5.624381	0.0000
HS_EXPHEALTH18	-2.33E-05	1.16E-05	-2.005842	0.0470
VIOLENCE_PC1	-1221.522	700.7993	-1.743042	0.0838
POP_PC1	-722.9837	395.1269	-1.829751	0.0697
FAM_MIG_NET_REMIT_MEDIAN	1960.771	372.7834	5.259814	0.0000

R-squared	0.919763	Mean dependent var	4529.567
Adjusted R-squared	0.916528	S.D. dependent var	13384.65
S.E. of regression	3867.037	Akaike info criterion	19.40342
Sum squared resid	1.85E+09	Schwarz criterion	19.53577
Log likelihood	-1255.222	Hannan-Quinn criter.	19.45720
Durbin-Watson stat	1.411273		

EQ01DEPT_GUATC_C
Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/18/19 Time: 13:57
Sample: 1 17
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.305176	0.703426	3.277068	0.0096
ECOI_CELLPHONES17	1.17E-07	4.40E-07	0.266935	0.7955
ECOI_GDPPERCAPITA17	-0.000334	8.47E-05	-3.949970	0.0034
HS_EXPHEALTH18	-4.36E-10	4.13E-10	-1.055480	0.3187
VIOLENCE_PC1	0.261751	0.062670	4.176656	0.0024
CIVIC_PC1	0.731299	0.151595	4.824049	0.0009
DR_PRECIPDEV	-0.402999	0.245979	-1.638348	0.1358
POP_PC1	0.201915	0.048839	4.134315	0.0025

R-squared	0.997601	Mean dependent var	1.009777
Adjusted R-squared	0.995735	S.D. dependent var	3.368877
S.E. of regression	0.220013	Akaike info criterion	0.114923
Sum squared resid	0.435650	Schwarz criterion	0.507024
Log likelihood	7.023152	Hannan-Quinn criter.	0.153899
F-statistic	534.6310	Durbin-Watson stat	2.018703
Prob(F-statistic)	0.000000		

CEO Department 2, DHUE = Huehuetenango

1 EQ01_DEPT_HUE_C
Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/18/19 Time: 14:03
Sample (adjusted): 197 228
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.825880	1.833868	-0.450349	0.6565
ECOI_CELLPHONES17	-3.97E-05	5.11E-05	-0.777828	0.4443
ECOI_GDPPERCAPITA17	0.000147	0.000483	0.305236	0.7628
HS_EXPHEALTH18	7.66E-08	5.39E-08	1.419906	0.1685
VIOLENCE_PC1	-0.622433	1.158967	-0.537059	0.5962
CIVIC_PC1	0.199581	0.115377	1.729807	0.0965
DR_PRECIPDEV	-0.366495	0.683787	-0.535979	0.5969
POP_PC1	-0.350179	0.497504	-0.703872	0.4883

R-squared	0.547418	Mean dependent var	0.529986
Adjusted R-squared	0.415415	S.D. dependent var	1.052817
S.E. of regression	0.804965	Akaike info criterion	2.616281
Sum squared resid	15.55123	Schwarz criterion	2.982715
Log likelihood	-33.86050	Hannan-Quinn criter.	2.737744
F-statistic	4.147008	Durbin-Watson stat	1.877509
Prob(F-statistic)	0.004042		

CEO Department 3, DQUET = Quetzaltenango

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/18/19 Time: 14:07
Sample: 113 136
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.091366	0.875498	1.246566	0.2305
ECOI_CELLPHONES17	-2.15E-05	1.45E-05	-1.482887	0.1575
ECOI_GDPPERCAPITA17	-0.000121	0.000184	-0.658532	0.5196
HS_EXPHEALTH18	2.08E-08	3.22E-08	0.647358	0.5266
VIOLENCE_PC1	1.966603	0.609020	3.229127	0.0052
CIVIC_PC1	-0.020155	0.194160	-0.103806	0.9186
DR_PRECIPDEV	0.220160	0.210284	1.046961	0.3107
POP_PC1	0.012013	0.139910	0.085860	0.9326

R-squared	0.830139	Mean dependent var	0.073690
Adjusted R-squared	0.755825	S.D. dependent var	0.968344
S.E. of regression	0.478499	Akaike info criterion	1.624875
Sum squared resid	3.663375	Schwarz criterion	2.017559
Log likelihood	-11.49850	Hannan-Quinn criter.	1.729054
F-statistic	11.17066	Durbin-Watson stat	2.650656
Prob(F-statistic)	0.000041		

CEO Department 4, DSAN = San Marcos

EQ01_DEPT_SAN_C
Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/18/19 Time: 14:13
Sample (adjusted): 167 195
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.228971	1.445328	2.925960	0.0081
ECOI_CELLPHONES17	-3.60E-05	3.63E-05	-0.993424	0.3318
ECOI_GDPPERCAPITA17	-0.000832	0.000402	-2.068266	0.0512
HS_EXPHEALTH18	5.60E-08	1.54E-08	3.632144	0.0016
VIOLENCE_PC1	-0.394291	0.580658	-0.679041	0.5045
CIVIC_PC1	4.885778	1.137369	4.295683	0.0003
DR_PRECIPDEV	0.082673	0.201257	0.410782	0.6854
POP_PC1	-0.190297	0.310400	-0.613071	0.5464

R-squared	0.831590	Mean dependent var	0.513787
Adjusted R-squared	0.775453	S.D. dependent var	1.348730
S.E. of regression	0.639114	Akaike info criterion	2.171483
Sum squared resid	8.577799	Schwarz criterion	2.548668
Log likelihood	-23.48650	Hannan-Quinn criter.	2.289612
F-statistic	14.81366	Durbin-Watson stat	2.312493
Prob(F-statistic)	0.000001		

CEO Department 5, DQUI = Quiche

Nothing significant

CEO Department 6, DTOT = Totonicapan

Not enough observations: not enough municipalities in the department to estimate equation

E. Regression Results by Push Factor Groups

Group 2 determinants: Migration as a function of economic opportunity as measured by income and wealth related variables

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_ecoi_notg_selective
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.513703	0.114515	4.485913	0.0000
ECOI_CELLPHONES17	7.62E-06	5.44E-07	14.00464	0.0000
ECOI_GDPPERCAPITA17	-0.000126	2.54E-05	-4.949779	0.0000
ECOI_POVERTY14	0.248293	0.173720	1.429272	0.1539

R-squared	0.416718	Mean dependent var	3.80E-16
Adjusted R-squared	0.411399	S.D. dependent var	1.260467
S.E. of regression	0.967035	Akaike info criterion	2.782775
Sum squared resid	307.6664	Schwarz criterion	2.828518
Log likelihood	-459.3320	Hannan-Quinn criter.	2.801015
Durbin-Watson stat	1.658460		

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_ecow_all
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.517364	0.068240	7.581492	0.0000
ECOW_DEPOSITSACC18	-0.000122	1.57E-05	-7.767196	0.0000
ECOW_DEPOSITSAM18	4.24E-07	4.14E-07	1.023382	0.3069
ECOW_ELECTRIFIC16	-1.066749	0.079587	-13.40353	0.0000
ECOW_QUALIHOUSING18	-0.261397	0.138938	-1.881385	0.0608
ECOW_QUANTIHOUSING18	-0.358714	0.237701	-1.509101	0.1322
ECOW_SAVINGSACC18	0.000106	6.95E-06	15.29660	0.0000
ECOW_SAVINGSAM18	-3.30E-06	1.06E-06	-3.120439	0.0020

R-squared	0.824693	Mean dependent var	3.80E-16
Adjusted R-squared	0.820917	S.D. dependent var	1.260467
S.E. of regression	0.533407	Akaike info criterion	1.604665
Sum squared resid	92.46985	Schwarz criterion	1.696152
Log likelihood	-259.1768	Hannan-Quinn criter.	1.641146
Durbin-Watson stat	1.470974		

Group 3 determinants: Migration as determined by Health Status variables

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_health_status
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.559447	0.122069	4.583057	0.0000
HS_CHRONICMAL15	0.490374	0.294878	1.662972	0.0973
HS_SSAFFILIATES17	2.56E-05	1.65E-06	15.51101	0.0000
HS_WATER14	-0.700325	0.180920	-3.870907	0.0001

R-squared	0.444653	Mean dependent var	3.80E-16
Adjusted R-squared	0.439589	S.D. dependent var	1.260467
S.E. of regression	0.943593	Akaike info criterion	2.733696
Sum squared resid	292.9311	Schwarz criterion	2.779440
Log likelihood	-451.1604	Hannan-Quinn criter.	2.751937
Durbin-Watson stat	1.642686		

Group 4 determinants: Migration as a function of Violence variables

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_violence_notfamily
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.246099	0.088050	2.795002	0.0055
V_EXTORTIONS18	0.004015	0.001208	3.322276	0.0010
V_HOMICIDES18	0.009218	0.003478	2.650224	0.0084

R-squared	0.452074	Mean dependent var	3.80E-16
Adjusted R-squared	0.448753	S.D. dependent var	1.260467
S.E. of regression	0.935847	Akaike info criterion	2.714238
Sum squared resid	289.0170	Schwarz criterion	2.748546
Log likelihood	-448.9206	Hannan-Quinn criter.	2.727918
Durbin-Watson stat	1.366901		

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_violence_all
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.280977	0.090096	3.118644	0.0020
V_EXTORTIONS18	0.003979	0.001249	3.186393	0.0016
V_HOMICIDES18	0.011542	0.003685	3.132060	0.0019
V_INFAMVIOFEM17	-0.002184	0.001042	-2.097308	0.0367
V_INFAMVIOMALE17	0.010604	0.004666	2.272701	0.0237

R-squared	0.460731	Mean dependent var	3.80E-16
Adjusted R-squared	0.454154	S.D. dependent var	1.260467
S.E. of regression	0.931251	Akaike info criterion	2.710325
Sum squared resid	284.4508	Schwarz criterion	2.767504
Log likelihood	-446.2691	Hannan-Quinn criter.	2.733125
Durbin-Watson stat	1.413035		

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_violence_pc1
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.523967	0.082218	6.372879	0.0000
VIOLENCE_PC1	0.486406	0.026071	18.65715	0.0000

R-squared	0.524100	Mean dependent var	3.80E-16
Adjusted R-squared	0.522662	S.D. dependent var	1.260467
S.E. of regression	0.870853	Akaike info criterion	2.567300
Sum squared resid	251.0252	Schwarz criterion	2.590171
Log likelihood	-425.4554	Hannan-Quinn criter.	2.576420
Durbin-Watson stat	1.460903		

Group 5 determinants: Measures of Civic Engagement

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_civic_engage
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	-0.021552	0.088489	-0.243560	0.8077
CIV_AGROCONFLICTS17	0.010534	0.003861	2.728354	0.0067
CIV_VOTERS18	1.63E-05	1.00E-06	16.24460	0.0000

R-squared	0.481581	Mean dependent var	3.80E-16
Adjusted R-squared	0.478439	S.D. dependent var	1.260467
S.E. of regression	0.910299	Akaike info criterion	2.658882
Sum squared resid	273.4529	Schwarz criterion	2.693190
Log likelihood	-439.7038	Hannan-Quinn criter.	2.672562
Durbin-Watson stat	1.112917		

Group 6 determinants: Migration as a function of Drought variables

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Eq01_climate
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.437461	0.123785	3.534042	0.0005
DR_PRECIPDEV	-0.334758	0.109997	-3.043341	0.0025
DR_TEMPDEV	-0.176185	0.465810	-0.378234	0.7055

R-squared	0.050958	Mean dependent var	3.80E-16
Adjusted R-squared	0.045206	S.D. dependent var	1.260467
S.E. of regression	1.231647	Akaike info criterion	3.263551
Sum squared resid	500.5953	Schwarz criterion	3.297858
Log likelihood	-540.3812	Hannan-Quinn criter.	3.277231
Durbin-Watson stat	1.465733		

Group 7 determinants: Migration as a function of Population Characteristics

Dependent Variable: MIGRATION_PC1
Method: Least Squares
Date: 07/16/19 Time: 10:18
Sample: 1 340
Included observations: 333

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEOINCL_NOT_G	0.450781	0.125526	3.591128	0.0004
POP_URBANPOP18	-0.835844	0.200904	-4.160419	0.0000
ECOI_GRADUATES18	2.752778	0.626486	4.393995	0.0000

R-squared	0.084269	Mean dependent var	3.80E-16
Adjusted R-squared	0.078719	S.D. dependent var	1.260467
S.E. of regression	1.209839	Akaike info criterion	3.227820
Sum squared resid	483.0246	Schwarz criterion	3.262128
Log likelihood	-534.4321	Hannan-Quinn criter.	3.241501
Durbin-Watson stat	1.495625		

F. Principal Components Analysis

Table 1, Group 1: Migration

Principal Components Analysis
Date: 06/29/19 Time: 12:33
Sample: 1 340
Included observations: 333
Balanced sample (listwise missing value deletion)
Computed using: Ordinary correlations
Extracting 2 of 2 possible components

Eigenvalues: (Sum = 2, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.584007	1.168014	0.7920	1.584007	0.7920
2	0.415993	---	0.2080	2.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2
MIG_REMITTANCES18	0.707107	-0.707107
MIG_RETURNEES18	0.707107	0.707107

Ordinary correlations:

	MIG_REMITTANCES18	MIG_RETURNEES18
MIG_REMITTANCES18	1.000000	
MIG_RETURNEES18	0.584007	1.000000

Table 2a, Group 2a: Economic Opportunity Income

Principal Components Analysis
Date: 06/29/19 Time: 09:26
Sample: 1 340
Included observations: 333
Balanced sample (listwise missing value deletion)
Computed using: Ordinary correlations
Extracting 5 of 5 possible components

Eigenvalues: (Sum = 5, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	2.996907	1.937207	0.5994	2.996907	0.5994
2	1.059700	0.537170	0.2119	4.056607	0.8113
3	0.522530	0.192974	0.1045	4.579137	0.9158
4	0.329556	0.238249	0.0659	4.908693	0.9817
5	0.091307	---	0.0183	5.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5
ECOI_CELLPHONES17	0.486904	0.472376	0.016098	-0.123744	0.724026
ECOI_GDPPERCAPITA17	0.484366	-0.157635	-0.382058	0.766564	-0.083380
ECOI_GRADUATES18	0.382276	-0.467391	0.793634	0.062335	0.040869
ECOI_LABORFORCE18	0.472509	0.501234	0.119307	-0.210360	-0.683385
ECOI_POVERTY14	-0.398641	0.531340	0.457912	0.590704	0.012198

Ordinary correlations:

	ECOI_CELLPHONES17	ECOI_GDPPERCAPITA17	ECOI_GRADUATES18	ECOI_LABORFORCE18	ECOI_POVERTY14
ECOI_CELLPHONES17	1.000000				
ECOI_GDPPERCAPITA17	0.587895	1.000000			
ECOI_GRADUATES18	0.330689	0.489985	1.000000		
ECOI_LABORFORCE18	0.904798	0.530408	0.335674	1.000000	
ECOI_POVERTY14	-0.335153	-0.609707	-0.517795	-0.295441	1.000000

Table 2b, Group 2b: Economic Opportunity Wealth

Principal Components Analysis
Date: 06/29/19 Time: 09:32
Sample: 1 340
Included observations: 333
Balanced sample (listwise missing value deletion)
Computed using: Ordinary correlations
Extracting 7 of 7 possible components

Eigenvalues: (Sum = 7, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	4.099008	2.816143	0.5856	4.099008	0.5856
2	1.282865	0.305581	0.1833	5.381873	0.7688
3	0.977284	0.352214	0.1396	6.359157	0.9085
4	0.625071	0.612078	0.0893	6.984228	0.9977
5	0.012992	0.010899	0.0019	6.997220	0.9996
6	0.002093	0.001407	0.0003	6.999314	0.9999
7	0.000686	---	0.0001	7.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7
ECOW_DEPOSITSACC18	0.491228	0.082572	-0.010870	0.037622	-0.096536	0.603401	-0.613947
ECOW_SAVINGSACC18	0.489461	0.090316	-0.013085	0.027956	0.716494	0.167847	0.458020
ECOW_QUANTIHOUSING18	0.073498	-0.174760	0.976954	-0.097306	-0.006717	-0.009504	0.003757
ECOW_QUALIHOUSING18	-0.171118	0.628136	0.198388	0.732458	0.014751	0.007612	-0.005899
ECOW_ELECTRIFIC16	0.065072	-0.738482	-0.070339	0.667118	0.017314	0.010466	0.002433
ECOW_DEPOSITSAM18	0.489183	0.087708	-0.021494	0.062846	-0.686863	0.010776	0.526022
ECOW_SAVINGSAM18	0.490821	0.082946	-0.022453	0.053319	0.070531	-0.779333	-0.369503

Ordinary correlations:

	ECOW_DEPOSITSACC18	ECOW_SAVINGSACC18	ECOW_QUANTIHOUSING18	ECOW_QUALIHOUSING18	ECOW_ELECTRIFIC16	ECOW_DEPOSITSAM18	ECOW_SAVINGSAM18
ECOW_DEPOSITSACC18	1.000000						
ECOW_SAVINGSACC18	0.995036	1.000000					
ECOW_QUANTIHOUSING18	0.116807	0.112953	1.000000				
ECOW_QUALIHOUSING18	-0.262905	-0.260137	-0.047515	1.000000			
ECOW_ELECTRIFIC16	0.069225	0.057714	0.077432	-0.348924	1.000000		
ECOW_DEPOSITSAM18	0.996643	0.986759	0.103429	-0.247971	0.074919	1.000000	
ECOW_SAVINGSAM18	0.997654	0.995833	0.104601	-0.257369	0.076112	0.995296	1.000000

Table 3, Group 3: Health Status

Principal Components Analysis
Date: 06/29/19 Time: 08:14
Sample: 1 340
Included observations: 333
Balanced sample (listwise missing value deletion)
Computed using: Ordinary correlations
Extracting 5 of 5 possible components

Eigenvalues: (Sum = 5, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	2.128836	0.776935	0.4258	2.128836	0.4258
2	1.351901	0.250986	0.2704	3.480737	0.6961
3	1.100915	0.692641	0.2202	4.581652	0.9163
4	0.408274	0.398200	0.0817	4.989926	0.9980
5	0.010074	---	0.0020	5.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5
HS_CHRONICMAL15	-0.209304	-0.151014	0.845330	0.467449	0.017186
HS_EXPHEALTH18	0.638864	-0.278567	0.137872	-0.027411	-0.703202
HS_SANITATION14	0.317127	0.649429	-0.174334	0.668144	-0.029378
HS_SSAFFILIATES17	0.649305	-0.251319	0.104438	-0.005432	0.710144
HS_WATER14	0.160865	0.643954	0.474457	-0.578181	0.006611

Ordinary correlations:

	HS_CHRONICMAL15	HS_EXPHEALTH18	HS_SANITATION14	HS_SSAFFILIATES17	HS_WATER14
HS_CHRONICMAL15	1.000000				
HS_EXPHEALTH18	-0.104834	1.000000			
HS_SANITATION14	-0.308621	0.153002	1.000000		
HS_SSAFFILIATES17	-0.141726	0.988606	0.195969	1.000000	
HS_WATER14	0.128059	0.054712	0.425187	0.059451	1.000000

Table 4, Group 4: Violence

Principal Components Analysis
Date: 06/29/19 Time: 09:39
Sample: 1 340
Included observations: 338
Balanced sample (listwise missing value deletion)
Computed using: Ordinary correlations
Extracting 4 of 4 possible components

Eigenvalues: (Sum = 4, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	3.357967	2.849442	0.8395	3.357967	0.8395
2	0.508524	0.437830	0.1271	3.866491	0.9666
3	0.070694	0.007880	0.0177	3.937186	0.9843
4	0.062814	---	0.0157	4.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4
V_EXTORTIONS18	0.508479	-0.425874	0.745851	-0.061539
V_HOMICIDES18	0.497454	-0.516439	-0.605538	0.345186
V_INFAMVIOFEM17	0.522311	0.290966	-0.252708	-0.760702
V_INFAMVIOMALE17	0.470297	0.683564	0.114758	0.546252

Ordinary correlations:

	V_EXTORTIONS18	V_HOMICIDES18	V_INFAMVIOFEM17	V_INFAMVIOMALE17
V_EXTORTIONS18	1.000000			
V_HOMICIDES18	0.927962	1.000000		
V_INFAMVIOFEM17	0.818425	0.790397	1.000000	
V_INFAMVIOMALE17	0.658913	0.613013	0.897847	1.000000

Table 5, Group 5: Civic Engagement (strength of Civil Society, Social Capital)

Principal Components Analysis
Date: 06/29/19 Time: 08:41
Sample: 1 340
Included observations: 340
Computed using: Ordinary correlations
Extracting 2 of 2 possible components

Eigenvalues: (Sum = 2, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.061377	0.122754	0.5307	1.061377	0.5307
2	0.938623	---	0.4693	2.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2
CIV_AGROCONFLICTS17	0.707107	-0.707107
CIV_VOTERS18	0.707107	0.707107

Ordinary correlations:

	CIV_AGROCONFLICTS17	CIV_VOTERS18
CIV_AGROCONFLICTS17	1.000000	
CIV_VOTERS18	0.061377	1.000000

Table 6, Group 6: Drought

Principal Components Analysis
Date: 06/29/19 Time: 10:16
Sample: 1 340
Included observations: 340
Computed using: Ordinary correlations
Extracting 2 of 2 possible components

Eigenvalues: (Sum = 2, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.114244	0.228488	0.5571	1.114244	0.5571
2	0.885756	---	0.4429	2.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2
DR_PRECIPDEV	0.707107	-0.707107
DR_TEMPDEV	0.707107	0.707107

Ordinary correlations:

	DR_PRECIPDEV	DR_TEMPDEV
DR_PRECIPDEV	1.000000	
DR_TEMPDEV	0.114244	1.000000

Table 7, Group 7: Population Characteristics

Date: 06/29/19 Time: 10:06
Sample: 1 340
Included observations: 333
Balanced sample (listwise missing value deletion)
Computed using: Ordinary correlations
Extracting 2 of 2 possible components

Eigenvalues: (Sum = 2, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.393832	0.787665	0.6969	1.393832	0.6969
2	0.606168	---	0.3031	2.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2
POP_POPDENSITY18	0.707107	-0.707107
POP_URBANPOP18	0.707107	0.707107

Ordinary correlations:

	POP_POPDENSITY18	POP_URBANPOP18
POP_POPDENSITY18	1.000000	
POP_URBANPOP18	0.393832	1.000000