



GUATEMALA

SELECTED ISSUES PAPER

June 2018

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GUATEMALA

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SELECTED ISSUES

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Prepared by Michal Andrle, Yara Esquivel, Valentina Flamini, Carlos Janada, Esther Perez, Jasmin Sin, Iulia Ruxandra Teodoru, Victoria Valente, Cristhian Vera, Roany Toc Bac; with editorial support from Carolina Friend and Javier Ochoa.

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REMITTANCES AND HOUSEHOLDS' BEHAVIOR: THE CASE OF GUATEMALA

Remittance-receiving households invest in human capital relatively more than non-receivers, and their members are relatively more elastic to wages. We take this as indirect evidence that low education and employment outcomes primarily reflect low investment returns from education, likely due to inadequate labor market policies.

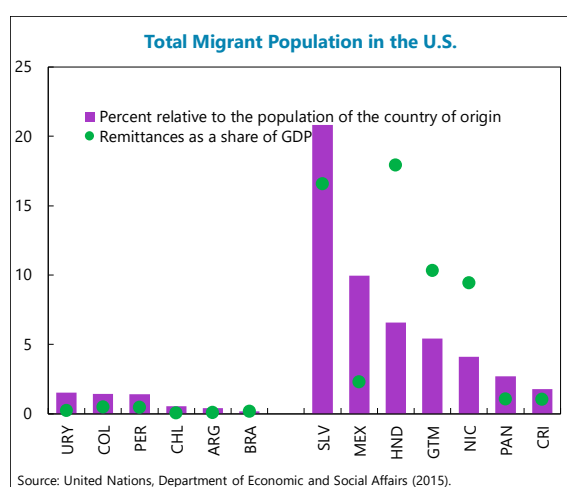
A. Introduction¹

1. Remittances are a structural feature of the Guatemala economy (Table 1). In 2017, remittance flows accounted for over 11 percent of GDP and benefitted over 1½ million of Guatemalan households (over 6 million of Guatemalans). Both remittances and the emigration rate have been on an upward trend over the past decade and are presently high in regional comparison. Dependence on remittances is highest in the regions of San Marcos, Huehuetenango, and Quetzaltenango.

2. The large size and persistent nature of remittances raises the question of their role in Guatemala's development.

To date, most of the empirical evidence for Guatemala (Castaneda and Catalan, 2007, Moran and Perez, 2013, Castillo and Rojas, 2014 and 2015) has highlighted the role of remittances as a major source of foreign exchange earnings and examined the conduct of monetary and FX policies in the face of strong remittances. However, the evidence on the contribution of remittances to growth in Guatemala is scant. To fill this gap, this paper explores whether remittances alter households' spending patterns and labor decisions, with a strong focus on consumption goods, education, and labor supply decisions.

3. This paper takes a microeconomic approach and explores the compensatory nature of remittances. Are remittances intended to be used in ways that directly promote economic growth or are they simply compensatory in nature? Specifically (i) do remittance-receiving households spend more (less) at the margin on food, consumer durable goods—proxies for consumption—and education—proxy for human capital—relative to non-receiving households; (ii) do remittances affect households' labor supply decisions?



¹ Prepared by Esther Perez and Victoria Valente.

Table 1. Guatemala: Immigrants and Remittances

No.	Indicator	2010	2011	2012	2013	2014	2015	2016	2017
(1)	Total population 1/	14,376,054	14,713,763	15,073,375	15,438,384	15,806,675	16,176,133	16,545,589	16,923,483
(2)	Population residing abroad 2/	1,637,119	1,808,143	1,881,374	1,954,604	2,027,834	2,101,065	2,301,175	2,374,405
(3) = (2) / (1)	Emigration rate (percent)	11.4	12.3	12.5	12.7	12.8	13.0	13.9	14.0
(4)	Remittances (USD, thousands) 3/	4,126,784.1	4,378,032.0	4,782,728.7	5,105,189.0	5,544,097.6	6,284,977.8	7,159,967.6	8,192,213.1
(5) = (4) / (2)	Remittance flow per immigrant (USD)	2,520.8	2,421.3	2,542.1	2,611.9	2,734.0	2,991.3	3,111.4	3,450.2
	Annual average growth	2.5%	-3.9%	5.0%	2.7%	4.7%	9.4%	4.0%	10.9%

Source: Banguat

1/ Guatemala's Instituto Nacional de Estadística (U.N. International Organization for Migration for 2016 and 2017); and Banguat's calculations.

2/ U.N. International Organization for Migration; and Banguat's calculations.

3/ FX market data, Banguat.

4. The rest of the paper is organized as follows. Section B describes the data used in the analysis. Section C analyzes expenditure patterns of remittance-receiving and non-receiving households. Section D discusses labor supply patterns for the two groups of households. Section E discusses policy implications.

B. Data

5. Households microdata are taken from the 2014 Nation Household Survey of Living Conditions (ENCOVI by its acronym in Spanish). The survey includes 11,498 urban and rural households, of which 10,389 receive international remittances and 1,109 receive no remittances. Two remittance-related questions are asked: (i) does your household receive remittances from people living abroad; and (ii) how much remittances did your household receive in the past 12 months?² For each of the households surveyed, ENCOVI provides detailed information on households' socio-economic characteristics and on six major categories of expenditures.

- Remittances represent almost 50 percent of income for remittance-recipient households (Table 2). The two household types differ in various socioeconomic, locational and human capital characteristics. For example, remittance-receiving households present a rural and non-indigenous bias, and they have a higher proportion of members with secondary education. These households' characteristics are expected to influence households' spending behavior alongside different levels of income hence they are included in the empirical model used in the analysis (below).
- On average, each of the two groups of households spends almost $\frac{3}{4}$ of their budgets on consumption items, food and durable consumer goods (Table 3). Within consumption, expenditure is biased towards durables (food) for remittance-receiving (non-receiving)

² The focus of the survey and throughout this study is on the receipt of remittances by the household rather than on migration or the type of person sending remittances. Also, all remittances in this study are cash flows, that is, in-kind remittances are not included.

households. In addition, remittance-receiving households tend to spend relatively more on health and education.

Table 2. Guatemala: Households Characteristics

	<i>Receive remittances</i>	<i>Receive no remittances</i>	<i>Total</i>
Household head is indigenous	0.31	0.36	0.35
Mean age of household head (years)	49.77	45.84	46.19
Household head is between 25 and 59 years old	0.64	0.74	0.73
Household head is above 59 years old	0.31	0.21	0.21
There are children below age 5 in household	0.34	0.41	0.41
There are children between 5 and 15 years old in household	0.58	0.56	0.56
There are household members with primary education	0.80	0.80	0.80
There are household members with secondary education	0.59	0.53	0.54
There are household members with tertiary education	0.11	0.15	0.15
Area (1=urban)	0.48	0.55	0.54
Mean monthly per capita income (incl. remittances) in quetzals	1,032	1,128	1,120
Remittances as percent of total per capita income (incl. remittances)	46.51	0.00	4.14
Observations	1,109	10,389	11,498

Source: 2014 ENCOVI Survey, Instituto Nacional de Estadística.

Note: t-test has null hypothesis that the two means are identical^{***}; ** and *** denotes significance at the 0.05 and 0.01 levels, respectively.

Table 3. Guatemala: Expenditure Categories and Average Budget Shares

	<i>Receive remittances</i>	<i>Receive no remittances</i>	<i>Total</i>
Food	0.43	0.46	0.46
Durable consumer goods	0.04	0.03	0.03
Housing	0.14	0.14	0.14
Education	0.06	0.04	0.05
Health	0.01	0.01	0.01
Other goods 1/	0.32	0.31	0.31
Observations	1,109	10,389	11,498

Source: 2014 ENCOVI Survey, Instituto Nacional de Estadística.

1/ Household services, transport, communications, legal and personal services.

C. Households' Spending Patterns on Consumption

6. In thinking about how remittances are spent, three main views emerge from the literature (i) remittances are spent at the margin like any other source of income; (ii) the spending of remittances is biased towards consumption either signaling liquidity constraints faced by remittance-receiving households or households' preference towards status-oriented goods; and (iii) the spending of remittances is biased towards investment goods. The latter view is consistent

with the permanent income hypothesis view insofar as remittances are perceived as transitory income.

7. To examine the impact of remittances on households’ spending behavior we rely on a Working-Lesser specification for expenditures (Working, 1943, Leser, 1963, and Deaton and Muellbauer, 1980a).³ In expenditure share form:

$$C_i/EXP = \alpha_i + \beta_i/EXP + \gamma_i \log(EXP) + \sum_j \mu_{ij} Z_j/EXP + \theta_{ij} Z_j \quad (1)$$

where C_i/EXP is the share of expenditure on good i in total per capita households’ expenditure, Z_j denote the j th household socioeconomic and locational characteristics (family size, number of children, education, geographic region, rural-urban and ethnic divide) allowing for shifts in the intercept and/or slope of the demand functions. Specification (1) ensures the additivity criterion $\sum C_i/EXP = 1$. Interactions terms aside, $\beta_i > 0$ and $\gamma_i > 0$ for normal luxury goods, $\beta_i < 0$ and $\gamma_i < 0$ for inferior goods (the goods classification is ambiguous otherwise).

From equation (1) the marginal budget shares for the i th good (MBS_i) can be expressed as:

$$MBS_i = dC_i/dEXP = \beta_i + \gamma_i (1 + \log EXP) + \sum_j \theta_{ij} Z_j \quad (2)$$

Equation (2) shows the response in the budget share of good i , to one dollar increase in household expenditure (holding constant household characteristics Z_j) allowing for rising, falling or constant marginal propensities to spend.

8. The spending pattern of remittance-receiving households seems biased towards human capital (Table 4).

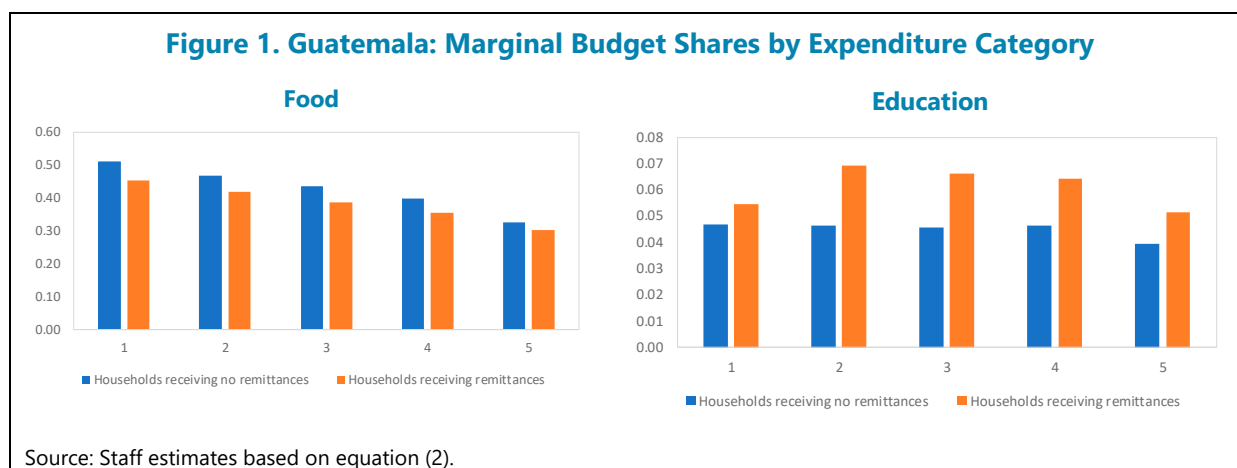
At the mean, households receiving remittances spend less on food for each additional dollar of income, and more on education, than non-recipient

Table 4. Guatemala: Marginal Budget Share by Expenditure Category		
	Receive remittances	Receive no remittances
Food	0.35	0.40
Durable consumer goods	0.06	0.04
Education	0.08	0.04
Source: 2014 ENCOVI Survey. Instituto Nacional de Estadística.		

households (for regression results underlying Table 4, see Annex I). However, since households receiving remittances also enjoy higher per capita income levels, it is possible that these findings are driven by the higher levels of income enjoyed by remittance-receiving households.

³ Despite these controls, the possibility of bias may still arise because the apparent difference in outcome between these two groups of units may depend on characteristics that affected whether or not a household received remittances instead of due to the effect of remittances per se. To reduce the bias due to confounding variables, statistical approaches such as propensity score matching (PSM) attempt to control for these differences to make intrinsically different groups more comparable.

9. At all quintiles, the spending pattern of remittance-receiving households seems biased towards human capital (Figure 1). We divide all of the 11,498 households into quintile groups based on the total annual per capita income including remittances, and partition the quintiles into remittance-receiving and non-receiving households.⁴ Thus the main difference for any quintile group between the two types of households is in whether they receive remittances. The findings suggest that, at the mean, households receiving remittances spend less on food for each additional dollar of income, and more on education, than non-recipient households. This holds for all quintile groups. We also find that, at the mean, households receiving remittances spend more on durable goods than what they would have spent without the receipt of remittances, either signaling households' liquidity constraints or preference towards status-oriented goods.



10. While remittance receipts are found to favor human capital accumulation, the effects on domestic growth depend on the recipients' subsequent participation in the labor force. Remittance receipts can conceivably stimulate investment in education by either financing the cost of this investment directly or by reducing the need for younger members of the household to prematurely abandon formal schooling to contribute to household income. However, the effects on domestic economic growth will ultimately depend on existing incentives for recipients to participate in the domestic labor market. Two dimensions to this are whether remittances themselves induce disincentives to work, which we explore in the next section; and whether the extra education funded by remittances is adequately rewarded by the domestic (as opposed to the foreign) labor market, which we discuss in the last section of this paper.

D. Households' Labor Supply Decision

11. Remittances may reduce labor market effort. Remittance receipt would be expected to have a negative effect on labor force participation for the several reasons. Since remittances are simple income transfers, recipients may rationally substitute unearned remittance income for labor income, which must be earned through the expenditure of effort. In addition, remittance transfers

⁴ Within each group of households, quintile means are determined by aggregating mean individual household values.

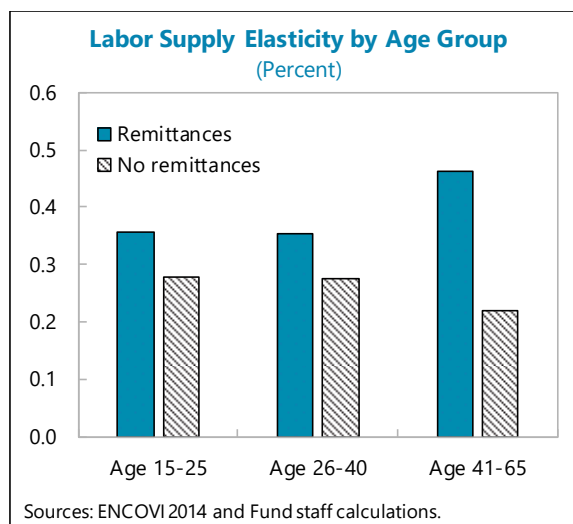
may be plagued by severe moral hazard problems (Chami, Fullenkamp, and Jahjah, 2003) since these flows occur under asymmetric information—the distance separating remitter and recipient makes monitoring difficult. These moral hazard problems may induce recipients to divert resources to the consumption of leisure.

12. To estimate the effects of remittances on the labor supply, we use a conventional specification:

$$\text{weekly work hours}_j = \alpha + \beta \text{ weekly salary}_j + \gamma \text{ other weekly income}_j + \delta \text{ age}_j + \mu \text{ age}_j^2 + \sum_j \theta_j Z_j \quad (3)$$

where j denotes individuals and Z_j denote the j th individual socioeconomic and locational characteristics (family size, number of children, education, geographic region, rural-urban and ethnic divide) allowing for shifts in the intercept and/or slope of the demand functions.

13. There is no evidence of remittance-induced work disincentives. Equation (3) was estimated for all age groups 15–25, 26–40, and 41–65. The results suggest that the labor supply for members of remittance-receiving households is relatively more elastic, most markedly so for the 41–65 age group: a one percent increase in weekly wages leads to a ½ percent increase in weekly hours worked for members of remittance-receiving households, versus 0.2 percent increase for non-remittance-receiving households (for regression results underlying text chart, see Annex I).



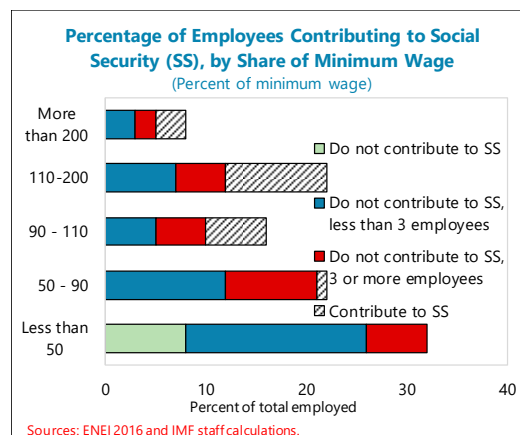
E. Policy Recommendations

Absent remittance-induced disincentives on households' labor supply decisions, low education and employment outcomes primarily reflect inadequate labor market policies. Tackling informality and increasing functional flexibility are important to enhance participation in the domestic labor market.

14. A reflection of inadequate labor market absorption capacity, informality and poverty reinforce each other. At 3.1 percent of the labor force, the unemployment rate remains low, yet informality reaches 70 percent of total employment (40 percent in Latin America). Lack of social security coverage contributes to high poverty levels and low productivity, feeding back into informality.

15. Fighting informality needs an integral program with political backing. Informality largely owes to low productivity relative to minimum wage requirements (54 percent of employed workers receive salaries below the minimum wage), followed by legal restrictions (15 percent of workers, mostly self-employed, are not allowed to contribute to the Social Security System, IGSS), and inadequate control (12 percent of workers evade IGSS obligations).

Combating informality therefore needs a multi-pronged approach: (i) increases in social assistance combined with minimum wage and productivity-enhancing measures for workers earning salaries below the minimum wage (e.g. high-return rural roads and irrigation); (ii) extended health and pensions coverage for the self-employed; and (iii) tighter tax controls for non-complaints.



16. An updated minimum wage policy and functional flexibility are key to enhancing labor market absorption capacity.

- *Minimum wage.* A discretion of the president, Guatemala’s minimum wage is one of the highest in Latin America. To better balance its social role against informality, the authorities should consider bringing it closer to regional standards. This could be done by adopting objective criteria for its determination (as per ILO guidelines), typically inflation indexation and some appropriation of the economy-wide productivity gains.
- *Functional flexibility.* Low education⁵ hinders hiring and limits mobility out of agriculture and informality. To remedy this, apprenticeship schemes such as *Mi Primer Empleo* and vocational training should be expanded. To make part-time work a successful route to formal employment, particularly for women and the youth, the recently ratified ILO Convention 175 should be swiftly transposed to national legislation with a twofold aim: to secure labor rights for part-time employees and to set remunerations in proportion to the effective time worked.⁶

⁵ Out of the total employed workers, one fourth have no education, 30 percent have not completed primary school (90 percent of which are illiterate), and only 3 percent have a secondary school degree (ENEI).

⁶ Enshrined in the Labor Code as a legitimate modality of employment, part-time employment (less than 48 hours per week) is to be remunerated at the full ordinary daytime weekly wage.

Annex I. Regression Results

Table 1. Guatemala: Household Expenditure Estimates for Households Receiving no Remittances

	Food	Consumer goods, durables	Housing	Education	Health	Other
Log total annual per capita household expenditure (γ)	-0.064*** (0.003)	0.018*** (0.001)	0.023*** (0.003)	-0.003** (0.001)	0.004*** (0.001)	0.021*** (0.002)
Household head is indigenous	0.000 (0.004)	-0.004*** (0.001)	-0.002 (0.003)	-0.000 (0.002)	-0.003*** (0.001)	0.008*** (0.003)
Household head is between 25 and 59 years old	-0.046*** (0.008)	0.013*** (0.003)	0.031*** (0.005)	0.007** (0.003)	-0.001 (0.002)	-0.004 (0.007)
Household head is above 59 years old	-0.055*** (0.009)	0.012*** (0.003)	0.066*** (0.006)	-0.005 (0.003)	0.005** (0.002)	-0.023*** (0.007)
There are children below age 5 in household	-0.004 (0.004)	0.009*** (0.002)	-0.001 (0.003)	-0.026*** (0.002)	0.004*** (0.001)	0.018*** (0.003)
There are children between 5 and 15 years old in household	-0.028*** (0.004)	0.009*** (0.002)	-0.014*** (0.003)	0.039*** (0.002)	0.001 (0.001)	-0.007* (0.003)
There are household members with primary education	-0.015*** (0.005)	0.006*** (0.002)	-0.015*** (0.004)	0.011*** (0.002)	-0.001 (0.001)	0.015*** (0.004)
There are household members with secondary education	-0.067*** (0.003)	0.019*** (0.001)	-0.012*** (0.003)	0.039*** (0.002)	0.002** (0.001)	0.019*** (0.003)
There are household members with tertiary education	-0.052*** (0.003)	0.022*** (0.002)	-0.017*** (0.003)	0.028*** (0.003)	0.002** (0.001)	0.017*** (0.003)
Area (1=urban)	-0.029*** (0.002)	-0.003*** (0.001)	0.023*** (0.002)	0.008*** (0.001)	-0.001* (0.001)	0.002 (0.002)
Constant (α)	1.083*** (0.029)	-0.153*** (0.012)	-0.058** (0.026)	0.020 (0.014)	-0.023*** (0.007)	0.131*** (0.023)
R2	0.335	0.185	0.191	0.266	0.032	0.075

Source: IMF staff calculations.

Note: Table reports the OLS estimation of (1). Beta, interactions of each of the exogenous variables with the inverse of the total expenditure, and urban/rural dummy and seven regional dummy variables not reported. *, **, and *** significant at the 0.1, 0.05, and 0.01 levels.

Table 2. Guatemala: Household Expenditure Estimates for Households Receiving Remittances

	Food	Consumer goods, durables	Housing	Education	Health	Other
Log total annual per capita household expenditure (γ)	-0.062*** (0.008)	0.017*** (0.004)	0.019*** (0.007)	-0.004 (0.005)	0.006* (0.003)	0.024*** (0.007)
Household head is indigenous	-0.005 (0.012)	-0.018*** (0.006)	0.014 (0.009)	0.004 (0.007)	-0.007 (0.004)	0.012 (0.010)
Household head is between 25 and 59 years old	-0.072** (0.030)	0.011 (0.009)	0.032 (0.020)	0.017 (0.012)	0.016* (0.008)	-0.005 (0.018)
Household head is above 59 years old	-0.078** (0.030)	0.020* (0.010)	0.055*** (0.020)	0.001 (0.012)	0.016* (0.008)	-0.013 (0.019)
There are children below age 5 in household	-0.024* (0.013)	0.007 (0.006)	0.001 (0.009)	-0.026*** (0.008)	0.004 (0.004)	0.037*** (0.010)
There are children between 5 and 15 years old in household	0.000 (0.011)	0.001 (0.006)	-0.029*** (0.007)	0.027*** (0.007)	-0.004 (0.004)	0.005 (0.009)
There are household members with primary education	-0.011 (0.013)	0.017** (0.008)	0.001 (0.011)	0.014* (0.008)	-0.014** (0.007)	-0.006 (0.011)
There are household members with secondary education	-0.061*** (0.010)	0.022*** (0.005)	-0.025*** (0.007)	0.052*** (0.006)	-0.006 (0.004)	0.018** (0.008)
There are household members with tertiary education	-0.038*** (0.010)	0.008 (0.007)	-0.024*** (0.008)	0.054*** (0.011)	-0.006 (0.003)	0.005 (0.012)
Area (1=urban)	-0.017** (0.007)	-0.008** (0.004)	0.038*** (0.006)	0.004 (0.005)	-0.001 (0.002)	-0.016*** (0.006)
Constant (α)	1.044*** (0.090)	-0.135*** (0.042)	-0.041 (0.075)	0.026 (0.051)	-0.036 (0.035)	0.141* (0.075)
R2	0.278	0.106	0.189	0.289	0.062	0.087

Source: IMF staff calculations.

Note: Table reports the OLS estimation of (1). Beta, interactions of each of the exogenous variables with the inverse of the total expenditure, and urban/rural dummy and seven regional dummy variables not reported. *, **, and *** significant at the 0.1, 0.05, and 0.01 levels.

Table 3. Guatemala: Labor Supply by Age Group

Weekly hours of work	Households receiving remittances			Households receiving no remittance		
	Age 15-25	Age 26-40	Age 41-65	Age 15-25	Age 26-40	Age 41-65
Weekly salary	0.357*** (0.082)	0.324*** (0.062)	0.463*** (0.112)	0.277*** (0.034)	0.275*** (0.022)	0.219*** (0.023)
Other weekly income	-0.016 (0.038)	-0.072*** (0.025)	-0.051 (0.039)	-0.024*** (0.007)	-0.028*** (0.006)	-0.024*** (0.007)
Age	0.458* (0.272)	0.163 (0.126)	0.184* (0.094)	0.070 (0.059)	0.000 (0.031)	0.007 (0.020)
Age2	-0.011 (0.006)	-0.003 (0.002)	-0.002* (0.001)	-0.002 (0.001)	-0.000 (0.000)	-0.000 (0.000)
Area (1=urban)	0.042 (0.079)	0.189*** (0.065)	0.107 (0.136)	-0.028 (0.023)	-0.016 (0.019)	-0.066*** (0.021)
Household head is indigenous	0.252** (0.103)	-0.138* (0.080)	0.090 (0.123)	0.002 (0.025)	-0.030 (0.020)	-0.034 (0.023)
There are household members with primary education	0.325*** (0.095)	0.191** (0.089)	0.291* (0.169)	0.051* (0.026)	0.038* (0.021)	0.138*** (0.029)
There are household members with secondary education	0.105 (0.102)	-0.022 (0.092)	0.023 (0.106)	-0.019 (0.026)	-0.057*** (0.018)	-0.020 (0.020)
There are household members with tertiary education	-0.110** (0.048)	-0.153*** (0.036)	-0.088 (0.064)	-0.088*** (0.014)	-0.150*** (0.013)	-0.108*** (0.015)
There are children below age 5 in household	0.068 (0.090)	0.013 (0.067)	0.078 (0.096)	0.044** (0.021)	-0.011 (0.016)	0.017 (0.020)
There are children between 5 and 15 years old in household	-0.270*** (0.086)	-0.058 (0.073)	0.032 (0.102)	-0.007 (0.021)	0.019 (0.018)	-0.051** (0.021)
Region2	-0.065 (0.300)	-0.049 (0.173)	-0.966 (0.662)	-0.001 (0.052)	-0.098** (0.040)	-0.038 (0.048)
Region3	0.231 (0.145)	0.072 (0.105)	0.055 (0.156)	-0.038 (0.038)	-0.056* (0.030)	-0.036 (0.034)
Region4	0.154 (0.134)	0.109 (0.116)	-0.012 (0.151)	0.042 (0.037)	0.003 (0.033)	-0.033 (0.040)
Region5	0.319** (0.147)	0.223* (0.118)	-0.118 (0.211)	0.073** (0.028)	0.059** (0.024)	0.035 (0.030)
Region6	0.178 (0.124)	0.242** (0.113)	0.099 (0.144)	0.044 (0.028)	-0.037 (0.025)	-0.041 (0.032)
Region7	0.109 (0.140)	-0.158 (0.135)	0.024 (0.201)	-0.154*** (0.054)	-0.050 (0.037)	-0.067* (0.040)
Constant	-3.574 (2.844)	-0.633 (2.027)	-4.145 (2.562)	1.607** (0.660)	2.336*** (0.506)	2.400*** (0.550)
Observations	135	186	123	1,372	2,680	1,832
R-squared	0.450	0.342	0.308	0.186	0.188	0.151

Source: 2014 ENCOVI Survey, Instituto Nacional de Estadística.

Note: *, **, and *** significant at the 0.1, 0.05, and 0.01 levels.

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INFLATION PERSISTENCE IN GUATEMALA¹

Food inflation in Guatemala seems to emerge from sequential independent shocks rather than persistence of individual shocks. Second-round effects from food to core inflation are limited, with the output gap dominating core inflation dynamics.

A. Introduction

1. This paper examines inflation persistence in Guatemala since 2003. Measuring the persistence in inflation is important from a policy perspective. Quantifying the nature of the short run trade-off between inflation and real activity, and how past inflation and inflation expectations affect current inflation helps policymakers understand how strong and how fast the response of monetary policy should be. We define inflation persistence as the tendency of inflation to converge slowly towards its long-run value following the realization of shocks. By this definition, a variable shows persistence if and only if its past levels, or past expectations about its current level, have a direct influence on its current level.

2. To measure persistence in inflation we are using a univariate, an economic, and a VAR approach. First, we identify the statistical importance of inflation inertia, seeking to address the following questions: how dependent is inflation on its own past? Second, we identify the importance of backward and forward-looking inflation, as well as the output gap in affecting current inflation by estimating a Phillips Curve, and explain the determinants of food inflation, and its impact on core inflation and inflation expectations. Third, we estimate a VAR to analyze the joint time-series behavior of food and core inflation in response to various shocks, including from remittances, the exchange rate, output gap, wages, and the policy rate.

3. A few lessons emerge consistently from the three approaches. They point to high persistence of core inflation and low persistence of food inflation. Shocks to food inflation die off after about three quarters, while they die off after seven quarters for core inflation. Both economic and VAR approach suggest limited second-round effects from food or from international food and energy prices to core inflation. We found a small persistent impact of wages on core inflation.

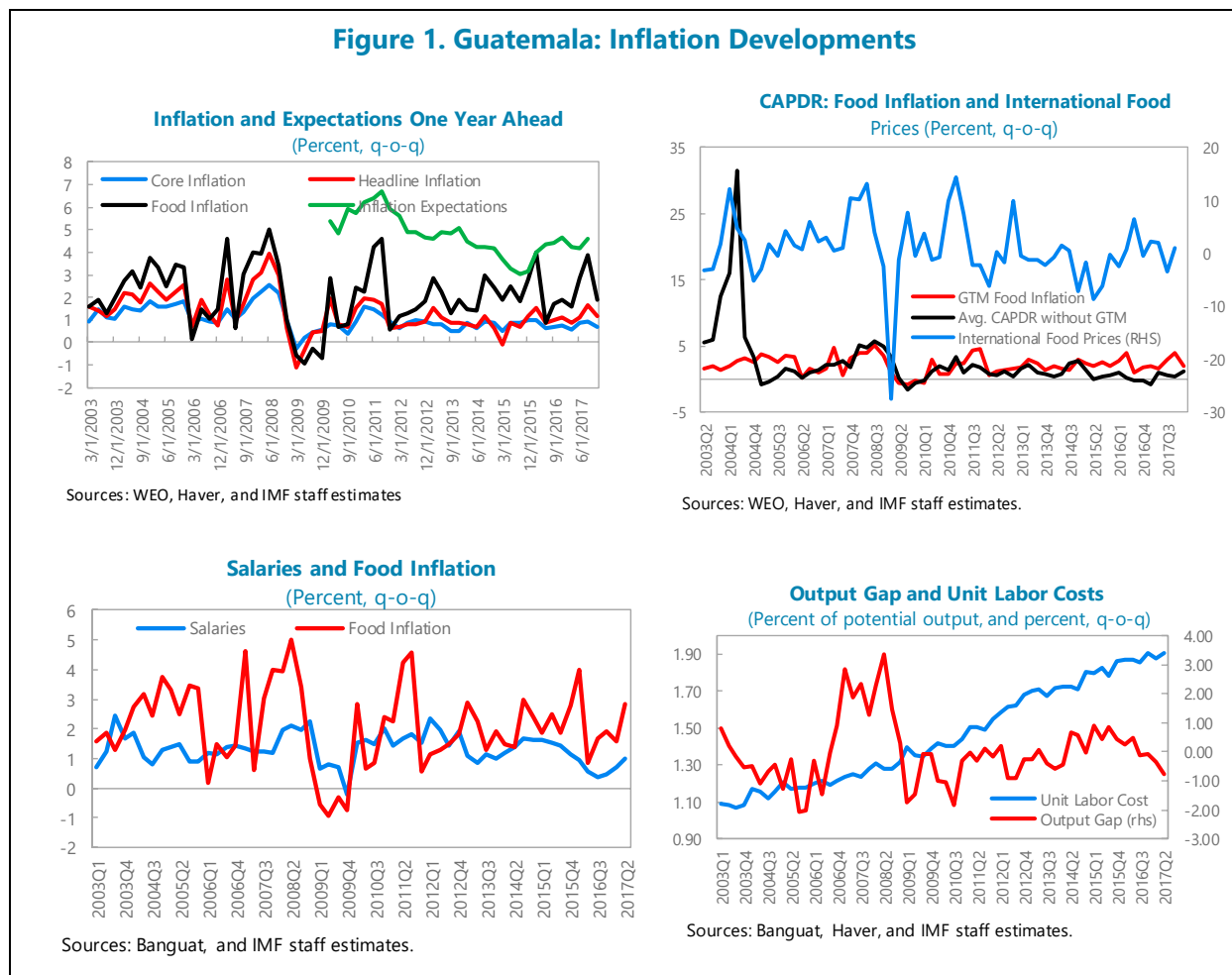
4. The rest of the paper is structured as follows. Section II presents the facts and latest developments in inflation, section III presents the methodology and macroeconomic evidence on inflation persistence, and section IV presents the conclusions.

B. Rising Headline Inflation and Low and Stable Core: The Facts

5. A sound monetary policy management has kept inflation within the central bank's target range of 4 ± 1 percent. A declining headline inflation towards the bottom of the range in early 2014, which reflected a deceleration in core inflation which had been on a declining trend since

¹ Prepared by Iulia Ruxandra Teodoru. The author is grateful to Banguat and the National Institute for Meteorology for providing the data underlying this paper.

Q3 2011, prompted monetary policy easing starting in 2013. Headline inflation remained below the target band in 2015, and comfortably remained within the target range since 2016. In 2015–16, inflation was influenced by the fall in international commodity prices, while core inflation remained stable. Slowing activity, low oil prices, and a strong currency kept headline inflation within the target range in 2017, leaving aside a couple of short-lived bouts of food inflation. In recent months, food price inflation has shown signs of easing.



6. Core inflation is below the mid-point of the target band and inflation expectations have been firmly within the target range. Core inflation is at the lower end of the target range and has been stable for many years, while inflation expectations are slightly above the 4 percent mid-point since Q1 2016, but well anchored within the target range. Staff also forecasts inflation to end 2018 in the middle of the target range and slightly below the mid-point of the target range in 2019. Low energy prices in 2015–16 kept core inflation low, despite a closed output gap, while a negative output gap in 2018–19 is expected to keep core inflation subdued, even with rising energy prices.

7. Food price increases are a main driver of headline inflation. Food inflation more than offsets the negative contributions from other components of the CPI directly related to oil prices—transport and utilities. Food price inflation contributed about two thirds to total inflation since 2012, despite having a weight of less than one third in the CPI. In recent months, food inflation has eased and appears to be on a downward trend. Lower food inflation across countries in Central America suggests that country-specific factors (both supply and demand factors) have been driving the high food inflation in Guatemala, at least since 2013 (given that international food prices have been easing since then) (2016 Selected Issues and Analytical Notes: Food Inflation in Guatemala).

Components of CPI Division	
CPI Division	CPI Weight (in percent)
Food and Nonalcoholic Beverages	28.75
Housing, Rent, Water, Electric/Gas	12.61
Transportation	10.43
Restaurants and Hotels	9.24
Clothing and Footwear	7.41
Miscellaneous/Other Goods and Services	7.16
Recreation & Culture	5.62
Household Furnishings & Equipment	5.43
Communications	5.15
Health	4.22
Education	3.72
Alcoholic Beverages & Tobacco	0.28
Total	100
Source: INE.	

C. Macroeconomic Evidence

Univariate Approach

8. In this section, we identify the statistical importance of inflation inertia. We are seeking to address the following questions: has inflation exhibited a unit root in the sample? How serially correlated is inflation in Guatemala and what is the magnitude of autocorrelation?

9. The statistical measure to identify persistence is an autoregressive process of inflation. This is accomplished by estimating the following equation:

$$\pi_t = \alpha + \sum_{i=1}^5 b_i \pi_{t-i} + \varepsilon_t, \quad \varepsilon \approx (i.i.d)$$

The sum of autoregressive coefficients is used as simple measure of the dependency of inflation on its own past. The equation above is estimated using quarterly seasonally-adjusted² series, spanning 1Q2003–3Q2017. With the exception of interest rates, all variables are in log first differences to ensure stationarity.

10. As expected, over the past 15 years, inflation rates have proved stationary. This holds for all headline, core, and food inflation. The augmented Dickey-Fuller (ADF) tests, which test whether the AR(1) quarterly inflation process contains a unit root, shows that the null of unit root can be rejected at 99 percent confidence in all three cases. The variance-ratio test, which examines the predictability of time series data by comparing variances of differences of the data calculated

² Series were seasonally-adjusted using the Census X-13 procedure where they were not available in seasonally adjusted form from original sources.

over different intervals, shows that the variance-ratios of headline, core, and food inflation decreases over time. However, the relative stability of the variance ratio at different intervals is indicative of a certain inflation persistence.

Non Stationary Tests					
(quarterly data, 2003Q1-2017Q3)					
	Variance ratio test				ADF 1/
	k=2	k=4	k=8	k=16	
CPI	0.86	0.74	0.38	0.26	-3.91***
CPI, core	0.98	0.75	0.48	0.51	-6.11***
CPI, food	0.70	0.60	0.33	0.22	-4.80***

Source: IMF staff calculations.
1/ t statistic for augmented Dickey-Fuller test for the AR coefficient in an OLS regression including intercept. *** means the null of unit root is rejected at the 99 percent level.

11. Core inflation shows a high degree of inertia, while food inflation appears less inertial.

The sum of the autoregressive coefficient (k=5) of 0.71 can be taken as evidence of high inertia in core inflation, likely indicating less flexibility in the formation of prices and a high weight on the backward-looking component of inflation (intrinsic inertia), while a lower coefficient of 0.26 points to less inertia in food inflation.

Univariate Evidence on Inflation Persistence			
(quarterly data, 2003Q1-2017Q3)			
	CPI	CPI, core	CPI, food
$\sum_{i=1}^5 b_i$	0.58 (0.15)	0.71 (0.17)	0.26 (0.14)
R ²	0.45	0.62	0.30

Source: IMF staff calculations.

Phillips Curve Regressions

12. The second approach assesses the relative importance of economic factors that explain inflation. The following specifications are considered for headline, core, food, and wage inflation.

13. Headline Inflation. We use a Phillips curve where inflation is related to movements in the output gap, intrinsic persistence due to the price-setting mechanism, and a forward-looking component associated with inflation expectations, as well as the policy rate. The Phillips Curve takes the form:

$$\pi_t = \lambda\pi_{t+1}^e + (1 - \lambda)\pi_{t-1} + \beta ygap_t + \phi i_t + \varepsilon_t, \quad \varepsilon \approx (i.i.d)$$

where π_{t+1}^e , π_{t-1} , $ygap_t$ respectively denote the one-year-ahead inflation expectations, past inflation, and the output gap. We also estimate the equation with and without the restriction that the parameters of backward and forward-looking inflation add to one. If such long-run restriction is met, the Phillips curve is vertical and monetary policy is neutral.

14. Core inflation. Core inflation is driven by the output gap and the terms of trade:

$$\pi_{core_t} = \alpha\pi_{core_{t-1}} + \beta ygap_t + \delta tot_t + \varepsilon_t, \quad \varepsilon \approx (i.i.d)$$

where $\pi_{core_{t-1}}$, $ygap_t$, tot_t respectively denote past core inflation, the output gap, and the terms of trade.

15. Food inflation. Food inflation reflects both demand (remittances and salaries) and supply (rain and the international food price) factors. Two specifications are considered:

$$\pi food_t = \varphi \pi food_{t-1} + \gamma w_t + \varepsilon_t, \quad \varepsilon \approx (i.i.d)$$

$$\pi food_t = \varphi \pi food_{t-1} + \gamma remit_{t-2} + \eta int food_{t-2} + \lambda rain_t + \varepsilon_t, \quad \varepsilon \approx (i.i.d)$$

where $\pi food_{t-1}$, w_t , and $remit_{t-2}$, $int food_{t-2}$, and $rain_t$ respectively denote past food inflation, wages, lagged remittances and international food prices, and rain. The first specification for food inflation contains salaries, given a high correlation between these two variables (see related chart in section II). The second specification contains remittances, given a high correlation with food inflation (especially prices of food products that have been experiencing important increases), while rain and international food prices are supply factors that likely have a significant impact on food inflation too. Other variables such as trade margins and transportation costs due to infrastructure deficiencies, which are likely driving food inflation too, are not available.

16. Nominal wage inflation. Wage growth is driven by past as well as current core inflation and past wage growth:

$$\pi w_t = \alpha w_{t-1} + \beta \pi core_t + \varepsilon_t, \quad \varepsilon \approx (i.i.d)$$

where w_t and $\pi core_t$ denote nominal wages and core inflation. The impact of current and past food inflation on nominal wage growth is analyzed as well.

17. Results. The results can be summarized as follows:

- **The estimated coefficients:** overall have the expected signs and are significant (at the 95 percent confidence in most cases).
- **Headline inflation:** is explained by both backward and forward-looking inflation, in about equal proportions, and by the output gap which has large impact, as well as the policy rate.
- **Food inflation:** is explained by past food inflation, remittances and lagged international food prices, as well as drought (lack of rain). In an alternative specification, wage growth appears to be significant for food inflation with a large coefficient. If salaries are included in the second specification, salaries as well as past food inflation are insignificant, and remittances and rain are significant at the 90 percent confidence level only.
- **Core inflation:** is determined by the output gap and the terms of trade, as well as past core inflation, which has a large and significant coefficient (0.67) pointing to high inertia of core inflation. In another specification, including international energy and food prices, the output gap has a smaller coefficient, but the coefficient for past core inflation remains large. Wage growth does not appear to be significant for core inflation.
- **Inflation expectations:** food inflation (or international food and energy prices) does not appear to influence inflation expectations to a large extent, thus any potential second round effects from shocks to food prices that could contaminate core inflation should be limited.

- **Nominal wage growth:** appears to be partially explained by past or current core inflation and to a little extent by current food inflation, while past food inflation becomes insignificant for wage growth.

Estimation Results for Inflation (Quarterly data, 2003Q1-2017Q3)												
CPI			CPI, core			CPI, food			CPI, expect		Nominal wages growth	
Variable	Coeff.	Prob.	Variable	Coeff.	Prob.	Variable	Coeff.	Prob.	Variable	Coeff.	Prob.	
1) PIE(-1)	0.52	0.00	1) PIE(-1)	0.58	0.00	1) PIEFOOD(-1)	0.34	0.01	1) PIE_E(-1)	0.90	0.00	
YGAPHP	0.66	0.07	YGAPHP	0.13	0.01	SALGROWTH	0.56	0.09	PIEFOOD	0.12	0.01	
R ²	0.37		INTFOODG	0.01	0.00	R ²	0.19		R ²	0.85		
			INTOILG(-1)	0.02	0.00							
			R ²	0.65		2) PIEFOOD(-1)	0.25	0.05	2) PIE_E(-1)	0.89	0.00	
2) PIE(-1)	0.30	0.03			INTFOODG(-2)	0.07	0.01	INTFOODG(-1)	0.03	0.00		
YGAPHP	0.86	0.01			RAINGROWTH	-0.01	0.03	R ²	0.87			
I	-1.24	0.00	2) PIE(-1)	0.67	0.00	REMITGROWTH(-2)	0.07	0.06				
PIE_E	0.38	0.01	YGAPHP	0.36	0.05	R ²	0.37		3) PIE_E(-1)	0.90	0.00	
R ²	0.49		TOTGROWTH	-0.02	0.10				INTOILG(-1)	0.01	0.01	
			R ²	0.58	0.00	3) PIEFOOD(-1)	0.22	0.09	R ²	0.85		
3) PIE(-1) *	--	--			INTFOODG(-2)	0.07	0.01					
PIE_E *	0.55	0.00			SALGROWTH	0.56	0.08					
YGAPHP	0.66	0.07			R ²	0.29						
I	-1.56	0.00										
R ²	0.41											

*Restriction that coefficients on past and expected inflation add to one.

Note: pie denotes headline inflation, piefood food inflation, piex core inflation, pie_e inflation expectations, ygap hp the output gap, i the policy rate, totgrowth the terms of trade, intfoodg in international food prices, intoilg international fuel prices, raingrowth rain, remitgrowth remittances, salgrowth wage inflation. All variables are expressed in log differences.

Source: IMF staff calculations.

18. In conclusion, persistence embedded in food inflation is lower than in core inflation.

- Confirming the findings from the statistical analysis, the degree of persistence embedded in food inflation is lower than for core inflation.
- The non-persistent component of core inflation is dominated by output gap dynamics while international food and energy prices play a lesser role.
- Wages emerge as one important driver of food inflation.
- The potential for second-round effects from shocks to food prices on core inflation (via inflation expectations) appear limited, as well as from shocks to international food and energy prices (via inflation expectations).

19. The results of the economic analysis should be interpreted with caution. The results of the analysis suffer from the disadvantages of using a relatively small number of observations. In addition, important changes to the CPI due to a rebasing of the index to December 2010, and thus, working with two distinct methodologies for the calculation of the CPI over the analyzed period may lead to imprecise results.

VAR Approach

20. This section complements the statistical and economic approach with a VAR analysis.

Theoretically agnostic, a VAR is well suited to capture the complex interaction between a system of variables and trace the response of inflation to shocks to remittances, the exchange rate, the output gap, wages, and policy rate. It allows investigation of the impact of shocks to food and core inflation, once feedback effects of all endogenous variables to the (shocked) inflation are taken into account, partly addressing endogeneity in univariate regression models.

21. The analysis is conducted by using a standard VAR model, as in:

$$Y_t = c + \sum_{i=1}^p \Phi_i Y_{t-i} + \sum_{i=0}^p \Phi_i X_{t-i} + \varepsilon_t \quad (1)$$

where Y_t , X_t , c , Φ_i , and ε_t respectively denote the vector of endogenous variables, the vector of exogenous variables, the vector of constants, the matrices of autoregressive coefficients, and the vector of white noise processes. All variables enter the VAR with two lags.³ The exogeneity block X_t incorporates the small open economy assumption, suitable for Guatemala, whereby foreign variables (i.e. international food prices) do not respond to changes in domestic variables.

Y_t is a vector of six endogenous variables:

$$Y_t = \{ remit_t, neer_t, ygap_t, p_{foodt}, p_{coret}, w_t, i_t \} \quad (2)$$

where $remit_t$, $neer_t$, $ygap_t$, p_{foodt} , p_{coret} , w_t , i_t respectively denote remittances, the nominal effective exchange rate, the output gap (HP-filtered industrial production index), food inflation, core inflation, nominal wages, and the monetary policy rate. The inclusion of remittances, wages, and the output gap is intended to capture demand shocks, and the interest rate allows the money market, including the impact of monetary policy, to influence inflation.

X_t contains one exogenous variable:

$$X_t = \{ food_t \} \quad (3)$$

where $food_t$ denotes world commodity food prices (the price index is expressed in U.S. dollars).

22. Identification of the structural shocks is achieved via a Cholesky recursive scheme.

Identified shocks contemporaneously affect their corresponding variables and those ordered at a later stage, but have no impact on variables that are ordered before.⁴ This implies that the most exogenous (endogenous) variables should be placed first (last) in the VAR. International food prices, remittances and the exchange rate are placed first given their tight correlation with growth and

³ Lag exclusion and lag length criteria (Schwarz, Akaike, and Hannan-Quinn) point to two lags. Including too many lags risks over parameterizing the model, and so we retain two lags for the sake of parsimony.

⁴ Cholesky identification scheme attributes all of the effect of any common component to the variable that comes first in the VAR system.

employment developments in the U.S. and globally-determined terms of trade. The output gap is placed second on the assumption that it is contemporaneously affected by exchange rate shocks while having a simultaneous impact on monetary and price variables. Prices and wages are placed last hence being affected by shocks to all other variables.

Baseline Cholesky ordering for food inflation: $food_t \rightarrow remit_t \rightarrow neer_t \rightarrow ygap_t \rightarrow p_{foodt}$ (4)

Baseline Cholesky ordering for core inflation: $remit_t \rightarrow neer_t \rightarrow ygap_t \rightarrow p_{foodt} \rightarrow p_{coret}$ (5)

23. Baseline results. The results can be summarized as follows:

- *Food inflation.* The impulse responses show that food inflation is less persistent than core (shocks to food inflation die off after about three quarters) (Figure 2). In response to a positive shock to international food prices, remittances and the output gap, food inflation increases (Figure 3 and 4). The impact from a shock to international food prices is large but dies off after four quarters. The impact from a remittances shock is also large and vanishes after about five quarters.
- *Core inflation.* In the second baseline specification which includes core inflation, the impulse responses show high persistence for core inflation (shocks to core inflation die off after seven quarters). At the same time, the impact from a shock to food inflation on core inflation appears to be short lived (the effect vanishes away after two quarters) and the output gap appears to be more persistent (the effect vanishes away only after five quarters) (Figure 4).

24. The robustness to alternative VAR identification schemes is examined further. Results are robust to alternative Cholesky orderings. The VAR (1)–(3) is estimated for alternative identification schemes used in the literature. These include:

Alternative 1: $remit_t \rightarrow neer_t \rightarrow ygap_t \rightarrow p_{foodt} \rightarrow p_{coret} \rightarrow i_t$. The main motivation is to reflect the impact of all other shocks over monetary policy rates.

Alternative 2: $remit_t \rightarrow neer_t \rightarrow ygap_t \rightarrow p_{foodt} \rightarrow w_t \rightarrow p_{coret}$, whereby wages are affected by shocks to food inflation and may feed into core inflation.

Alternative 3: $neer_t \rightarrow ygap_t \rightarrow p_{coret} \rightarrow w_t$ (Figure 5)

Alternative 4: $remit_t \rightarrow neer_t \rightarrow p_{foodt} \rightarrow w_t$ (Figure 6), with international food prices as exogenous variable.

25. The sensitivity analysis broadly confirms the baseline results. At the same time, alternative 3 and 4 show that higher wages have a small persistent impact on core and food inflation.

26. The results of the VAR analysis should be interpreted with caution. The number of variables in the baseline VARs and in some of the alternatives is high relative to the number of observations. Thus, the system is overdetermined, which means that the accuracy of the estimated coefficients is poor. The last two specifications with only 4 instead of 5-6 variables in the VAR are trying to correct this overdetermination issue.

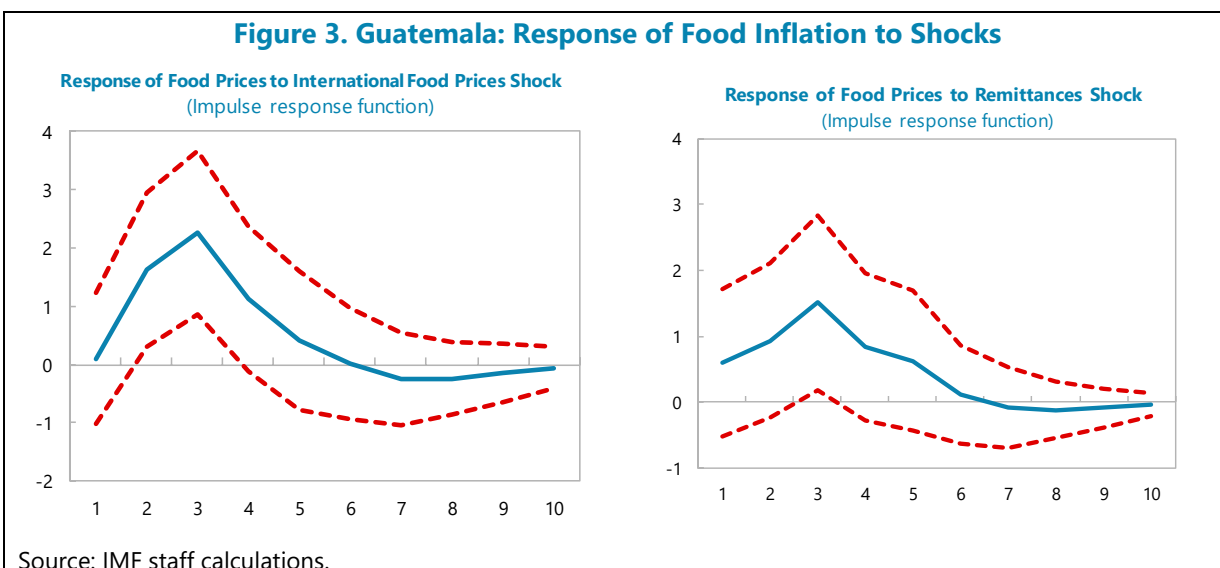
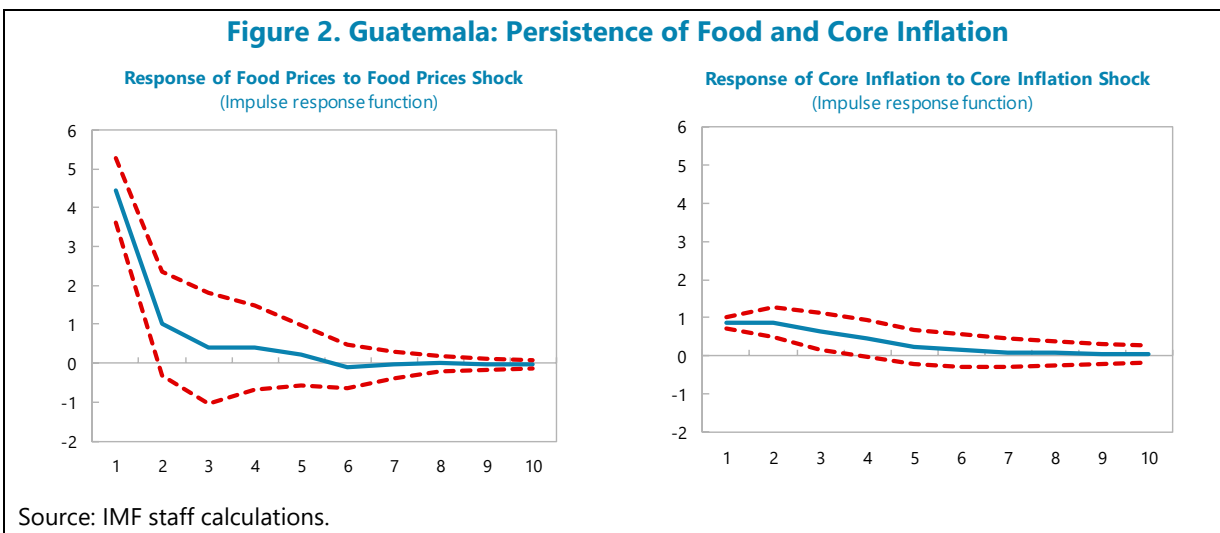
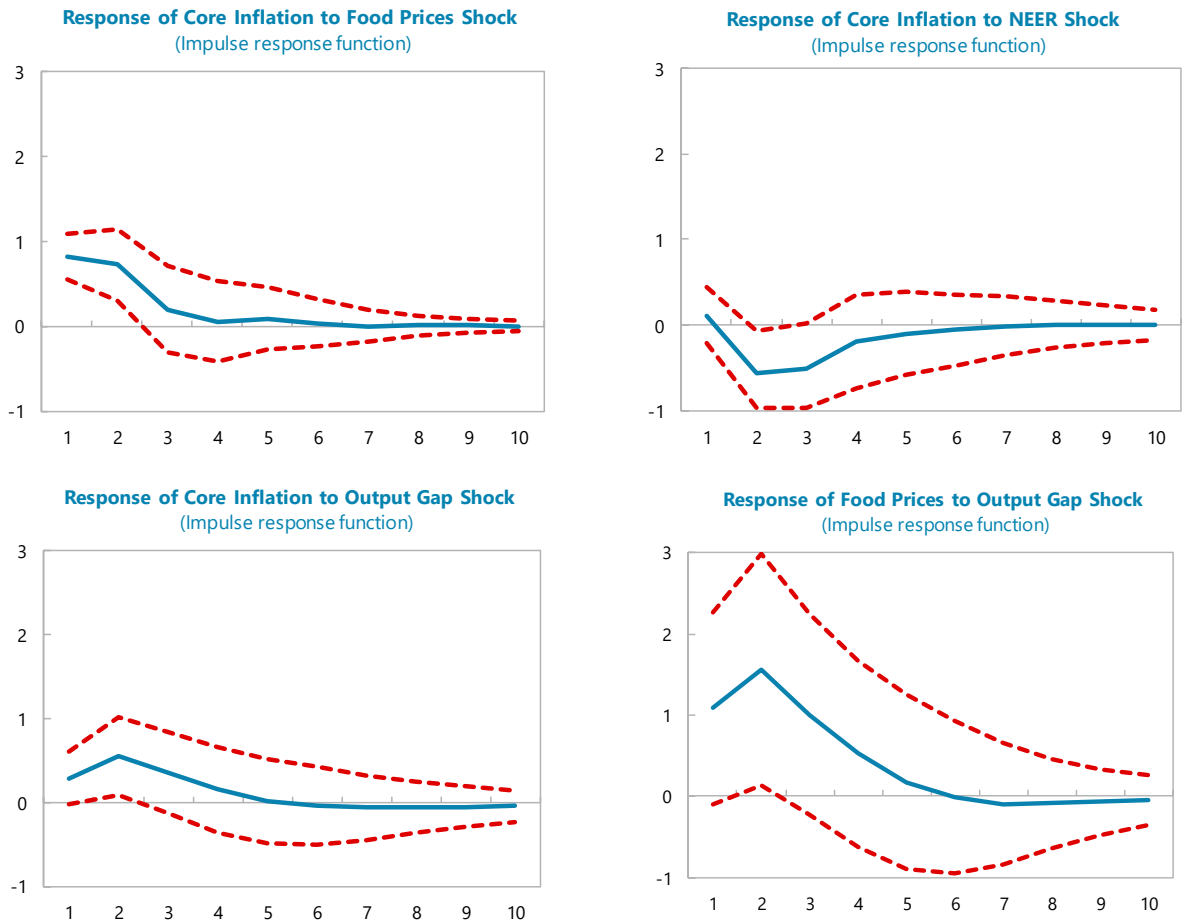
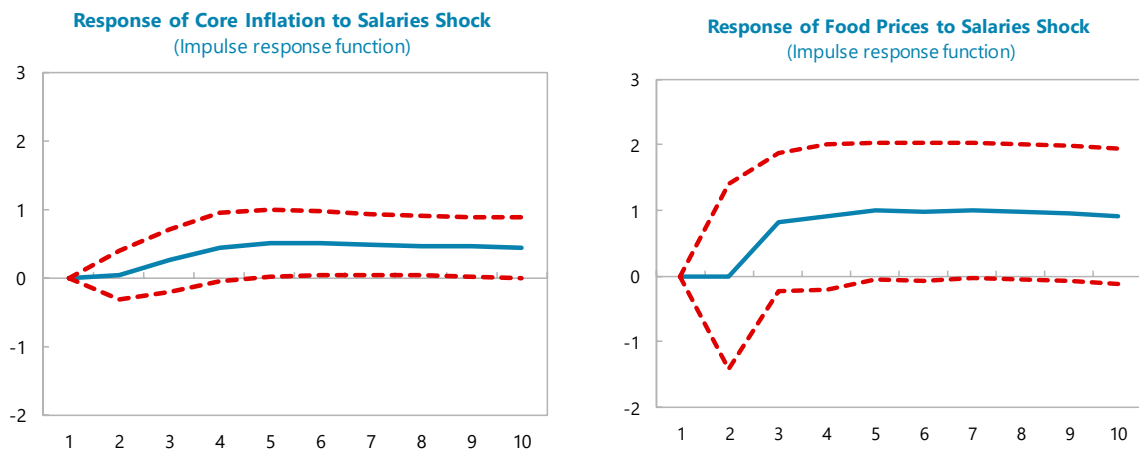


Figure 4. Guatemala: Response of Core Inflation to Food Prices and NEER Shocks, and of Food and Core Inflation to Output Gap Shock



Sources: IMF staff calculations.

Figure 5. Guatemala: Response of Core and Food Inflation to Salaries Shock



Source: IMF staff calculations.

D. Conclusions

27. The three approaches employed in this study show a high persistence of core inflation and limited second-round effects from food to core inflation. At the same time, food inflation exhibits a low degree of persistence. Shocks to food inflation die off after about three quarters, versus seven quarters for core inflation. This reflects both the influence of adaptive expectations and output gap dynamics. Both economic and VAR approaches suggest limited second-round effects from food or from international food and energy prices on core inflation, either directly or through inflation expectations, while the impact from a shock to wages on core inflation appears to be more persistent.

28. After being on hold for the last two years, the central bank cut the policy rate by 25 basis points in November 2017. The recent downward revision in the policy rate is appropriate, given a slowing economy (and a negative output gap), core inflation at the lower end of the target range, and a restrictive fiscal policy in 2017. With important uncertainties to the outlook, an output gap still not closing in 2018, and inflation risks to the downside, including little evidence of a pass-through from higher food prices to core inflation, inflation expectations well anchored, and core inflation expected to remain below the mid-point of the central bank's target range for the foreseeable future, there could still be scope to provide further monetary support to the economy.⁵ This would be particularly warranted if, as is likely, fiscal policy remains constrained in supporting demand.

29. On structural policies, promoting competition and investments in transport infrastructure should be prioritized to lower food prices. The new competition law should be adopted and a competition authority should be established promptly. Relatively higher trade and transport margins in food prices compared to other countries in the region point to anti-competitive behavior. The new competition authority should analyze competition in food and transport industries and sanction cases of monopolistic conduct. Investments in transport infrastructure will facilitate access to national food and other markets for those living in rural areas.

⁵ One caveat to this conclusion is that our estimates are based on quarter-on-quarter changes in inflation—rather than year-on-year changes, and the latter represent the basis on which Banguat makes monetary policy decisions.

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INVESTMENT, CONFIDENCE AND UNCERTAINTY IN GUATEMALA¹

Historical decomposition analysis suggests that confidence and uncertainty are important drivers of the investment residuals.

A. Introduction²

1. Structurally low investment rates impair Guatemala’s ability to bolster growth and living standards. In the period 2000–16, the average investment ratio (percent of real GDP) and real GDP growth stood at 16.9 and 3.5 percent, respectively (Figure 1). At 14.7 percent of GDP in 2016, Guatemala’s investment ratio was less than half the emerging market and developing economies’ (33.5 percent) and less than two thirds the Latin American and The Caribbean’s average (21.7 percent).

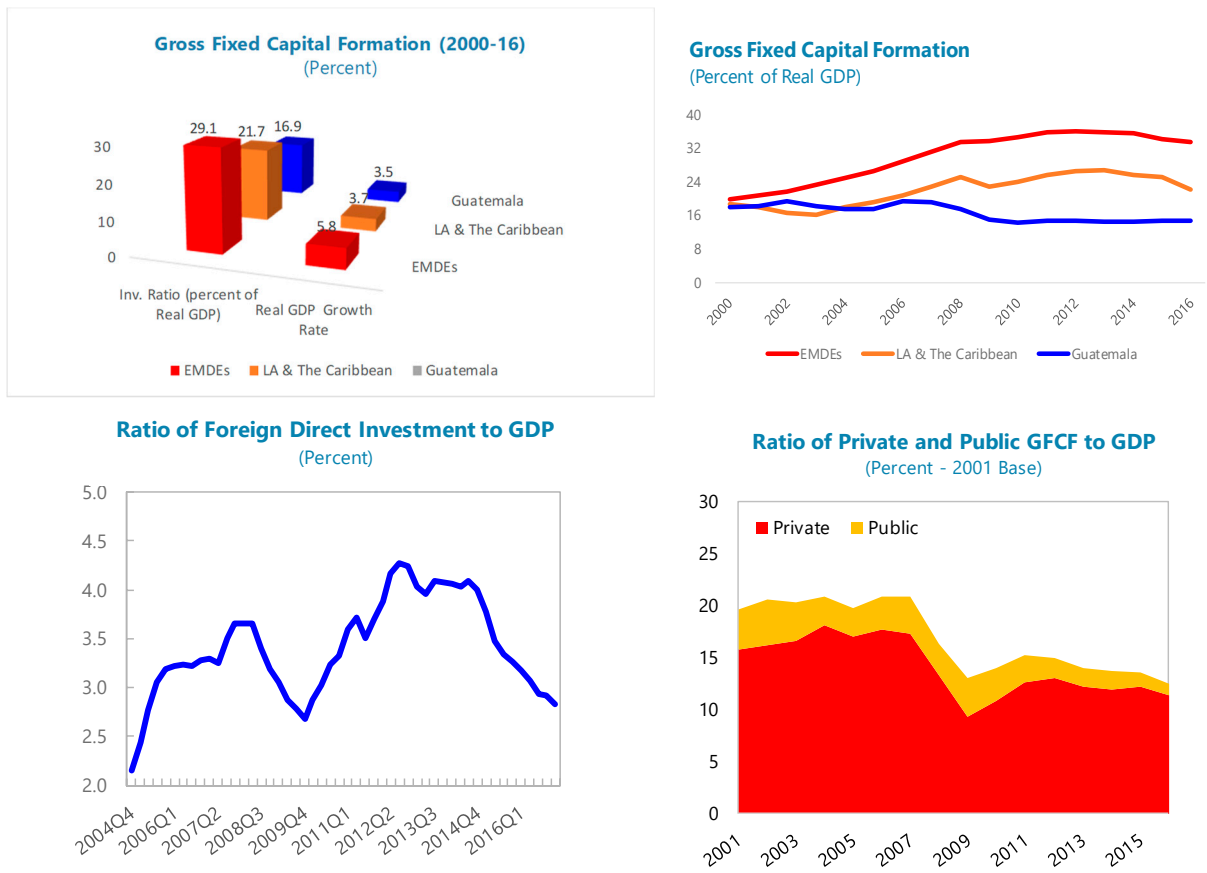
2. Investment has been losing momentum.³ While resilience in private consumption has supported domestic spending in Guatemala since the global financial crisis (GFC), investment remains a substantial drag on growth. Gross fixed capital formation was expanding at double-digit growth rates prior to the GFC, but has been underperforming in recent years. As a result, the overall investment rate has stagnated at about 14 percent of GDP. By components, the share of public investment in gross fixed capital formation has been narrowing and foreign direct investment (FDI), which had averaged about 4 percent of GDP in the first half of this decade, has been on a declining trend as well. Over the short term, the outlook for investment remains subdued based on current policies.

¹ Prepared by Carlos Janada.

² Acknowledgements: Xingwei Hu provided very knowledgeable technical assistance with the programming of the model. We are also grateful to Bank of Guatemala for providing key statistical data and the opportunity to present an earlier version of this paper in one of its seminars.

³ A private sector’s confidence index elaborated by Guatemala’s Central Bank (Banguat) declined rather rapidly in the aftermath of the mid-2017 political crisis.

Figure 1. Guatemala: Investment Developments



Sources: Banguat, WDI, WEO and IMF Staff Estimations.

3. The stagnation of the investment rate in Guatemala has generated a debate on its drivers. Observers point to weak confidence, alongside structural bottlenecks, as the main reasons underlying investment’s disappointing performance. Business confidence has indeed deteriorated throughout 2017, and governance and business climate indicators remain poor in global comparison. While the corporate rate is not particularly high in regional comparison, other factors are thought to constrain investment, including a poor rule of law, overall government effectiveness, low levels of human and physical capital.



4. Against this backdrop, this paper reviews business investment dynamics in Guatemala over recent years. The main motivation is to gauge the relative importance of investment drivers in explaining its dynamics, with a focus on confidence/uncertainty. Although an extensive literature has highlighted the importance of changes in expectations in driving investment,⁴ the existing evidence for Guatemala remains scant. As in Albagli and Luttini (2015), this study explores the relationship between confidence/uncertainty and private investment in Guatemala by using a vector autoregressive (VAR) approach. Specifically, we analyze the joint time-series behavior of a system representing global activity, confidence, uncertainty and the domestic economy (interest rates, labor costs, GDP and private investment).

5. The rest of the paper is organized as follows: Section B discusses measurement issues and data used in the analysis. Section C presents the VAR configuration and the results of its estimation. Section D concludes with some final remarks.

B. Data and Measurement Issues

Measuring Confidence and Uncertainty

6. To measure both confidence and uncertainty, we use the Central Bank's Economic Expectations Survey.

- The confidence index is based on the answers to four questions of the Central Bank's survey, *Encuesta de Expectativas Económicas (Economic Expectations Survey)*, and its calculation is derived by creating sub-indexes for each of the questions. The four questions are: (i) "How do you think the business climate for private sector's economic activity will evolve over the next six months compared with the previous six months?", (ii) "Do you agree the economy is in better shape than a year ago?", (iii) "Do you expect the country's economic performance to improve over the next six months?", and (iv) "What do you think of the present moment for companies to carry out investments?". The sub-indexes are constructed by subtracting from the percentage of positive answers, the percentage of negative answers and adding 100 to avoid negative values in the total. The confidence index is the average of the sub-indexes, expressed as a percent of the maximum possible average.
- For uncertainty, we follow the definition provided by Bachmann et al (2013):

$$Uncertainty = \text{root square } [(\%opt_t + \%pes_t - (\%opt_t - \%pes_t))^2]$$

Intuitively, if half of the poll participants are optimists and the other half are pessimists, uncertainty is 1. If all participants are either optimists or pessimists, uncertainty is 0. The

⁴ Low confidence and elevated uncertainty increase the option value of deferring investment, since it is difficult to reverse investment once the new capital has been deployed. See, for example, Beaudry, P. and F. Portier (2006), Bloom, N. (2009), Bloom, N., S. Bond, and J. Van Reenen (2006), Carriere-Swallow, Y. and L. F. Céspedes (2011).

uncertainty estimate is built based on the answers to the first question in Banguat's *Economic Expectations Survey*.

Data

7. The dataset comprises monthly series spanning M092004–M092017 (157 observations). For those series which are only available on a quarterly frequency (private gross fixed capital formation, unit labor cost and the world's real GDP growth rate), the quarterly data are interpolated into monthly series.⁵ All series used in the analysis are seasonally-adjusted.⁶ The Census X-13 procedure was used in those cases where the raw series were unavailable in seasonally-adjusted form.

8. To establish the appropriate estimation methodology, we determine the stationarity of the data by applying the augmented Dickey-Fuller test. Series (log of) GDP, (log of) private investment, (log of) S&P 500, (log of) oil price and (log of) IMAE series do not reject the null hypothesis of having a unit root in our sample period (Table 1). The uncertainty variable rejects the null hypothesis of a unit root, while confidence, the world's real GDP growth rate, the Fed Funds rate and the VXO series do not evidence unit roots at a 95 percent confidence level.

C. VAR Analysis

VAR Specification

9. The model. A VAR is well suited to capture the complex interactions between global conditions and domestic variables. The analysis is conducted by using a standard VAR model:

$$Y_t = c + \sum_{i=1}^p \Phi_i Y_{t-i} + \sum_{i=0}^p \Phi_i X_t + \varepsilon_t \quad (1)$$

where Y_t , X_t , c , Φ_i , and ε_t respectively denote the vector of endogenous variables, the vector of exogenous variables, the vector of constants, the matrices of autoregressive coefficients, and the vector of white noise error term. The exogenous block X_t incorporates the small open economy assumption—standard in the VAR literature—whereby foreign variables do not respond to changes in domestic variables.

⁵ In the case of the world's real GDP growth rate, the quarterly figure was repeated in the months of the quarter in question. For unit labor cost, the quarterly index was repeated into the last month of the quarter of interest, and the remaining two months were geometrically interpolated. Quarterly series for the private component of gross fixed capital formation were obtained using its share in series with annual frequency in real terms; these quarterly estimates were then used as the final months of the quarter; the values in between were interpolated vis-à-vis the behavior of the IMAE in the quarter of interest.

⁶ The uncertainty series (which contains several zeros) and the series on interest rate (since the real rate is used, it has several periods with negative values) are not seasonally adjusted due to incompatibility with the Census X-13 procedure.

Table 1. Guatemala: Unit Root Tests - Augmented Dicker-Fuller

Code	Series Name	Frequency	Transformation	Non-Seasonally Adj. Series - Unit Root?	Seasonally Adjusted Series - Unit Root?
gfip	Private Gross Fixed Capital Formation	Quarterly	Log of Level	No @ 95% Conf.	Yes
gfip	Private Gross Fixed Capital Formation	Quarterly	Fourth / First Diff. in Log of Level	No	No
ulc	Unit Labor Cost	Quarterly	Log of Level	No @ 95% Conf.	No @ 95% Conf.
wgdp	World's GDP	Quarterly	Rate of Growth	No @ 99% Conf.	No @ 99% Conf.
gdp	IMAE	Monthly	Level	Yes	Yes
gdp	IMAE	Monthly	Twelfth / First Diff. in Log of Level	No @ 99% Conf.	No @ 99% Conf.
ci	Confidence Index	Monthly	Level	No @ 95% Conf.	No @ 90% Conf.
unc	Uncertainty	Monthly	Level	No	
tpm	Monetary Policy Rate	Monthly	Level	No @ 90% Conf.	
sp500	S&P 500	Monthly	Log of Level	Yes	Yes
sp500	S&P 500	Monthly	Twelfth / First Diff. in Log of Level	No	No
oil	Oil Prices	Monthly	Log of Level	Yes	Yes
oil	Oil Prices	Monthly	Twelfth / First Diff. in Log of Level	No	No
ffr	FED Funds Rate	Monthly	Level	No @ 95% Conf.	
vxo	Volatility Index	Monthly	Level	No @ 95% Conf.	

Source: Staff Estimations

where tpm_t , ulc_t , ci_t , unc_t , gdp_t and inv_t denote: the monetary policy interest rate, the log of unit labor cost, the confidence index, uncertainty, the log of GDP and the log of private investment, respectively.

X_t is a vector of two exogenous variables:

$$X_t = \{pc1_t, pc2_t\} \quad (3)$$

where $pc1_t$ and $pc2_t$ summarize prevailing global conditions and denote the first two principal components of:

$$PC_{i,t} = \{wgdp_t, S\&P\ 500_t, ffr_t, oil_t, vxot_t\} \quad (4)$$

where $wgdp_t$, $S\&P\ 500_t$, ffr_t , oil_t and vxo_t denote the world's real GDP growth rate, the (log of) Standard & Poor's 500 Index, the Federal Funds rate, the (log of) crude oil prices, and The Chicago Board Options Exchange Standard & Poor's 100 Volatility Index, respectively.

10. The identification of the structural shocks is achieved via a Cholesky recursive form, whereby identified shocks contemporaneously affect their corresponding variables and those ordered at a later stage, but have no impact on variables that are ordered before.⁷ This implies that the most exogenous (endogenous) variables should be placed first (last) in the VAR. Two alternative orderings are tested, (4a) and (4b), they differ in the causal relationship between GDP and confidence/uncertainty, which is hard to determine on a theoretical basis.

$$\text{Baseline Cholesky ordering: } tpm_t \rightarrow ulc_t \rightarrow ci_t \rightarrow unc_t \rightarrow gdp_t \rightarrow inv_t \quad (4a)$$

$$\text{Baseline Cholesky ordering: } tpm_t \rightarrow ulc_t \rightarrow inv_t \rightarrow gdp_t \rightarrow ci_t \rightarrow unc_t \quad (4b)$$

11. We estimate a VECM. The variables used in the analysis are a combination of I(0) and I(1) and a set of variables are found to have several cointegrating vectors. Therefore, we estimate a vector error correction model (VECM). A VECM is a restricted VAR that has cointegration restrictions built into the specification. It adjusts to both short run changes in variables and deviations from equilibrium.

12. A historical decomposition of the investment residual was carried out to determine its major drivers. The historical decomposition breaks down the estimated residuals into its structural innovations. It measures the overall, cumulative impact of the shocked variable on other variables (structural innovations), including feedback effects from shocks to the exogenous variables.⁸

Results

13. A vector-error correction model (VECM) was ultimately estimated. A VAR was estimated with 4 lags (see Annex I for further details).⁹ Since it was found no co-integration, a VECM was then estimated, and whose results in terms of contributions are summarized in the tables below^{10 11} (Figure 2, Table 2).

⁷ The Cholesky identification scheme attributes all the effects of any common component to the variable that comes first in the VAR system.

⁸ Annex I explains how the impact arising from global factors was estimated.

⁹ The Akaike, Schwarz and Hannan Quinn Criteria all suggested 2 lags.

¹⁰ The Johansen Cointegration Test suggested 2 cointegrating equations at the 5 percent level.

¹¹ Annex I explains how the contributions were estimated.

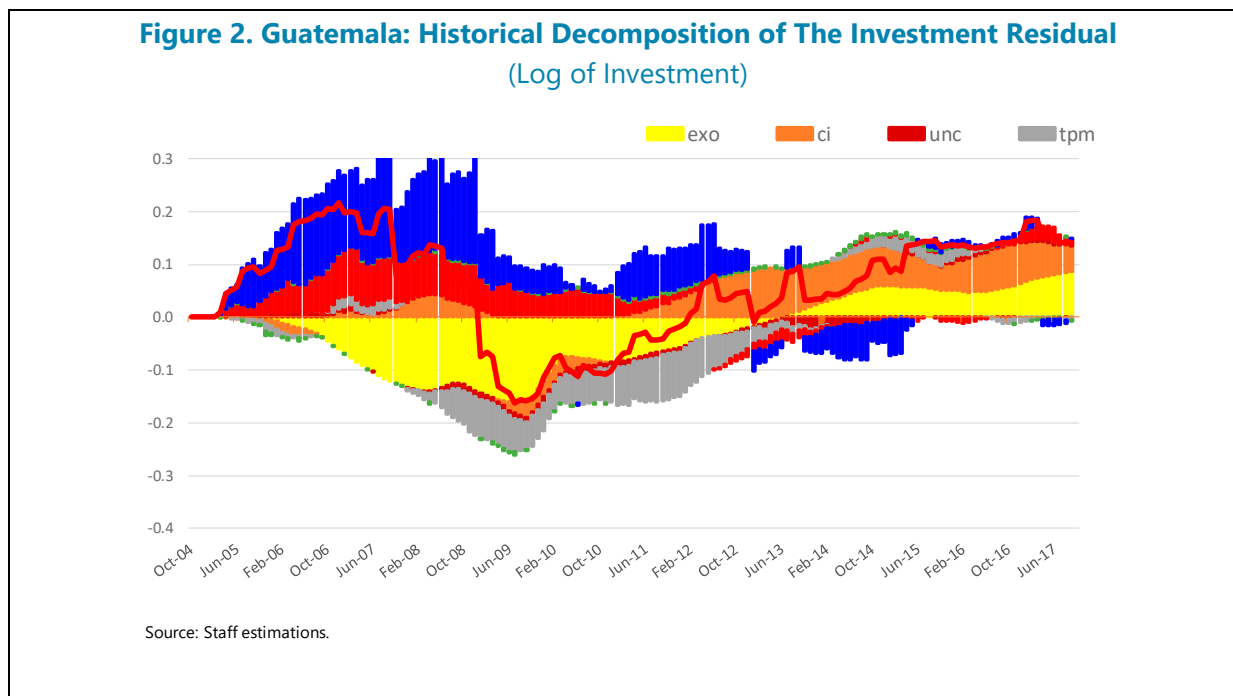


Table 2. Guatemala: Contributions to Investment Residuals (Seasonally Adjusted Figures) (Percent)

	Investment Residuals								
	glo	tpm	ulc	ci	unc	gdp	inv	Total	
2008-10	35.3	17.6	12.5	8.7	3.1	0.7	22.2	100.0	
2016-17	51.4	1.7	7.7	33.7	1.6	0.9	3.1	100.0	
2005-17	36.9	10.6	11.7	16.3	1.6	0.9	21.9	100.0	

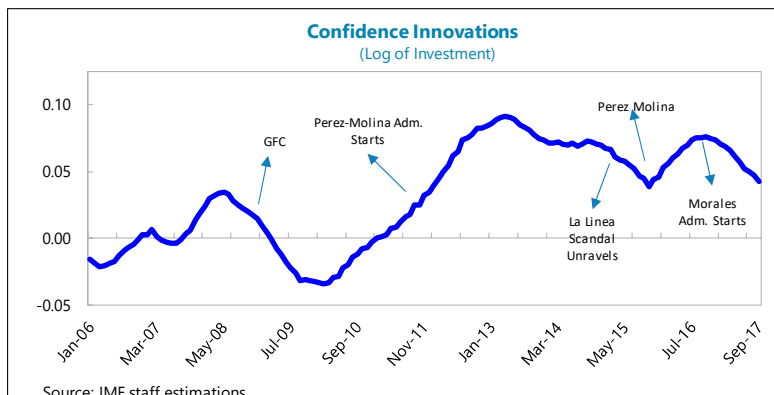
Source: IMF Staff Estimations.

14. The innovations of global factors and confidence are the most important drivers of the investment residuals. During the period 2005–17:

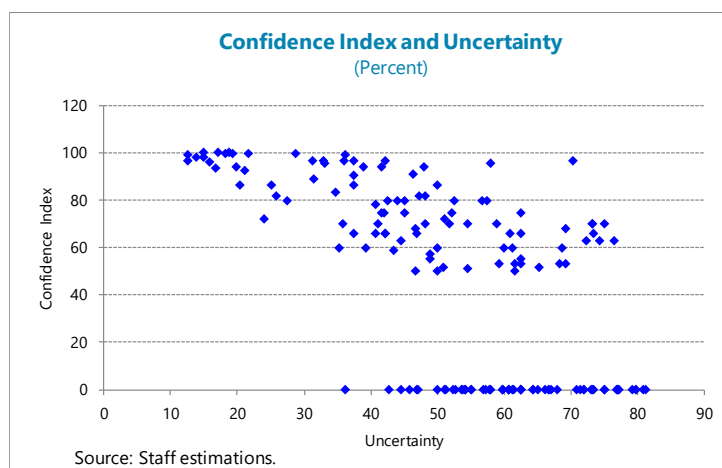
- Global factors explain over one third of the investment residuals. Their innovations have been trending upwards since the end of the GFC, broadly in sync with the trend of confidence innovations (discussed below).



- The contribution of confidence accounted for nearly one sixth of the investment residuals. The innovations for confidence gradually increased after the GFC, peaking in early 2013 and declining thereafter through 4Q2015 (ousting of Perez-Molina administration on far-reaching corruption charges). Confidence innovations rose rapidly again with the advent of the Morales administration in early 2016 and have been declining over the last couple of years amidst an increasingly politically-charged environment.



- Uncertainty seems to have contributed marginally to explain investment residuals, at less than 2 percent. This likely reflects multicollinearity between the indicators of confidence and uncertainty used in the analysis (about -55 percent). Alternative VECM specifications using confidence and uncertainty separately, resulted into contributions of 9.7 and 9.3 percent, respectively.



- Shocks from labor costs and interest rates to investment residuals contribute about 12 and 11 percent, respectively; the contribution of GDP has been more muted in comparison.

15. Results are broadly robust to a change in the Cholesky ordering (from eq. 4a and 4b). When GDP and investment are considered more exogenous to confidence and uncertainty (eq. 4b), both the contribution of confidence and uncertainty to investment innovations decline slightly. The contributions of the other variables remain practically unchanged (Table 3). Results also proved robust to various other Cholesky orderings (Annex II).

Table 3. Guatemala: Contributions to Investment Residuals
(Seasonally Adjusted Figures – Cholesky Ordering)
 (Percent)

	Investment Residuals							
	glo	tpm	ulc	inv	gdp	ci	unc	Total
2008-10	35.3	17.6	12.5	22.4	0.7	8.4	3.0	100.0
2016-17	51.7	1.7	7.7	4.4	1.2	32.3	0.9	100.0
2005-17	37.0	10.6	11.7	22.7	1.1	15.5	1.4	100.0

Source: IMF Staff Estimations.

Final Remarks

16. Overall, our results suggest that confidence and uncertainty are important drivers of investment residuals.

- Over the period 2005–17, global factors contributed the most to explain the investment residual; the contribution of confidence was higher than those provided by interest rates, labor costs or GDP; and the contribution of uncertainty was marginal but this outcome might be due to multicollinearity.
- The relatively high sensitivity of private investment to global conditions and investors' confidence highlights the need for investment-enhancing policies. Reversing the downward trend in investment is key to raising living standards and capitalizing on the demographic dividend expected to occur over the next two decades.
- The actions required go beyond the scope of this paper, and will need a coordinated effort on multiple fronts. First, improving business environment conditions. Second, an integral fiscal reform encompassing continued tax administration efforts, tax policy changes, and spending flexibility, all geared at higher investments in physical and human capital. Third, expanding social protection by creating more formal jobs in the economy. Last, but not least, sustained efforts to improve governance, which is critical to durably raise investment and support efforts at revenue mobilization.

Annex I. Methodological Notes

1. This appendix briefly discusses some methodological notes and test results pertaining to the estimation of the model, they involve:

- Frequency of the model.
- Test results.
- Non-Seasonally Adjusted Series (NSAS) versus Seasonally Adjusted Series.
- Estimating the impact of changes in the exogenous variables.
- Estimating the contributions of structural innovations.

Frequency of the Model

2. A VAR with a combination of I(0) and I(1) series was estimated; thereafter a VECM was applied since no cointegration was found. The VAR was initially run with quarterly data but the degrees of freedom were low. Furthermore, by averaging monthly data to obtain quarterly indicators, some richness of the monthly data (in terms of variability information) was lost in the transformation. For these reasons, we switched to monthly data.

Test Results

3. No particular high positive or high negative correlation between two variables was highlighted by our residual correlation matrix; the highest correlation was between the confidence index and uncertainty at -54 percent. The VAR does not have polynomial roots outside the unit circle. The autocorrelation of the residuals (up to 12 lags) and within +/- 2 standard deviations does not suggest that the error term was autocorrelated.

4. The Lagrange Multiplier test for autocorrelation does not reject H_0 (no autocorrelation) for the first three lags.

5. When the VAR was estimated with 4 and 12 lags, the lag length tests (Schwarz Information Criterion, SC, Akaike, AIC, and Hannan-Quinn Information Criteria, HQ) suggested in the case of the former that 2 lags would be appropriate, while in the case of the latter, the most reliable test of the three (HQ) still suggested 2 lags as appropriate.¹

6. The Johansen Cointegration Test (trace) was used to determine the number of cointegrating equations. An unconstrained VECM with the appropriate number of

¹ It is usually suggested that if monthly data are used, the VAR, at least in its initial formulation, should have twelve lags. When the model was run with 12 lags, the most reliable test of lag length (Hanna Quinn) still suggest two lags.

cointegrating equations and lags was run (the number of lags in a VECM should equal the number of lags when the model is run in levels minus one).

Non-Seasonally Adjusted Series (NSAS) versus Seasonally Adjusted Series (SAS)

7. **Table 4 summarizes the test results of the model variables run with both non-seasonal and seasonal adjustment.** Note that the test results for NSAS are in general weaker than those for SAS (e.g., in the correlogram, the NSAS had one third of their autocorrelations above 2 standard deviations, while for SAS it was only one sixth). More discouraging, when the VAR with NSAS was estimated using 12 lags (as suggested by the HQ test), it yields 3 polynomial roots outside the unit circle, precluding convergence of the model towards equilibrium when NSAS are used.

Estimating the Impact of Exogenous Variables on a VAR System

8. **The exogenous block cannot be combined with the endogenous variables to estimate their overall impact on the VAR system since, by definition, the (domestic) endogenous cannot affect the (global) exogenous variables.** Rather impulse estimators are used to calculate the impact of changes arising from the exogenous block. A change in an exogenous variable in time t is transmitted to $t+1, t+2 \dots t+N-1$ (N is the size of the sample) and its impact is measured by the impulse responses in each period. The impact in the next period $t+1$, independent from the previous one in time t , is transmitted to $t+2, t+3 \dots t+N-2$. The overall impact of changes for each of the exogenous variable will be the summation of N partial aggregations.

Estimating the Contributions of Structural Innovations

9. **If the estimated innovation in the period in question had the same sign as the residual of the factor being explained, the contribution of this innovation was acknowledged, otherwise it was omitted with a zero value.** This procedure yielded periods whose components for a specific period were all either positive (including zeros) or negative (including zeros) innovations. The absolute value was then applied and figures corresponding to the innovations of each factor were added over time (the absolute value was taken because the residual was either positive or negative and a simple aggregation would have largely cancelled itself out). Once these summations were calculated for each factor in each sub-period, the results were expressed as percent of the totals. This is just an approximation since the historical decomposition of the residual, in a given period of time, does not yield innovations that are all positive or negative.

Table 1. Guatemala: Some Results of VAR Model with Series in Levels and 2 Lags - ci

Period: 2005 M9 - 2017 M9 (157 Monthly Observations)	Non-Seasonally Adjusted Series	Seasonally Adjusted Series
Residual Correlation	No particular high negative or positive corr. between two variables; the highest correlation was between ci and unc @ -49 percent.	No particular high negative or positive corr. between two variables; the highest correlation was between ci and unc @ -54 percent.
Number of Polynomial Roots Outside Unit Circle	3	0
Plot of Residuals	Randomly dispersed around the horizontal axis. Show some seasonality in a few cases.	Randomly dispersed around the horizontal axis.
Autocorrelation +/- 2 Standard Deviations (Correlograms)	12 out 36 beyond 2 s.d.	5 out 36 beyond 2 s.d.
LM Test - Autocorrelation	It does not reject Ho (no autocorrelation) only for the first lag @ 95 percent confidence level.	It does not reject Ho (no autocorrelation) for the first three lags
Lag Length Tests (AIC, SC, HQ) - Initial Number of Lags = 12	12 lags (AIC), 12 lags (HQ), and 2 lag (SC)	4 lags (AIC), 2 lags (HQ), and 1 lag (SC)
Johansen Cointegration Tests (trace)	4 cointegrating equations	2 cointegrating equations
Source: Staff Estimations.		

Annex II. Alternative Cholesky Orderings

Contributions to Investment Residuals (Seasonally Adjusted Figures – Cholesky Ordering) (Percent)

Investment Residuals								
	glo	tpm	ulc	gdp	inv	ci	unc	Total
2008-10	35.3	17.6	12.5	0.8	22.4	8.4	3.0	100.0
2016-17	51.7	1.7	7.7	1.3	4.4	32.3	0.9	100.0
2005-17	37.0	10.6	11.7	1.1	22.7	15.5	1.4	100.0
Investment Residuals								
	glo	gdp	inv	tpm	ulc	ci	unc	Total
2008-10	35.0	2.6	28.7	18.5	3.8	8.3	3.0	100.0
2016-17	52.1	3.1	8.3	1.8	1.1	32.6	0.9	100.0
2005-17	36.9	3.2	28.4	11.7	3.0	15.5	1.4	100.0
Investment Residuals								
	glo	ci	unc	tpm	ulc	gdp	inv	Total
2008-10	36.5	9.5	2.4	17.1	10.8	0.7	22.9	100.0
2016-17	51.0	35.6	2.2	1.4	5.9	0.9	3.1	100.0
2005-17	37.4	17.7	1.9	10.0	9.8	0.9	22.2	100.0

Source: IMF Staff Estimations.

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IMPROVING GOVERNANCE FOR GREATER AND MORE INCLUSIVE GROWTH IN GUATEMALA¹

While there has been significant progress since the 2015 political crisis, there is scope to intensify anti-corruption efforts. Conventional growth regressions suggest that per capita GDP gains from improved governance are likely to be substantial. Sustained government support plays a central role in the ongoing fight against corruption.

A. Introduction²

1. Guatemala's efforts to tackle endemic corruption are evident. The 2015 political crisis led to broad-based anti-corruption efforts. The government reasserted its control over the tax and customs administration, reformed public procurement practices, and enhanced the independence of the general attorney's office. In parallel, the General Prosecutor's Office (GPO) and the International Commission Against Impunity in Guatemala (CICIG) are making inroads into dismantling networks suspected of illegal activities in areas such as tax fraud, illicit campaign financing, irregular procurement practices, and influence peddling in the judiciary. Since 2014, the GPO has dismantled 178 criminal organizations operating at the national level and confiscated assets for over USD28.5 million (*Ministerio Publico*, 2018).³

2. Guatemala's Financial Intelligence Unit (IVE) has stepped up the capacity to conduct financial analysis and supervision of compliance with AML/CFT regulations over time. An effective AML framework can contribute to the prevention, detection and confiscation of ill-gotten gains. In recent years, IVE has undertaken many initiatives to improve its core responsibilities in conducting operational analysis of suspicious transaction reports (STRs) and enhancing supervision of AML/CFT obligations by reporting entities. These include enhancing the skills and knowledge of the AML/CFT supervisory personnel, raising awareness among reporting entities with respect to AM/FT risks and risk mitigating obligations, and increasing onsite inspections of reporting entities (GAFILAT, 2017). These initiatives have contributed to an increase in the number of STRs from reporting entities (Table 1) as well as in the number of financial intelligence reports disseminated to other AML/CFT stakeholders, in particular the GPO. ML cases filed and admitted for trial in first instance criminal courts have been stepped up, although the number of convictions of ML offenses has not seen a significant impact.

¹ The 2004 review of the IMF's surveillance highlighted the need for systemic coverage of governance issues within the IMF's mandate and called for enhanced and consistent treatment of governance issues in staff reports, enhanced coverage of the supply side of corruption, and enhanced use of material from other sources. An Executive Board review of the 1997 policy is envisaged this year.

² Prepared by Yara Esquivel, Esther Perez, Jasmin Sin, Roany Toc Bac, and Christian Vera.

Table 1. Guatemala: Financial Intelligence and Enforcement on Money Laundering

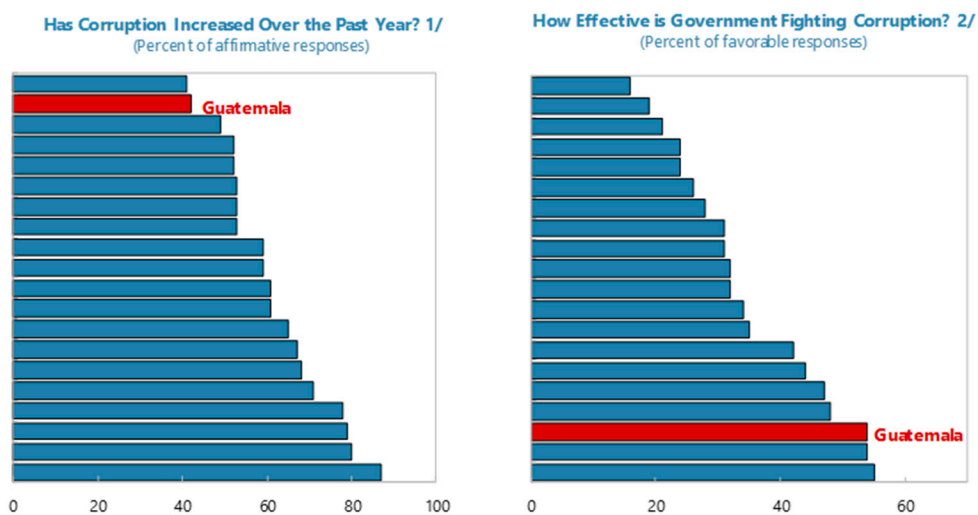
	2011	2012	2013	2014	2015
STRs to IVE	506	467	565	1060	1150
IVE requirements	7517	5258	13733	20337	12867
STRs used for filling of legal reports	142	165	239	395	183
Ratio STR reported over used	0.28	0.35	0.42	0.37	0.16
National reporting requirements attended by IVE	322	331	717	830	910
Prosecutions for ML offences	87	104	84	151	112
Convictions for the crime of ML as a stand-alone offence	0	0	17	15	15
ML cases filed	128	214	164	313	441

Source: Mutual Evaluation Report, Gafilat.

Note: IVE = Financial Intelligence Unit, ML = money laundering, STR = suspicious transactions reports. National reporting requirements attended by IVE for investigation on money laundering, asset forfeiture unit, and high-impact CICIG cases. Judgements of processing includes money laundering, bribery, tax/customs fraud, kidnapping or abduction, trade, trafficking and illegal storage, misappropriation or embezzlement, customs contraband, human trafficking, money transfer, extortion.

3. Anti-corruption efforts in response to the 2015 political crisis had been appreciated by the public. Public’s perceptions that corruption had increased during 2016 were the second lowest in the Latin America region (Figure 1). Similarly, citizens’ perceptions on how effective a government fighting corruption, and how socially accepted to report a corruption case, placed Guatemala as one of the top countries in the region.

Figure 1. Guatemala: Anti-Corruption Efforts in Regional Perspective



Source: *People and Corruption: Latin America and the Caribbean*, Global Corruption Barometer. Transparency International, 2017. The survey was conducted between May and December 2016 to 22302 citizens across 20 Latin American and Caribbean countries.

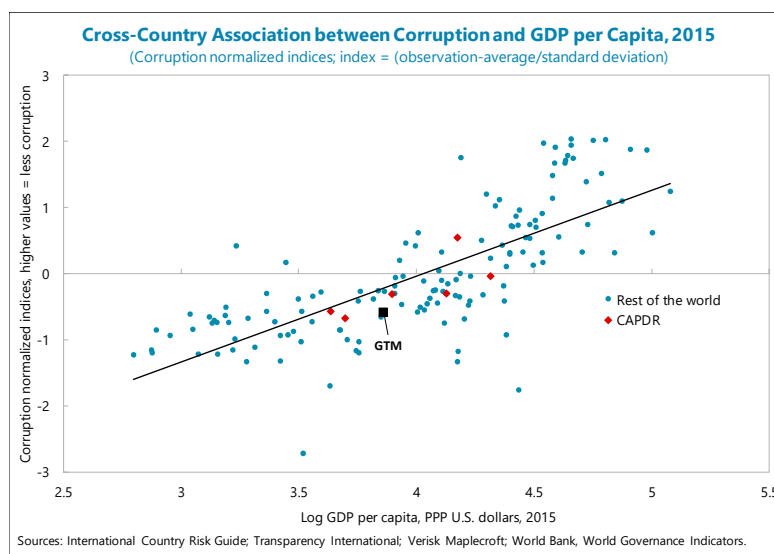
1/ Affirmative includes increased substantially, increased somewhat.

2/ Favorable includes very well, fairly well, and well.

4. Against this backdrop, this paper analyzes the association between corruption and economic growth.

Despite that corruption data are notoriously imprecise given the obscure nature of corruption (Heywood and Rose, 2014), the empirical evidence suggests significant negative effects of corruption on economic growth. Early evidence about the negative impact of corruption on economic growth based on a cross-country empirical analysis is presented in

Mauro (1995). Similar results are obtained by Wei (1999), Méon and Sekkat (2005), Gamberoni et al. (2016). For excellent reviews of the literature, see Svensson (2005), Campos et al. (2010), Ugur and Dasgupta (2011), and IMF (2016). Evidence about the negative economic impact of corruption is also found in microlevel studies, such as Svensson (2003), Fisman (2001), and Fisman and Svensson (2007). We revisit these findings using the most recent available data and relying on cross-country identification.



5. The paper is organized as follows. Section B discusses the channels through which corruption may affect growth. Section C presents the cross-country empirical analysis and discusses potential for faster growth from improved governance. Section D presents avenues for reform.

B. Governance and Growth: The Evidence

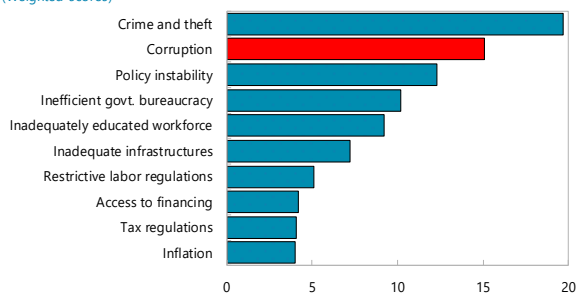
6. Weak governance may undermine the growth potential through various channels:

- *Investment.* Weak institutions increase the cost of doing business and make the appropriation of investment returns less certain (Hausmann *et al.*, 2005), overall reducing investor's risk appetite to invest. Guatemala's governance weaknesses are in the areas of rule of law and overall government effectiveness, with little progress over the past decade (Figure 2). In parallel, Guatemala's gross investment rate has stagnated at 15 percent of GDP after the Global Financial Crisis, significantly below the global, regional, and peers' marks (see companion *Selected Issues Paper* "Investment, Confidence and Uncertainty in Guatemala").

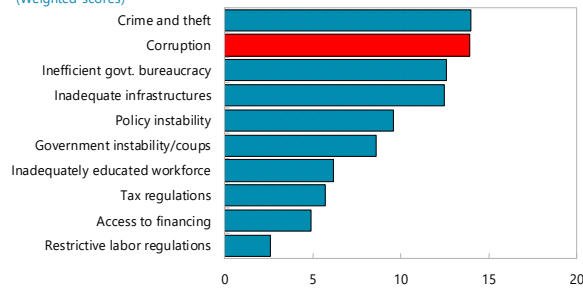
Figure 2. Guatemala: Most Problematic Factors for Doing Business

Weak governance has remained an obstacle for doing business over the past decade.

Top ten problematic factors for business in 2008
(Weighted scores)

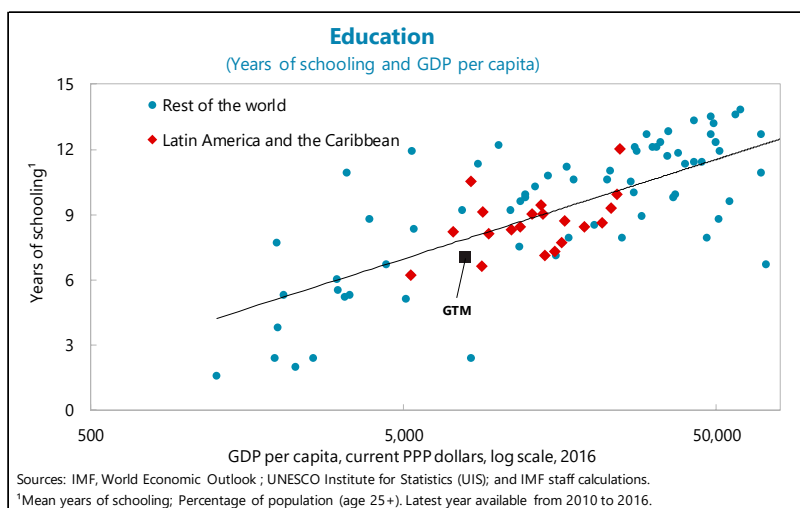


Top ten problematic factors for business in 2017
(Weighted scores)



Sources: Global Competitiveness Report, 2008-09 and 2017-18.

- Human capital.* Poor governance subtracts from government credibility and acts as an impediment to revenue mobilization, hence inadequate provision of public goods health and education—the most basic of human capital. Mauro (1998) and Gupta, Davoodi and Tiongson (2000) demonstrate that higher levels of corruption impacts negatively in the provision of health and education. IADB (2016) and ICEFI (2016) provide more details on the context of the inadequate level of provision of health and education in Guatemala.



- Productivity.* Weak institutions may affect productivity through different channels. First, they may act as a barrier to entry, even bigger than taxes, regulations or infrastructure (Campos, Estrin and Proto 2010). Second, firm-level evidence suggests that weak governance may hinder employment growth and innovation (Aterido, Hallward-Driemeier and Pagés 2007; De Rosa, Gooroochurn, and Görg 2010),³ lowering firms’ overall efficiency (Dal Bo and Rossi,

³ The first study, comprising 69,305 firms from 107 countries, showed that corruption created employment growth bottlenecks for medium and large firms over 2000–2006. The second study, based on enterprise data for Central and Eastern Europe and CIS, documented the association between corruption and firms’ innovation and overall performance.

2006).⁴ Third, weak governance may slow, or even prevent, public investment execution, with poor infrastructure constraining in turn the productivity of private inputs. In the case of Guatemala, reforms of the Procurement Law adopted over the past two years have facilitated greater oversight over public spending and contributed to tackling corruption, but have as a side-effect, led to slower execution of spending in the short term.

C. Cross-Country Evidence

7. We estimate the impact of corruption on economic growth using panel regressions.

Conventional (absolute) convergence regressions are augmented with different corruption indicators. This allows us to look at the impact of corruption on per-capita GDP growth controlling for other growth determinants. The regression is estimated using annual data for 89 countries including advanced and emerging economies. To mitigate the problem of reverse causality, we regress the one-period lagged value of the corruption index on per-capita GDP growth. More specifically, we use the following specification:

$$Y_{it} = c + \alpha \cdot \text{Corrup}_{it-1} + \gamma \cdot Y_{i,0} + \delta \cdot Y_{i,0}^2 + \beta \cdot X_{it} + \varepsilon_{it}$$

where Y_{it} is per-capita GDP growth, Corrup_{it-1} is the lagged corruption indicator, X_{it} is a vector of control variables and ε_{it} is the error term.

8. We exploit the cross-country variation of corruption by running pooled OLS regressions, controlling for country characteristics that affect long-term growth.⁵ We run separate regressions using four different corruption indicators: (i) the ICRG corruption index; (ii) World Bank's control of corruption (CCI) index; (iii) World Economic Forum (WEF)'s ethics and corruption index; and (iv) WEF's irregular payments and bribes index (for a detailed description, see Annex I). Following Barro (2001, 2015) and Contreras and Pinto (2015), we include the following control variables: the log of initial (level and squared) GDP per capita—to control for mean reversion in growth; life expectancy and fertility rate—to control for demographic differences; years of schooling for men and women—to capture human capital investment; inflation and government consumption ratio—to reflect macroeconomic stability; and trade openness and change in terms of trade—to capture the effect of external shocks.⁶

9. Our regression results suggest a significant and positive relationship between governance and GDP growth (Table 2).

⁴ Based on a dataset comprising 80 electricity distribution firms from 13 Latin American countries, the study finds a positive association between firms' inefficiency levels and corruption.

⁵ For some countries (especially advanced economies), the corruption index shows little variation over time. As Barro (2015) points out, variables that have little within-country time variation cannot be estimated with precision using country fixed effects. In a framework without country fixed effects, estimate bias can be eliminated by including a rich array of control variables.

⁶ We exclude investment ratio and measures of institutional quality (e.g. law and order, democracy) from our list of control variables because they are highly correlated with a country's degree of corruption.

Table 2. Guatemala: Impact of Corruption on Per-Capita Real GDP Growth

Per-capita real GDP growth				
<i>Use of corruption indicator:</i>	<i>ICRG corruption index</i>	<i>WB control of corruption</i>	<i>WEF ethics and corruption</i>	<i>WEF irregular payments & bribes</i>
Corruption indicator (one-period lag)	0.22179*** (0.08034)	0.70498*** (0.18733)	0.71305*** (0.22274)	0.53168* (0.28125)
Log(Initial GDP per capita)	5.46109*** (1.45362)	7.82421*** (1.82539)	7.65690** (3.53075)	6.28859 (5.04501)
Log(Initial GDP per capita) squared	-0.34681*** (0.07552)	-0.46960*** (0.09917)	-0.46732** (0.19474)	-0.35053 (0.28039)
1/(Life expectancy)	115.98194 (99.78348)	226.90330* (121.82109)	68.11344 (349.06584)	53.90564 (576.78935)
Log(Fertility rate)	-1.95831*** (0.42826)	-1.22302** (0.52395)	0.55976 (0.92985)	1.98328 (1.25006)
Years of schooling (male)	0.00326 (0.01516)	-0.01171 (0.01846)	0.00088 (0.02651)	-0.00754 (0.02721)
Years of schooling (female)	-0.00080 (0.01332)	0.01854 (0.01561)	0.02341 (0.02344)	0.02903 (0.02635)
Government consumption/GDP	-0.14848*** (0.02661)	-0.21483*** (0.03389)	-0.31429*** (0.05977)	-0.35046*** (0.08205)
Inflation rate	-0.01529*** (0.00388)	-0.05046*** (0.01749)	-0.05350*** (0.01712)	-0.07845*** (0.01412)
Trade openness	0.00869*** (0.00200)	0.00714*** (0.00209)	0.00876*** (0.00292)	0.00903** (0.00353)
(Terms of trade shock)*(Trade openness)	0.00038** (0.00019)	0.00047** (0.00021)	0.00083** (0.00033)	0.00110* (0.00057)
Constant	-15.22457** (7.69232)	-27.43257*** (8.70208)	-28.46918* (15.16164)	-25.40244 (19.83483)
Sample period	1984-2016	1996-2016	2007-2016	2007-2016
Number of observations	1,876	1,228	499	298
Number of countries	84	84	78	73
R-squared	0.08591	0.10137	0.20895	0.26347

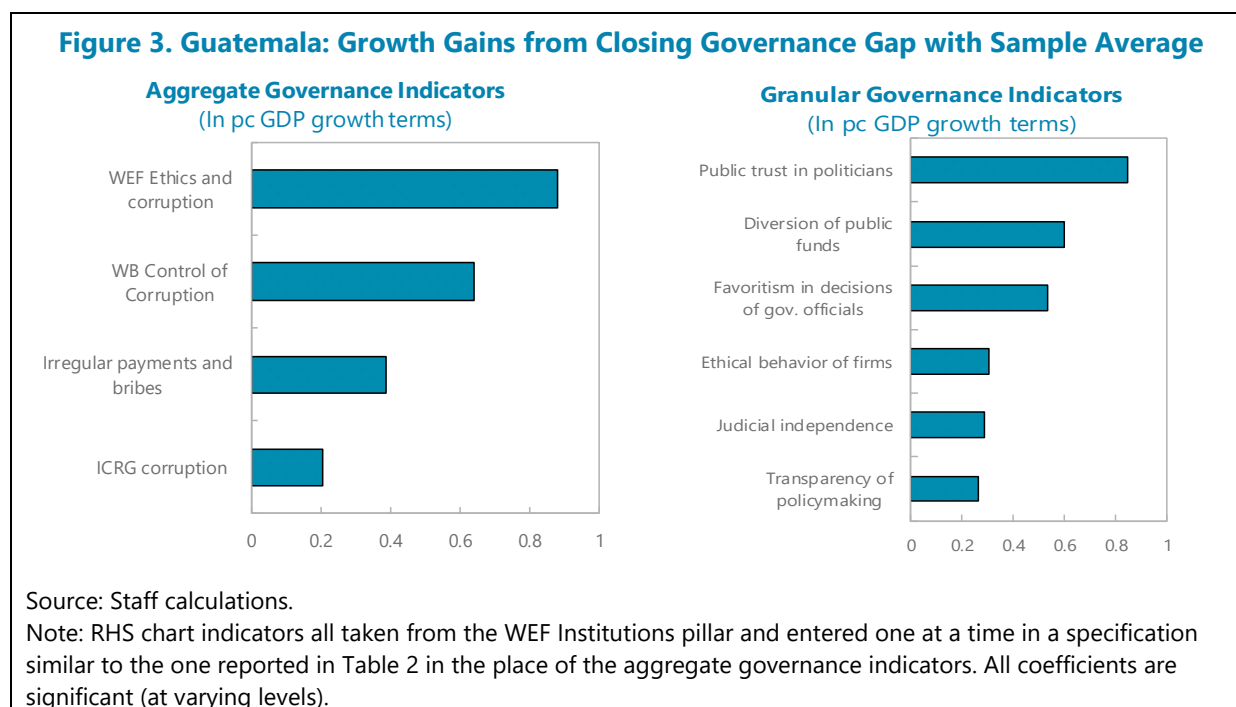
Source: IMF staff estimates.
Notes: Robust standard errors are in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

- For all the four corruption indicators that we use, a higher score indicates lower corruption in the country. The coefficients of the one-period lags of the corruption indicators are all positive and significant, suggesting that lower corruption would raise per capita GDP growth.
- The signs of the control variables are broadly as expected. The coefficients are significantly positive for log GDP and negative for the square of log GDP, implying a likely non-linear

relationship between growth rate and level: for the poorest countries, the marginal effect of GDP level on growth is positive; but for the richest countries, the marginal effect becomes strongly negative (see Barro, 2001). Longer life expectancy and higher fertility rate increase the size of the population and therefore tend to lower GDP growth per capita. Years of schooling are in general positively correlated to per-capita GDP growth, although the insignificant results may reflect poor quality of schooling data. Government consumption ratio is negative and strongly correlated to per-capita GDP growth, as it includes public outlays that do not directly promote productivity. Higher inflation usually suggests lower macroeconomic stability, and is estimated to have negative correlation with GDP growth. Trade openness is estimated to be positively related to growth, so as the improvement in terms of trade.

10. There are significant gains to be reaped from lower corruption in Guatemala.

Regression estimates suggest that, if Guatemala were to close the governance gap with the average country in the sample, its real per-capita GDP growth could be between 0.2 and 0.8 percentage points higher relative to baseline, depending on the corruption indicator considered. Results at a more granular level suggest that improving trust in politicians, tackling diversion of public funds and reducing favoritism in decisions of government officials can deliver the largest growth gains.

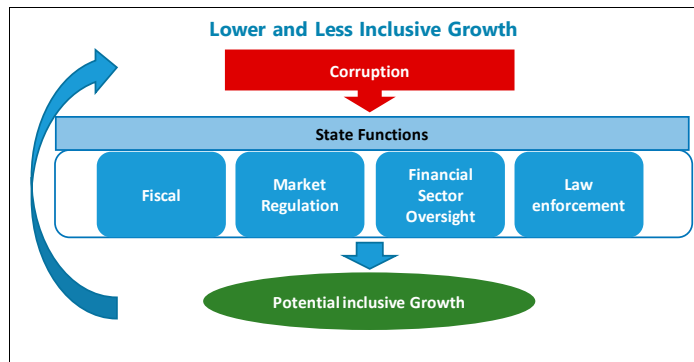


D. Reform Avenues

Sustaining Reform Momentum Through a Multi-Pronged Strategy

11. International experience shows that an effective anti-corruption strategy requires perseverance. Strong political ownership and sustained support from civil society play a vital role in reducing tolerance towards corruption. A newly elected Congress oversaw a flurry of legislation early

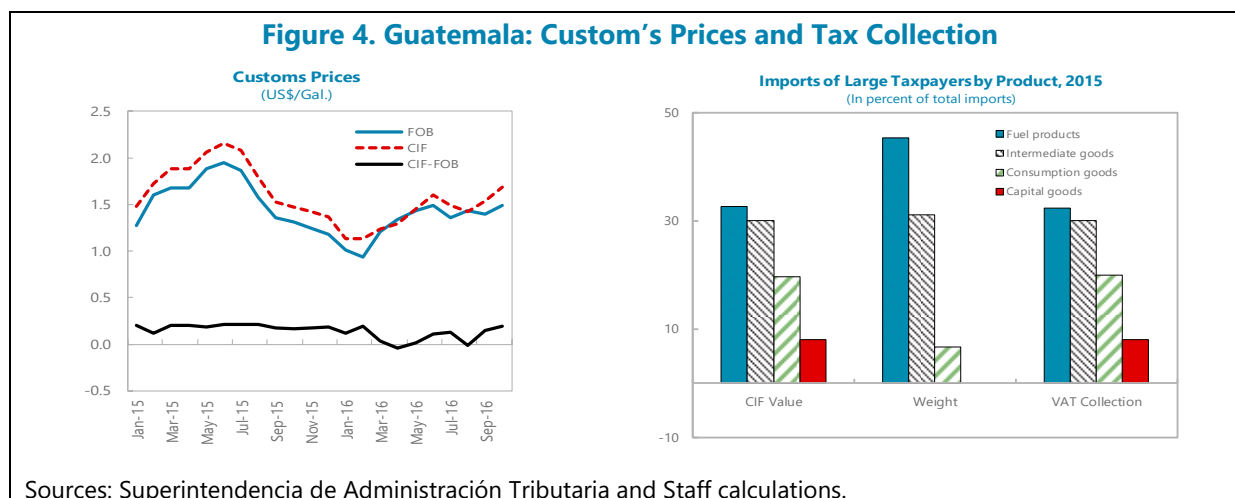
in 2016 (IMF Country Report No. 16/281) and palpable progress is underway in breaking up important criminal groups. These welcome efforts would benefit from additional anti-corruption measures in the fiscal, law enforcement, market regulation, financial sector oversight and public order and enforcement domains.



Tax Revenues

12. Tax administration reforms are off to a good start. Unveiled cases of tax graft in 2015 sharply eroded the credibility of the SAT, weakening tax compliance, and leading to collection losses (Figure 4). As a result, measures were adopted in 2015 to institute a new SAT law aimed at strengthening the integrity and accountability of SAT staff. Ongoing efforts needing perseverance include:

- New standardized, transparent processes that make it more difficult for officials to engage in corrupt practices (strengthened control of goods and their valuation in customs, control of special regimes, effective control of VAT through improved taxpayer registration).
- The publication of the list of VAT-refund recipients to avoid undue reimbursements.
- Retain qualified staff in the SAT and fully integrate information systems to facilitate the flow information between SAT, National Civil Police, IGSS, Ministry of Labor and Commercial Register.
- Deepen the existing inter-institutional agreements involving SAT and private operators and authorities in borders; and harmonizing tax and custom processes with bordering countries.



Public Expenditures

13. Visible efforts directed at promoting transparency of public expenses should be expanded. By releasing resources for investment in physical and human capital, improvements in transparency and the quality of public spending would likely increase GDP per capita in Guatemala.

- The Third National Action Plan of Open Government 2016-2018⁷ jointly elaborated with the CSO's and the Open Budget exercise are good initiatives to facilitate the evaluation of government policies and deter corruption.
- Going forward, there is scope to consolidate and expand the coverage of fiscal reports, enhance the transparency in financial statements of local governments, and bring to fruition the public sector personnel census.

Public Investment

14. Reforms of the Procurement Law, adopted over the past two years, have facilitated greater oversight over public spending and contributed to tackling corruption. The new regulations, which forbid government contracts with state officials and sponsors of political parties, was supported by the adoption of an e-outlet ("Guatecompras") to provide transparent information on procurement transactions and the introduction of reverse auctions to enhance competition among suppliers. While a leap forward, there is ample room to increase transparency in procurement practices:

- Further increase transparency of "Guatecompras". The online procurement portal should disclose documents at all stages of the contracting process and publish information on municipalities procurement activities, with certification and technical assistance from the Ministry of Finance on large procurement contracts. Efforts to make "Guatecompras" fully operational by providing technical assistance to companies, executing units, supervisors are also important.
- Clarify the scope of application for concurrent regulations and reconcile legal interpretations by procuring and auditing agencies. Having set up a Public Prosecutor's unit at the CGC will facilitate the pre-screening of cases avoiding the unnecessary escalation from administrative to criminal sanctions. In addition, new regulations should be adopted to increase the transparency of fideicomisos.⁸
- Further efforts are also needed to speed up spending execution without diluting the warranted focus on better governance: allow for a more streamlined procedure for MINFIN to approve payments on pending contracts; allow auditors from the Comptroller General to

⁷ Available at <http://gobiernoabierto.gob.gt/>

⁸ contracts with a trustor providing financial resources for a specific objective and mandating to a trustee (financial institution) the realization of such objective.

participate as observers in public bids; define procedures outside of the penal system to handle procedural errors in contracting.

- Introduce sanctions to combat fraudulent dividing up of procurement transactions⁹ and remove tax incentives to those entities breaching procurement regulations.
- The newly created vice-ministry for transparency and procurement will oversee and coordinate the myriad of entities involved in procurement with a strong focus on fiscal transparency.

Market Regulation

15. The government is in the process of implementing a comprehensive business facilitation reform to deter corruption. This includes easing procedures for the granting of construction licenses and providing administrative services to business electronically (e-government) on tax reporting (declaraguatae)¹⁰ and business registration (minegocio.gt).¹¹ In addition, the Commercial code now has introduced an arbitration instance for the resolution of business disputes (i.e., breach of contracts) as an alternative to a civil suit.

Anti-Money Laundering

16. A robust AML/CFT framework is important to support anti-corruption efforts. Proceeds of corruption are usually laundered to avoid detection or confiscation, and an effective AML framework can contribute to both prosecuting and deterring corruption. Under the Financial Action Task Force (FATF) standard, a country's AML framework must require (i) risk based supervision of financial institutions and designated non-financial businesses and professions (DNFBPs); (ii) transparency of the ultimate beneficial owner of corporate vehicles; and (iii) effective and operational agencies specialized in preventing and combatting money laundering. These measures, among others, can protect the integrity of the public sector, prevent the abuse of the private sector, and increase the transparency of the financial system to facilitate detection, investigation and prosecution of corruption, therefore enabling the recovery of proceeds of crime.

17. Building on recent efforts to reinforce financial integrity, a stronger AML framework will be paramount to support efforts against corruption and organized crime. Intensified on-site inspections by Guatemala's Financial Intelligence Unit (IVE), and enhanced customer due diligence has helped uncover laundering of proceeds of corruption, including through the capture of banks. Further reinforcement of the AML/CFT regime would support efforts to deter illicit payments. This includes the prompt submission to parliament of a bill, drafted with support from

⁹ The division of a large procurement operation into smaller transactions with a view of bypassing strict bidding and contracting requirements.

¹⁰ SAT is exploring the possibility to consolidate firms' quarterly tax filings into the annual tax report, saving companies close to 40 hours in tax filing per year (240 hours currently).

¹¹ This would allow registering companies online in the Commercial Register, the SAT, the IGSS and the Ministry of Labor.

international organizations. The bill would enact risk-based supervision of financial institutions and designated non-financial business and professions (DNFBPs), which could ensure effective enhanced customer due diligence of politically exposed persons, and suspicious transaction reporting for better oversight.

18. The authorities should continue to increase transparency on the ultimate beneficial owner of legal persons. Guatemala has taken steps to increase transparency in identifying the beneficial ownership of legal persons. Bearer shares have been eliminated and converted to nominative shares, and IVE's 2014 guidelines require reporting entities to establish the identity of those shareholders with a participation greater than 10 percent of the total shares. Additional measures should be adopted to enhance transparency, including an obligation for reporting entities to refrain from entering into, or to terminate, a business relationship when the ultimate beneficial owners cannot be identified (FATF Recommendation #10) and ensuring that the authorities have timely access to accurate information on the ultimate beneficial owners of legal persons.

Enforcement

19. In 2003 the Government of Guatemala requested the United Nations assistance in the creation of a mechanism to support the State in the investigation and prosecution of organized crime. Years after the 36-year-old civil war in Guatemala, the country continued to grapple with a wide spread problem of petty and organized crime, and a prevalent inefficiency of government institutions. After a wave of attacks against human rights activists, the Government of Guatemala requested the United Nations support in the creation of an agency that would investigate and prosecute organized crime—the Commission against Impunity in Guatemala (CICIG). CICIG commenced operations in 2007, and soon after uncovered the existence of sophisticated macro-criminal organizations that had captured different areas of government, from the illicit financing of political parties to the use of the State machinery to produce illicit assets and their consequent laundering. The CICIG's mandate has been extended five times, and it is up for renewal in September 2019.

20. Collaboration between the General Prosecutor's office and the CICIG has been effective at promoting independent investigation of acts of corruption. While the CICIG has signed MOUs with several government agencies, including the IVE, the SAT, and the Comptroller General's Office, its closest relation is with the Prosecutor General's Office (PGO). Since its inception in 2006, the CICIG has collaborated with the PGO in the investigation of complex criminal networks that have infiltrated government institutions. This close collaboration has resulted in increased prosecutorial capacities and independence, a strengthened legal framework through reforms promoted by the CICIG, and in the uncovering of several high-profile cases (Box 1).

Box 1. Unveiling High-Profile Corruption Cases: A Collaborative Effort Between the Public Prosecutor and the CICIG

The CICIG is an independent United Nations body created in 2006. Following 36 years of civil war and long post war period during which organized crime continued to grow, the Guatemalan government requested the United Nations support in the creation of a mechanism for the investigation and prosecution of organized crime. After a consultation with the Constitutional Court, the CICIG was designed as an agency that would support the Public Prosecutor's Office, and work alongside a special unit of prosecutors created specifically for this purpose. The CICIG is led by a Commissioner who is recruited internationally by the UN and has the grade of Under Secretary General (USG), and its staff is also recruited internationally.

CICIG's mandate consists of three objectives. First, to investigate the existence of illicit security forces and clandestine organizations that commit crimes that affect the fundamental human rights of the citizens of Guatemala, identify the illegal group structures, their modes of operation and sources of financing. Second, to collaborate with the Guatemalan Government in the disarticulation of clandestine organizations, promote the investigation, prosecution and sanction of the individuals involved in the illegal groups. Third, to make recommendations to the Government for the adoption of policies directed at eradicating these criminal groups. Additionally, CICIG is also authorized to make administrative complaints against public officials and can act as an interested third party in disciplinary procedures initiated against them. CICIG can also provide technical assistance to government agencies to fight organized crime.

To support the CICIG, a special unit within the Prosecutor General's Office was created, called the Special Prosecutor's Office against Impunity (FECI). The FECI is charged with the investigation and prosecution of those cases of organized crime selected by the Prosecutor General's Office and the CICIG as involving clandestine organizations or illegal security forces, based on the criteria established in the Agreement and determined by the Prosecutor General and the Commissioner, together. CICIG/FECI cases are decided by High Risk Tribunals, created by Decree number 21-2009 to decide on cases that pose a higher risk to magistrates, judges, prosecutors, and other judicial employees, as well as witnesses, defendants and other actors, which includes organized crime.

Over the last few years, the MP and the CICIG have dismantled several networks suspected of illegal activities. A few of the most prominent cases include:

- **Tax Fraud.** A case unveiled in 2015 known as La Linea would have involved importers benefitting from an expedite customs clearance and/or dismissal of customs duties in exchange of payouts to government officials. Investigations on another case led to one of the largest fines on record on a company trying to bribe tax officials to dismiss fraud allegations.
- **Illicit Government Contracts.** (i) Criminal networks would have gained control over public institutions assigning and paying contracts, breaching procurement regulations. Proceeds from these operations would have allegedly financed political campaigns; (ii) Irregular award of contracts was also present in the provision of goods and services such as medicines, medical equipment, and promotional events. Selected companies (in some cases linked to public officials) lacking infrastructure, technical capacity or personnel required for the provision of goods or services would have breached their contract obligations.
- **Judiciary.** Bribery charges have been brought against judges and magistrates for issuing illegal decisions regarding construction license permits, revoking political parties' permissions and protecting relatives, in exchange of payouts or promotions in the Judicial branch.
- **Financial sector.** Bank's executives would acquire undervalued properties from the same bank's portfolio through irregular auctions were funds would be transferred to paper companies' current accounts.

21. However, for anti-corruption efforts to be effective, judicial integrity must be strengthened. While the investigation and prosecution of acts of corruption has increased, the number of convictions has not seen a significant impact (Table 3). At the same time, recent convictions and investigations against members of the judiciary have brought into light the need to enhance judicial integrity. This could partly be due to a lack of transparency in the appointment of judges and magistrates as well as on an insufficient disciplinary regime that does not cover all magistrates (Box 2). This can be achieved through (i) transparency and accountability throughout the selection process of judges and magistrates, beginning with a review of the appointment procedures of the nominations committee, and deeper scrutiny of the members; (ii) and an effective implementation of a transparent merit-based system for the advancement of judges' careers. Online publication of all judicial decisions is step towards reinforcing legal certainty.

Table 3. Guatemala: Prosecution and Conviction of Acts of Corruption

		2010	2017	Avg. 2010-17	Totals 2010-17
Passive bribery	Indictments	7	11	11.0	88
	Convictions	3	2	5.1	41
Active bribery	Indictments	0	4	1.1	9
	Convictions	0	2	0.5	4
Misappropriation	Indictments	0	11	2.6	21
	Convictions	0	2	0.4	3
Trading in influence	Indictments	0	2	0.4	3
	Convictions	0	0	0.1	1

Source: Office of the General Prosecutor.

Box 2. Enhancing Judicial Integrity: Appointment Procedure

According to article 217 of the Constitution, magistrates are appointed from a list compiled by a "nominations Committee". This committee gathers one representative from each Law University in the country, an equal number of representatives from the Bar Association, and an equal number of Supreme Court magistrates. The Law on the Nominations Committees establishes that the committee itself will draft the profile of the candidates and a scoring table for each requirement. The vacancy announcement must be published, as well as the candidates' names, once selected. Once candidates' requirements are verified, and once the interview process is concluded, candidates are scored and the commission will compile a list based on those scores. The list is then submitted to Congress for the subsequent appointments. There is no requirement that the selection process or the voting must be made public, and the candidates' scores are not binding for the final appointment decision. Increased transparency in this selection process could improve judicial integrity, and subject the members of the commission to higher scrutiny in the selection of candidates.

22. Alongside increased judicial integrity, higher judicial effectiveness is much needed. A production based business model could result in increased judicial efficiency. This could include a number of reforms, such as (i) reorganization of courts (separating technical from managerial functions), (ii) simplification of administrative procedures, online access to services, proactive case management, improved budgetary mechanisms, and performance accountability (Esposito, Lanau and Pompe, 2014).

23. Asset disclosures have proven to be a valuable tool to combat corruption. Asset disclosures as included in the Public Probity Law, have been already used in the investigation of corruption and illicit enrichment by the General Prosecutor and the CICIG, with good results. Emblematic cases and ongoing investigations have proven that asset disclosures are an important source of information and support efforts to achieve the integrity of public officials (Table 4). Since 2014, the Comptroller General's Office has received, verified and sanctioned officials administratively for delayed disclosure. It has submitted a total of 540 cases for criminal investigation by the PGO, including for breaches to the Public Probity Law and incurring in delays, or for unexplained patrimonial increases. However, for the system to be truly effective, important reforms are needed, such as (i) the implementation of electronic filing of asset disclosures, which will relieve significant resources currently used to digitalize forms; (ii) access to banking information for the purpose of verification; (iii) the online publication of asset disclosures of all public officials, which will increase transparency and accountability, all of which require legal reforms.

Table 4. Guatemala: Asset Disclosures and Administrative Sanctions

	2014	2015	2016	2017
Received	31,128	17,943	25,948	18,967
Verified	269	220	428	282
Submitted to the GPO	23	16	208	293
Dismissed by the GPO	6	2	18	0
Administrative sanctions	31	36	49	45
Source: Office of the General Prosecutor.				

24. An updated legal framework could enhance anti-corruption efforts. A suite of draft laws is already with Parliament, waiting debate and approval. Laws supporting anti-corruption efforts include a reform to the criminal code (which includes a reform to the crime of illicit political party financing), a reform to the General Comptroller's Office law (to include open government reforms and preventive auditing mechanisms), a reform to the Public Procurement Law, and a reform to the law on the Judicial Power (to separate administrative and jurisdictional functions). Additional laws are needed, which are not yet included in this package, such as a reform to the Law on Appointment Committees, the Public Probity law, or the new AML/CFT law.

Annex I. A Description of Third-Party Corruption Indicators

1. Since corruption is notoriously difficult to measure, we rely on several different data sources:

- Corruption Index from the International Country Risk Guide (ICRG). This index varies between 1 and 6 (with lower values indicating higher corruption) and captures the extent of corruption within the political system, in particular in reference to “excessive patronage, nepotism, job reservations, ‘favor-for-favors’, secret party funding, and suspiciously close ties between politics and business.”
- Corruption Perception Index from Transparency International. This index varies from 0 to 100, with lower values indicating higher corruption. It is constructed by averaging 12 different data sources that capture the perceptions of business people and country experts about the level of corruption in the public sector.
- Control of Corruption indicator from the Worldwide Governance Indicators. This index varies from -2.5 to +2.5 (with lower values denoting higher corruption) and is constructed by aggregating multiple underlying data sources. It captures “perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests.”
- World Economic Forum (WEF)’s ethics and corruption index and WEF’s irregular payments and bribes index is a survey-based index compiled by the World Economic Forum (WEF) in its Global Competitiveness Report. Ethics and corruption is the average of two variables: Diversion of public funds: In your country, how common is diversion of public funds to companies, individuals, or groups due to corruption? (1 = very common; 7 = never occurs) and Public trust of politicians: How would you rate the level of public trust in the ethical standards of politicians in your country? (1 = very low; 7 = very high). Similarly, irregular payments and bribes index average score across the five components of the following questions: In your country, how common is it for firms to make undocumented extra payments or bribes in connection with (1) imports and exports; (2) public utilities; (3) annual tax payments; (4) awarding of public contracts and licenses; (5) obtaining favorable judicial decisions? In each case, the answer ranges from 1 [very common] to 7 [never occurs].

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DISTRIBUTIONAL IMPACT OF FISCAL POLICY AND TAX REFORM¹

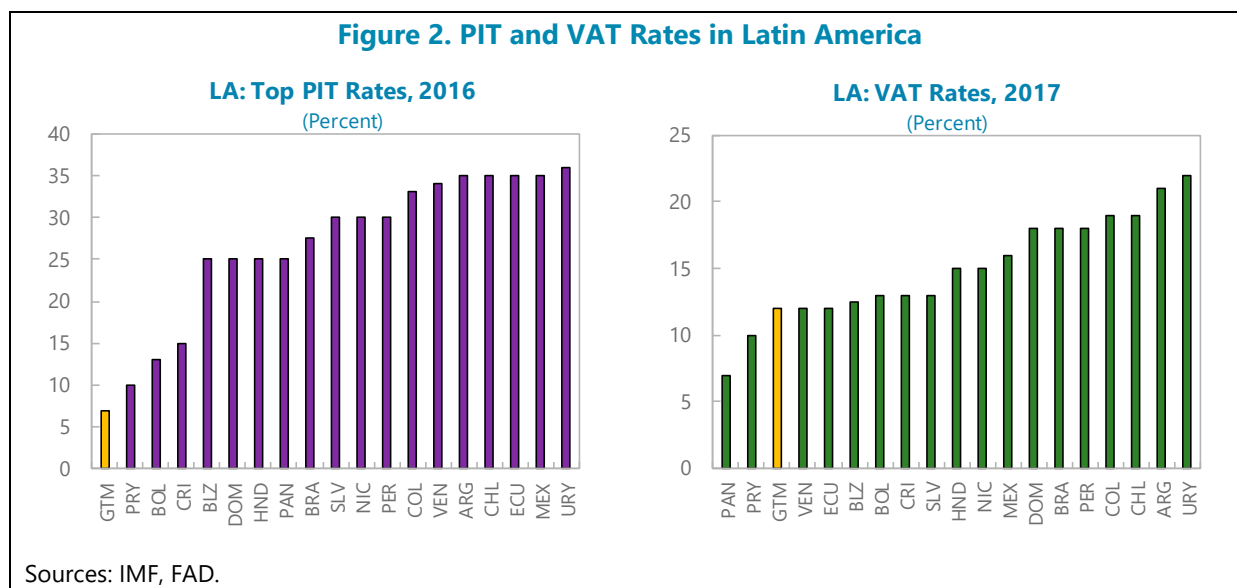
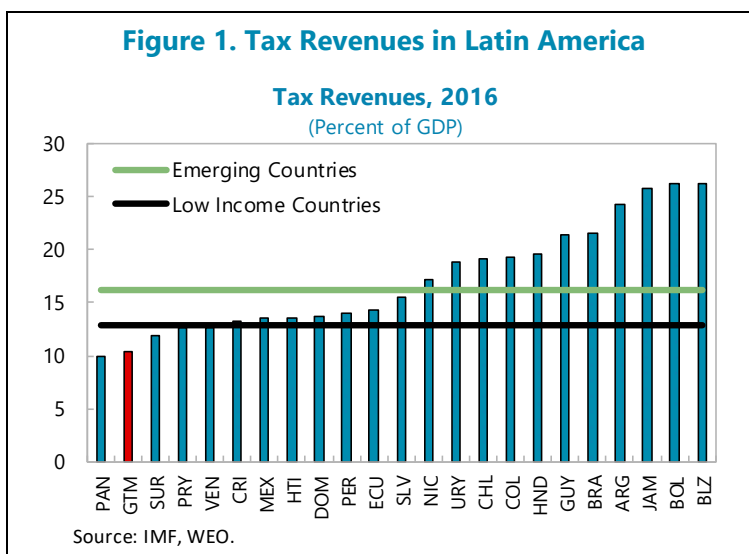
This note examines the distributional impact of fiscal policy in Guatemala, both under the current system and a tax reform scenario. We find that fiscal policy in Guatemala reduces inequality mainly on account of direct taxes and in-kind education and health transfers, but slightly increases poverty as social spending is not sufficient to offset the poverty increasing effect of taxation. The government's 2016 tax reform proposal would likely have raised revenues of 1½ percent of GDP (per official estimates) without materially affecting inequality and poverty compared to the baseline. A progressive spending of the additional revenues could have improved the redistributive outcome of the reform and its impact on inequality and poverty.

A. Introduction

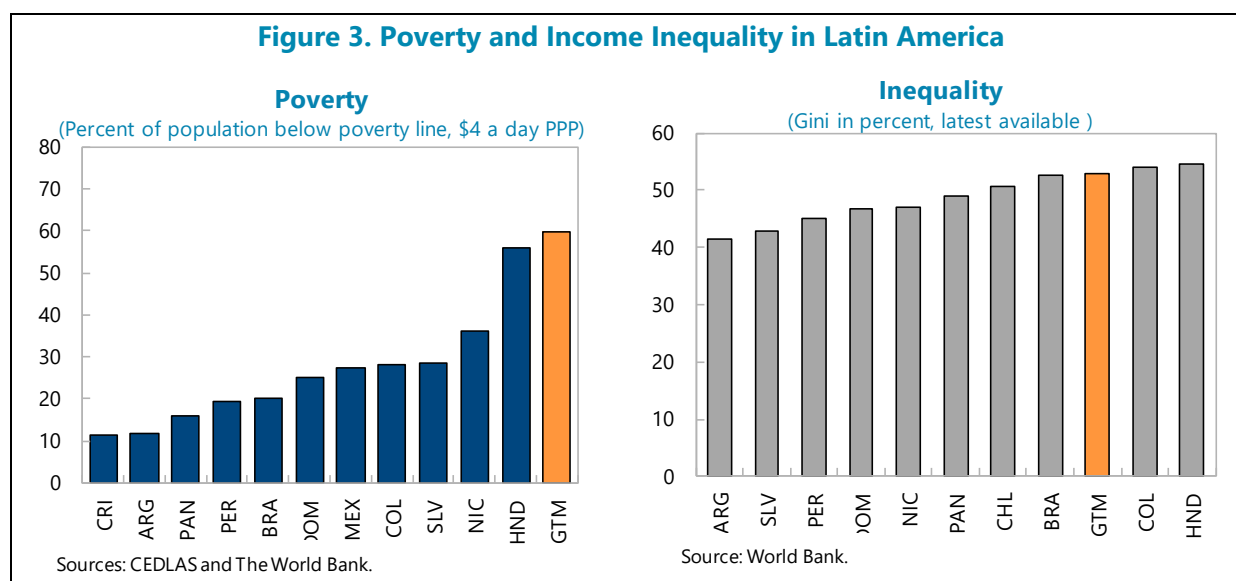
1. Guatemala's tax revenues are one of the lowest in Latin America and the world. In 2016, tax revenues amounted to 10.4 percent of GDP, compared to an average of 17 percent of GDP in Latin America and 16 percent in other Emerging Economies, and even below the average in low income countries (Figure 1). Current tax revenues are only about half the Guatemala's collection potential (tax frontier) which is estimated to be close to 20 percent of GDP based on the country's level of development, openness to trade, inflation, income distribution, corruption, and ease of tax collection (Fenochietto and Pessino, 2013).

2. Low tax rates, tax evasion, and to a lesser extent exemptions are at the root of the low level of tax collection. The maximum marginal rate of personal income tax (PIT, 7 percent) is the lowest in the world (Figure 2), and its threshold (equal to 5.3 times the GDP per capita) is the highest in the region. The value added tax (VAT) rate of 12 percent is also low compared to 13.5 and 15.3 percent in Central and Latin America respectively, although to a lesser extent (Figure 2), while the excise rate on fuel products has not been adjusted for inflation for 10 years. The VAT tax efficiency, which measures VAT collection in relation to private consumption, is one of the lowest in the region on account of exemptions, tax evasion, and the high level of consumption of own production goods. Tax evasion is high even by regional standards, and while tax expenditure is comparatively low when measured in relation to GDP (2.5 percent), it is high when measured in relation to collection (23 percent).

¹ Prepared by Maynor Cabrera, Valentina Flamini, Sandra Martínez and Hilcías E. Morán. This study is part of a collaborative effort between the IMF and the Commitment to Equity (CEQ) Institute. The CEQ project is an initiative of the Center for Inter-American Policy and Research (CIPR) and the Department of Economics, Tulane University, the Center for Global Development and the Inter-American Dialogue. For more details visit www.commitmentoequity.org.



3. Low tax collection reduces the progressivity of the tax regime and the redistributive capacity of public spending. The current structure of PIT, with only two brackets and a very low top marginal rate, dramatically reduces the progressivity of the PIT, and so does its low collection. Low tax revenues constrain the size of the government and its capacity to provide essential public goods. Besides limiting the potential to finance the social and infrastructure spending that the country needs, low revenues also limit the redistributive capacity of public spending, necessary to lift its people out of the pervasive levels of poverty and inequality. As a consequence, compared with other Latin American countries, Guatemala is the poorest and one of the countries with the highest income inequality (Figure 3).



4. In August 2016, the government proposed a tax reform aimed at increasing tax revenues. The main objectives of the reform proposals were to: (i) widen the tax base; (ii) raise revenues from income taxes; (iii) update excises on fuel products and cement; and (iv) increase royalties on the mining sector. The tax reform proposal had strong technical underpinning and was consistent with Fund advice, but had to be withdrawn due to lack of political support.

5. This paper estimates the distributional impact of the Guatemalan fiscal policy under the current system and the tax reform proposed in August 2016. By using standard incidence analysis and microdata from the 2014 Nation Household Survey of Living Conditions (ENCOVI by its acronym in Spanish), we estimate the income redistribution and poverty impact of fiscal policy (taxes, social spending and subsidies) under the current system (baseline) as well as in a reform scenario simulating the implementation of the August 2016 tax reform proposal. We also estimate how individual fiscal measures affect the redistribution capacity of the system and its poverty outcomes to better interpret our aggregate results and provide more granular guidance for the design of a more progressive system.

B. The August 2016 Tax Reform

6. Official estimates indicate that the reform proposal would have raised tax revenues by 1½ percent of GDP. Its main components were:

- An increase in *corporate income tax (CIT)* rates both under the net income and gross sales regimes (Table 1):

Table 1. Guatemala: CIT Reform Proposal

Table 1. Guatemala: CIT Reform Proposal				
<i>Profits Regime</i>	Actual		Reform	
	25%		29%	
<i>Gross Sales Regime</i>	Actual		Reform	
Brackets	Fixed amount	Rates	Fixed amount	Rates
Q1 - Q30,000	0	5%	0	5%
Q30,000 - Q250,000	Q1,500	7%	Q1,500	7%
Q250,000 -	Q1,500	7%	Q17,500	12%
Source: Authors' elaboration based on Iniciativa de Ley para la Recuperacion de la Capacidad Fiscal (Decree 10-2012). Retrieved from				

- An increase in *personal income tax (PIT)* rates and the introduction of two additional brackets to the scale (Table 2), while re-establishing the tax credit for VAT on personal purchases for wage earners (which had been eliminated with the 2012 tax reform). The proposal also introduced new deductible expenses for medical, private education, and contributions to private pension plans payments. These deductibles, along with the VAT tax credit, would have partially offset the increase in tax revenues from higher rates and a more progressive scale.

Table 2. Guatemala: PIT Reform Proposal

Table 2. Guatemala: PIT Reform Proposal			
Actual			
Brackets	Fixed amount	Rates	
Q 1- 300,000	0	5%	
Q300,000 -	Q15,000	7%	
Reform			
Brackets	Fixed amount	Rates	
Q1 – Q65,000	0	15%	
Q65,000 – Q180,000	Q9,750	20%	
Q180,000 – Q295,00	Q32,750	25%	
Q295,000-	Q61,500	29%	
Source: : Authors' elaboration based on Iniciativa de Ley para la Recuperacion de la Capacidad Fiscal (Decree 10-2012). Retrieved from http://www.minfin.gob.gt/images/archivos/prensa/comunicados/compre79_110816.pdf			

- Higher *excise taxes on fuel products* by 3 quetzales (USD 40 cents) per gallon of gasoline, diesel, jet fuel and kerosene. The additional revenues would have been earmarked to finance the road maintenance fund (*Unidad Ejecutora de Conservación Vial, COVIAL*).
- Higher *excise tax on cement* from 1.50 quetzales (USD 20 cents) to 5 quetzales (USD 70 cents) per bag of cement.

- Higher *royalties* from 1 to 10 percent for gold, silver and platinum, and to 3 percent for other metallic minerals. Part of the of royalties would have been distributed to the municipal governments in which the mining operations are located.
- Other tax administration measures aimed at widening the tax base.

7. Given the nature of the analysis, based on household microdata, this study examines the redistributive impact of the PIT and excise taxes (fuel and cement) components of the reform. The proposed reforms to the corporate income tax and royalties cannot be analyzed as they do not directly affect households' income and consumption.

C. Data and Methodology

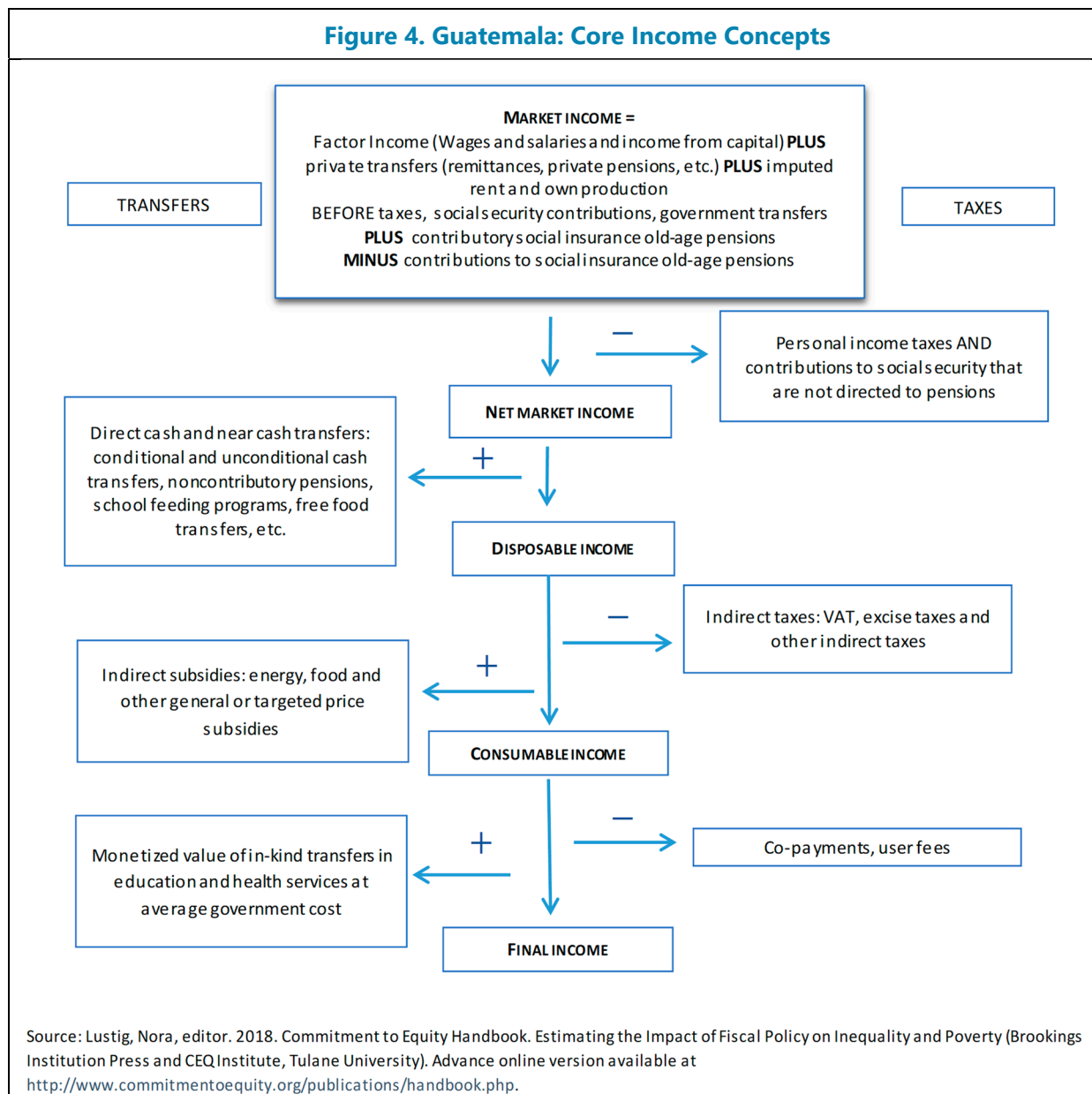
8. We apply standard incidence analysis to household microdata based on five core income concepts. Households microdata are from the 2014 ENCOVI (latest available). The analysis is static, reflecting the estimated impact of policy amendments without any feedback effects from possible dynamic adjustments in taxpayers' behavior in response to the reforms. The key measure is the difference between the Gini coefficients for relevant income definitions before and after the reforms. Following Lustig (2018), the five core income concepts used for the incidence analysis are (Figure 4):

- *Market income.* Includes factor income (wages and salaries and income from capital), private transfers (remittances, private pensions, etc.), imputed rent, and self-consumption.
- *Net market income.* Subtracts from market income direct personal income taxes (obtained by simulation) on the income sources subject to taxation, and contributions to social security.
- *Disposable income.* Adds direct government transfers to the net market income.
- *Consumable income.* Adds indirect subsidies and subtracts indirect taxes (e.g., value added tax, excise tax, etc.) from disposable income. Indirect taxes are obtained through simulation based on household consumption, current rates and tax exemptions. For taxes on fuel products, in addition to the direct effect of consuming them, we estimate the indirect effect resulting from the price increase of other consumption goods that use fuels in their production/transportation.²
- *Final income.* Adds to consumable income the monetized value of in-kind government transfers in the form of free or subsidized education and health services. For the former, the national average value of per-level expenditure was imputed to those individuals who reported attending a public education school in the ENCOVI. For the latter, the average value

² The indirect effect was estimated by matching the consumption product categories of ENCOVI 2014 with the disaggregation of the Social Accounting Matrix (SAM) and multipliers corresponding to the cost-push model by Jellema and Inchauste, 2018. The SAM was estimated by Escobar (2015) using as inputs the National Accounts published by the Bank of Guatemala and the ENCOVI 2011.

was imputed to those who reported using health centers and public hospitals and those being affiliated to the Guatemalan Social Security Institute (IGSS). These average values were estimated using the functional classification reported by the Ministry of Public Finance and the program spending reported by the IGSS.

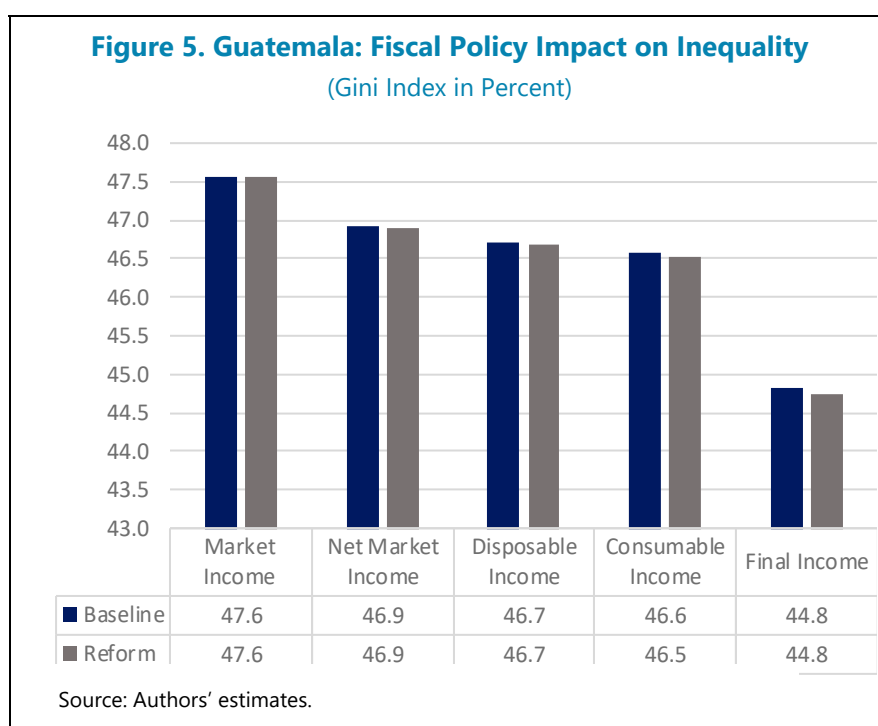
Figure 4. Guatemala: Core Income Concepts



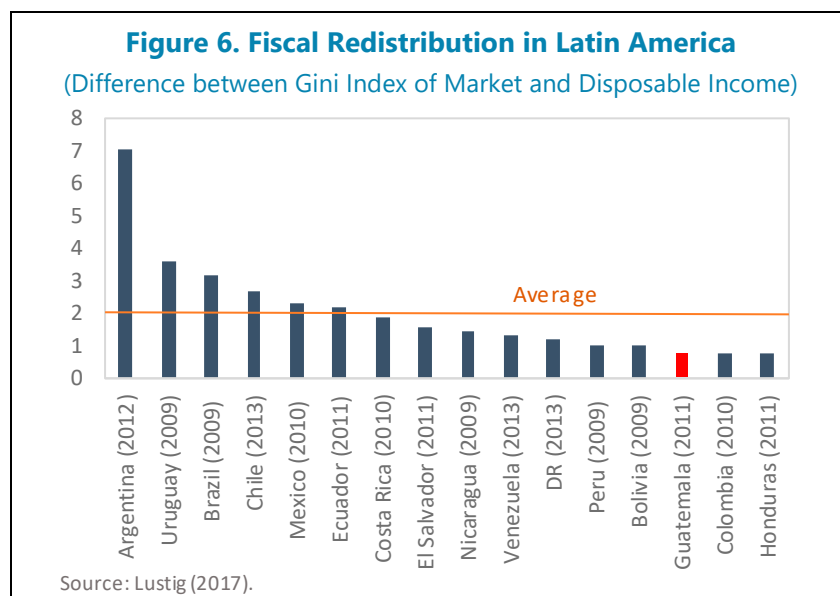
D. Main Results

Fiscal Policy Impact on Income Inequality

9. Fiscal policy only moderately reduces income inequality, mainly because of direct taxes and in-kind transfers. At 47.6 percent, the market income Gini coefficient is one of the highest in Latin America. The Gini coefficient for net income decreases by 0.7 percentage points, as a consequence of direct taxation (Figure 5). Government transfers and indirect taxes have a comparatively smaller reduction effect on inequality, lowering the index by only 0.2 and 0.1 percentage points respectively. The Gini coefficient falls by 1.7 percentage points—to just below 44.8 percent—once the monetized value of education and health services is considered, pointing to a substantial inequality reducing impact of in-kind government transfers. However, at merely 2.8 percentage points, the overall effect of fiscal policy on income inequality is very small, making Guatemala one of the least redistributive countries in Latin America (Figure 6).



10. The reform would have not materially affected income inequality compared to the current system. The Gini coefficients under the reform scenario are broadly the same compared to the baseline (Figure 5). The proposed reform to indirect taxes on fuel products and cement would have slightly improved income redistribution but this effect would have been marginal (a reduction of about 0.1 percentage points in the Gini index for consumable income).

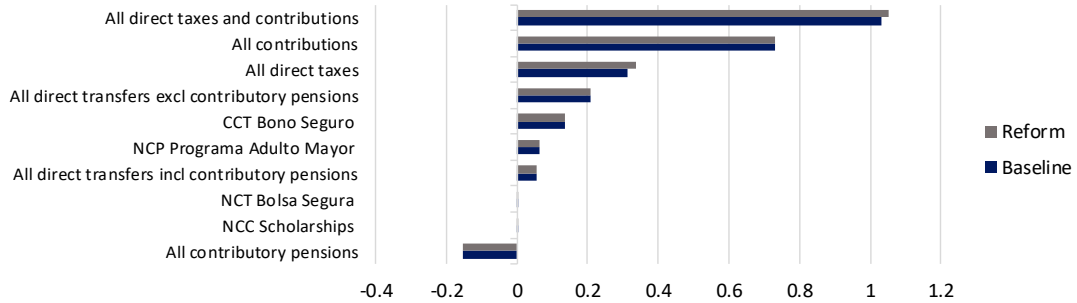


11. Direct taxes and government transfers, particularly in-kind, have the most equalizing effect. Marginal contributions single out the redistributive effect of specific policies, they are calculated as the difference between Gini coefficients with and without the relevant measure all other policies being equal. Taxes and transfers are defined as equalizing, neutral, or non-equalizing if their marginal contribution is positive, nil, or negative, respectively. The marginal contributions to each income definitions displayed in Figure 7 shows that direct taxes and government transfers are equalizing, but contributory pensions increase inequality as low-income workers are often not eligible for contributory pensions having short contribution histories mainly because of work in the informal sector. The conditional cash transfer program *Mi Bono Seguro* is more equalizing than the non-contributive pension *Aporte al Adulto Mayor*, while other conditional transfers programs are neutral. Indirect subsidies are also neutral, while indirect taxes are slightly more equalizing under the reform than in the baseline because of the higher excises on fuel products. Spending on education and health are also equalizing, and the marginal contributions of primary education far exceed those of other social spending items, while in-kind university education and social security health services worsen inequality as they tend to be accessed by higher income population.

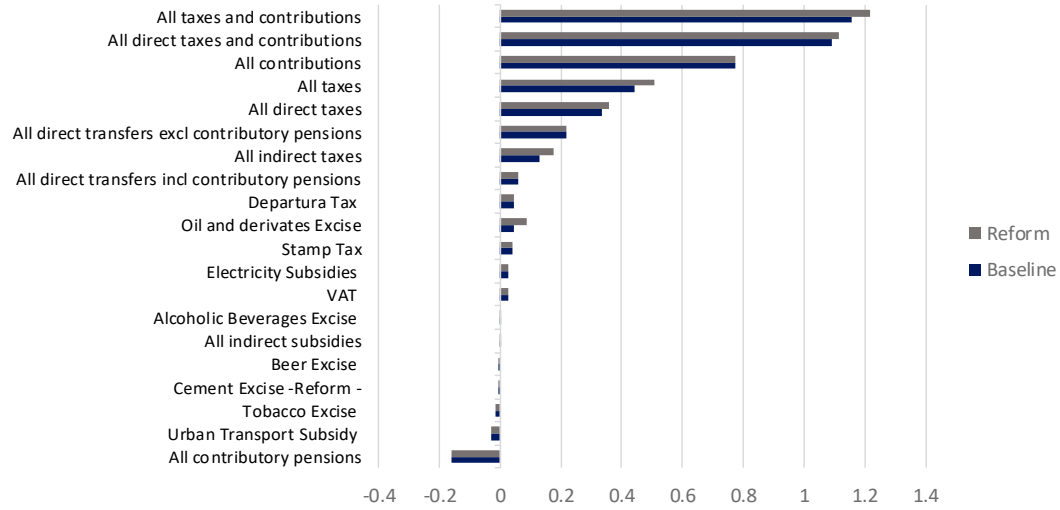
Figure 7. Guatemala: Marginal Contribution of Selected Individual Measures by Income Definition

(Difference in Gini Index with and w/o Measure, Percentage Points)

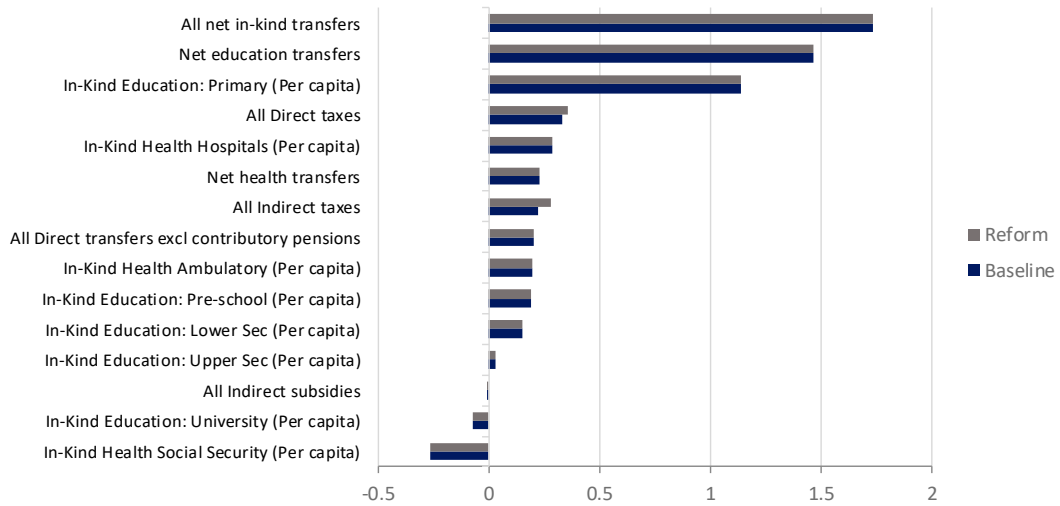
To Disposable Income



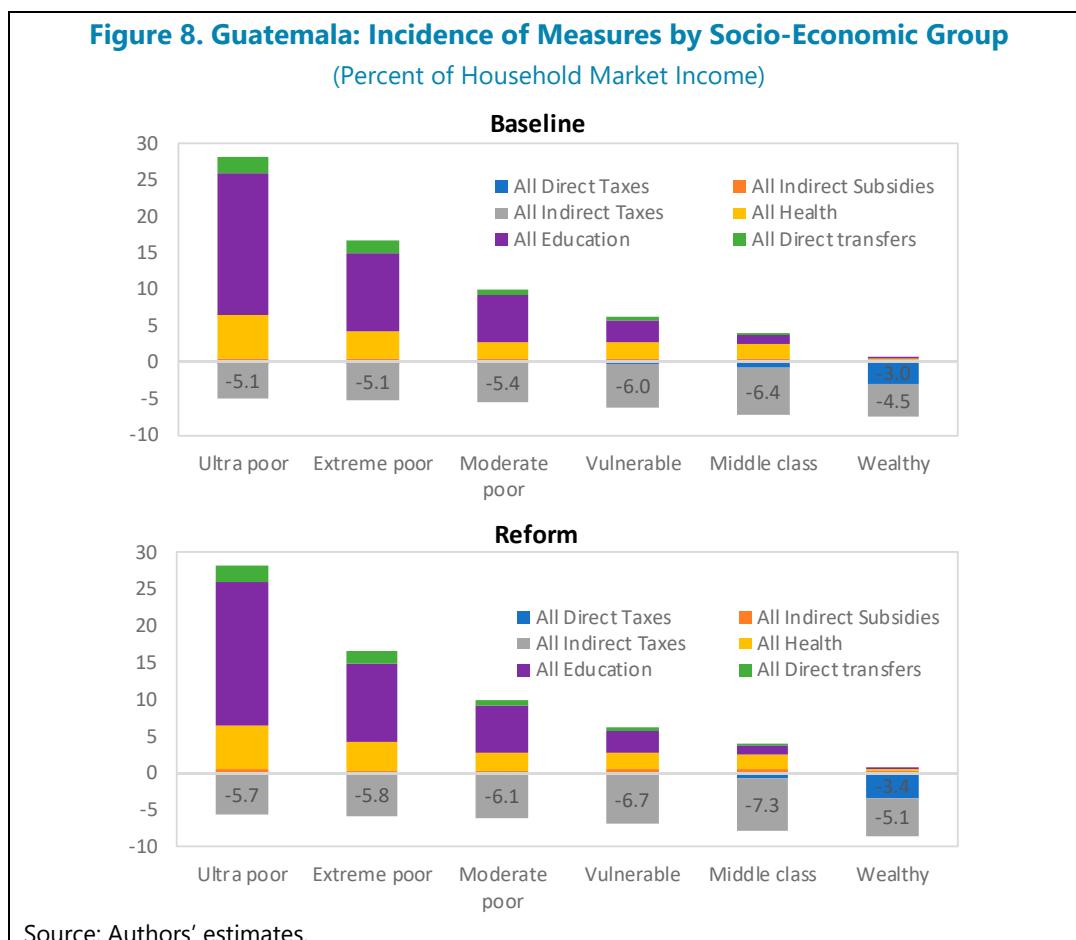
To Consumable Income



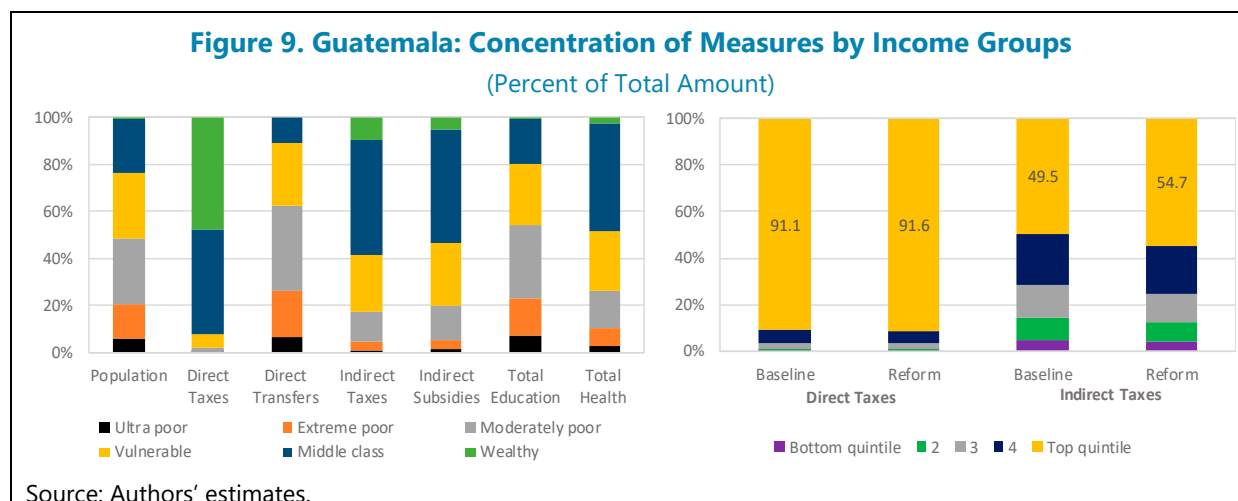
To Final Income



Source: Authors' estimates.

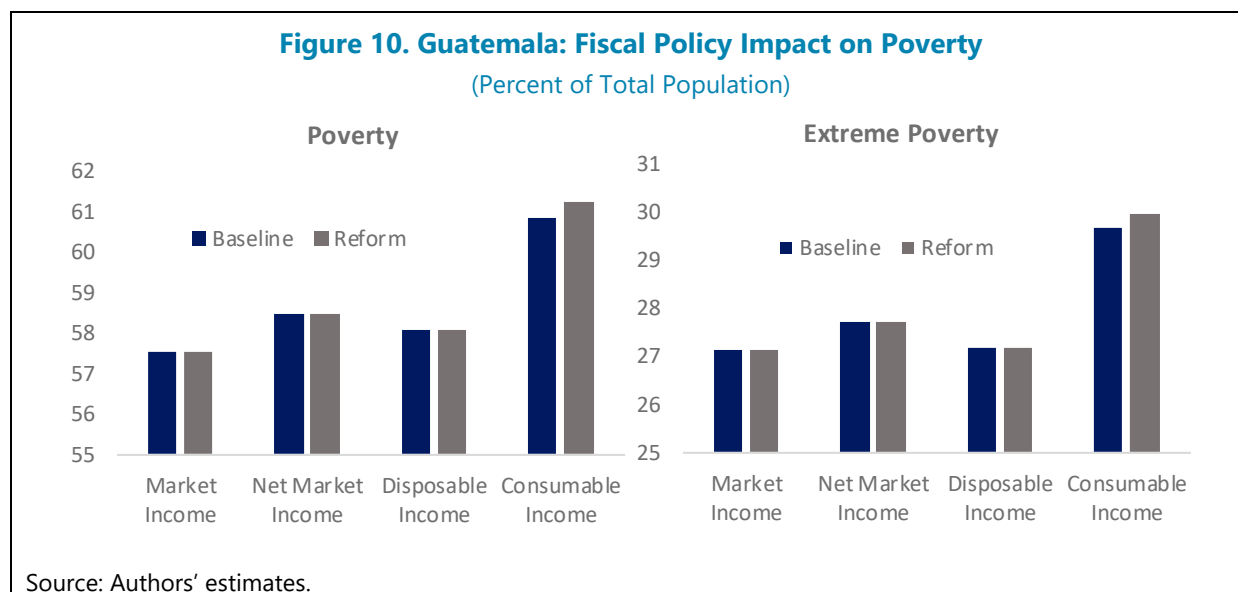


12. The tax reform would have increased the share of total direct and indirect taxes contributed by the rich. Under the current system, approximately 93 and 60 percent of total direct and indirect taxes respectively is paid by the wealthy and the middle class (Figure 9, left panel). Almost 90 percent of total direct transfers is received by the poor and the vulnerable, although more than 50 percent of indirect subsidies are received by the middle class and wealthy population due to their higher consumption levels compared to poor households. Education is more pro-poor than health: while 80 percent of education benefits are received by poor and vulnerable population groups, almost 50 percent of health benefits are received by the middle class and the wealthy due to the incidence of contributory health coverage. The tax reform would have increased the direct and indirect tax burden on the top quintile by 0.5 and 5.1 percent of total payments respectively, proportionally reducing the burden on lower quintiles (Figure 9, right panel).



Fiscal Policy Impact on Poverty

13. Direct transfers effectively reduce poverty but their impact is not sufficient to offset the poverty increasing effect of taxation. Under the current system, net market income poverty is marginally higher than for market income, suggesting that direct taxation increases the share of the population leaving below the poverty line (Figure 10). Direct transfers lowers of disposable income poverty but this effect is not sufficient to entirely offset the poverty-increasing effect of direct taxation. Moreover, indirect taxes increase consumable income poverty to about 61 percent of total population, compared to 58 for market income.³



³ Poverty of final income cannot be evaluated due to the difficulty of quantifying the minimum income necessary to acquire basic levels of health and education services provided by governments.

14. The reform would have not materially altered the effect of fiscal policy on poverty. Net market and disposable income poverty under the reform is the same as under the current system. This is because the tax reform did not contemplate changes to the system of direct transfers while the reform of PIT would have only impacted the top 20 percent of the Guatemalan population (Figure 9), which are not poor. However, consumable income poverty would have marginally but not significantly increased under the reform due to higher indirect taxes that lower the purchasing power of all social economic groups, including the poor (Figure 8).

15. Expanding the current system of cash transfers would help mitigate the poverty increasing effect of fiscal policy in Guatemala. Figure 11 shows that the poverty-increasing effect of direct taxation mainly stems from social security contributions, which are also paid by low income workers, and to a less extent to PIT. On the other hand, the non-contributory pension program *Mi Adulto Mayor* and the conditional cash transfers program *Mi Bono Seguro* effectively reduce poverty but their small budget dramatically limits their potential to lift the incomes of Guatemala's poor people. For example, the coverage and budget of the *Mi Bono Seguro* program, which is the most important of the two, has been shrinking since 2012: the program's budget only amounted to 0.06 percent of GDP in 2015, and it only covered less than 20 and 30 percent of poor and extremely poor population respectively. Figure 11 also shows the negative effect of indirect taxation and its marginally higher impact under the reform due to higher fuel and cement excises.

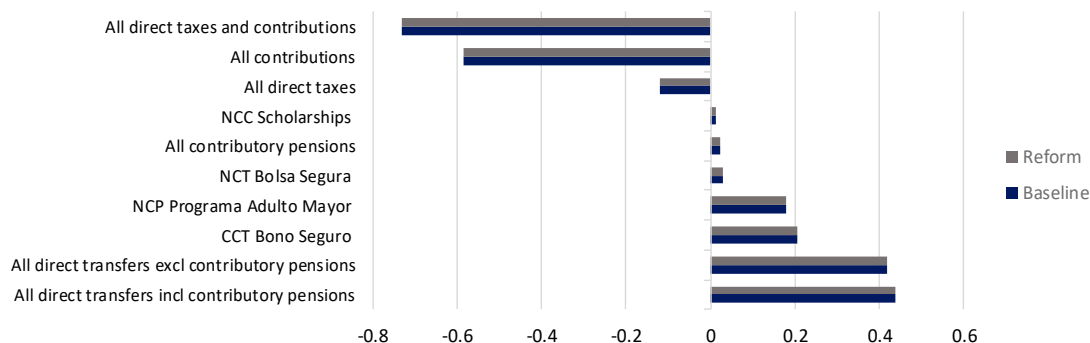
E. Conclusions and Policy Recommendations

16. The fiscal reform would have not materially impacted poverty and inequality, but would have mobilized revenues that could have been used to improve the progressivity of the system. Our analysis suggests that poverty and income inequality under the reform would have not been materially different than under the current system. However, the revenue potential of the reform (1½ percent of GDP per official estimates) could have been used to lift the income of poor households or step up investment. In the former case, poverty and inequality could have been directly decreased through direct income assistance to poor households. In the latter case, both would have decreased through the indirect effect of higher growth and potential, which would have boosted labor demand and productivity, and plausibly lowered food prices and their deleterious effect on extreme poverty (IMF cr16282).

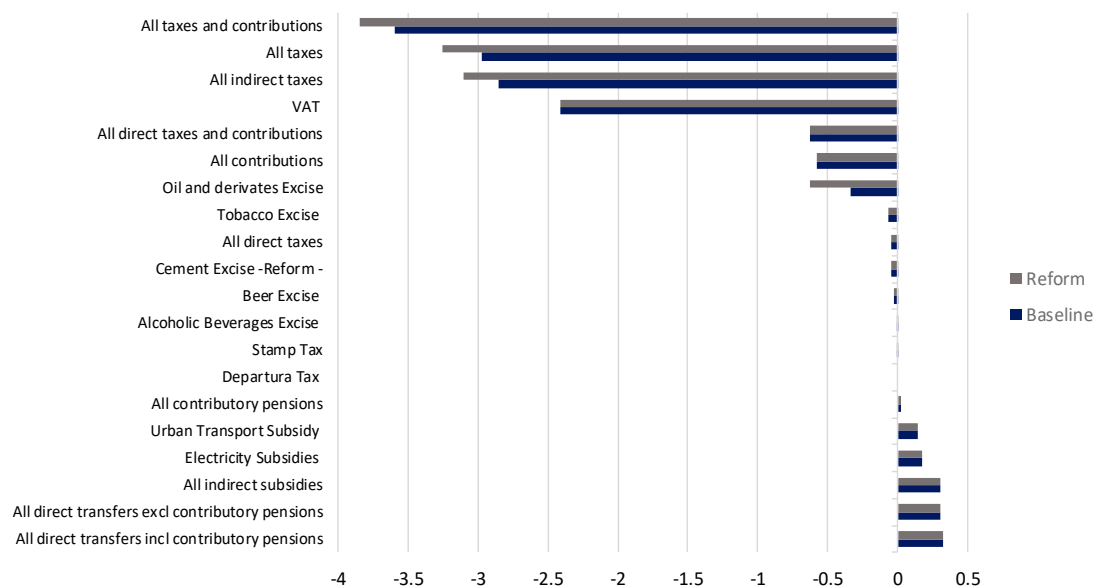
17. A well-designed tax reform should maximize income potential while mitigating the negative incidence of higher taxes on poor households. Our disaggregated results show that direct taxation has a milder negative effect on lower income households compared to indirect taxation. Given very low PIT rates in Guatemala, PIT represent a privileged candidate to be reformed. However, the revenue potential of direct taxation tends to be lower than that of indirect taxation suggesting that a tax reform may need to involve indirect taxes as well, given Guatemala's significant tax revenue gap. As noted above, the ultimate redistributive effect of a tax increase depends on the way the revenues mobilized are spent: if the yield from higher indirect taxes are used to finance an expansion of well targeted social spending, the negative incidence on the income of the poor could be mitigated and possibly entirely offset.

Figure 11. Guatemala: Poverty Reduction Effect of Individual Measures
(Difference in poverty rates with and w/o selected measures)

To Disposable Income



To Consumable Income



Source: Authors' estimates.

18. The results presented above provide a granular assessment of individual policies that could guide the design of a more progressive fiscal policy in Guatemala. The incidence and concentration of individual policies estimated above could be used to design a fiscal system that maximizes revenues and progressivity while minimizing the negative effect on poor households. Given endemic poverty levels in Guatemala, an initial expansion of social assistance programs—particularly in conditional cash transfers that tend to enhance human capital through better education and health care—should be prioritized. However, boosting infrastructure investment (and with it potential growth and productivity) and expanding formality would also be crucial to initiate a virtuous cycle of growth and poverty reduction in which better labor and higher equality of opportunities would help poor household lift themselves out of their condition.

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BANKING SECTOR VULNERABILITIES AND RESILIENCE TO SHOCKS¹

This note conducts stress tests to Guatemalan banks' solvency and liquidity positions. Results suggest that the financial sector is exposed to valuation losses on government bonds and very severe liquidity shocks in U.S. dollars, but is well prepared to absorb a range of shocks with available buffers. The identified vulnerabilities could be mitigated by introducing capital requirements for market risks, and adopting the Basel III LCR in U.S. dollars for monitoring purposes to enhance banks' management of liquidity risks.

A. Soundness of the Banking Sector and Risks

1. Banks are well capitalized, asset quality and liquidity indicators are robust, and healthy profits provides reasonable cushion. The CAR for the banking system was 15 percent as of September 2017, well above the 10 percent minimum regulatory requirements. On average, only less than 3 percent of total loans are impaired, although this share is higher for selected banks with limited market share, and loan performance has been declining over the past two years. The system is liquid and healthy profits provides cushion although a continued increase in non-performing loans could erode profitability metrics.

2. Banks are mainly oriented towards lending activities and deposits are the main source of funding. On average, loans represent about half of banks assets, the rest comprising of long-term bonds (14 percent) cash and T-bills (13 percent), and other assets (18 percent). Given the composition of banks' balance sheets, most potential losses and risks to solvency are likely to come from direct and indirect credit risks in the loan book. Deposits account for almost 75 percent of total liabilities across the system, with little difference among banks. The deposit to loans ratio is also well above 100 for the system as a whole as well as individual banks, with only two exceptions. However, at 30 percent of total, the share of foreign liabilities is significant and has been on an increasing path over the last years—from about 10 percent in 2010—exposing the system to rollover risks.

3. The banking system remains very concentrated and FX induced risk is an important vulnerability. Nearly 90 percent of total assets are concentrated in the six largest banks (out of 18) and the top three accounts for over 65 percent of market share. The relatively high dollarization of both bank assets and liabilities remain the main source of risk to the system. About 40 percent of banks loans are denominated in foreign currency, and 44 percent of them (or 17 percent of total) are extended to un-hedged borrowers, exposing the system to FX risk through credit risk. At the same time, about one third of bank liabilities are denominated in foreign currency, exposing banks to FX risk in case of a large currency depreciation, although the system overall has positive net FX exposure, thus mitigating such risk.

¹ Prepared by Valentina Flamini. The author thanks Hilda Maria Pacheco Escobar de Figueroa and Cesar Enrique Marroquin Fernandez for providing the data necessary for the analysis.

Table 1. Guatemala: Selected Banking Sector Soundness Indicators
(Percent, September 2017)

	All banks
<i>Capital Adequacy</i>	
Total capital / RWA (CAR)	14.8
<i>Asset Quality</i>	
NPLs (gross)/ total loans	2.6
Provisions/NPLs	113.6
FX loans/total loans	38.4
<i>Funding</i>	
Deposits/total liabilities	73.4
Deposits/total loans	128.5
<i>Profitability</i>	
ROA (after-tax)	1.3
ROE (after-tax)	13.9
<i>Liquidity</i>	
Liquid assets/total assets	27.0
Liquid assets/short-term liabilities	65.8
<i>Sensitivity to Market Risk</i>	
Net FX exposure / capital	14.2
Sources: SIB; and IMF staff calculations.	

B. Solvency Stress Test

4. The stress test covers the main risks to solvency and liquidity faced by the banking sector. The top-down solvency stress test includes: (i) credit risk, through an aggregate NPL shock as well as differentiated sectoral shocks; (ii) market risk, through interest and exchange rate risk; (iii) contagion risk through interbank exposure, and (iv) a set of reverse tests. The liquidity stress test models a simple liquidity drain that affects all banks in the system proportionally to each bank's liquidity holdings (the next section focuses on a more granular and longer-term analysis of FX liquidity buffers in the system).

5. The impact of single shocks to solvency is moderate and could be absorbed by existing buffers:

- The *Credit risk shock* is modeled as a system-wide proportional increase in NPLs to 3.3 percent of total loans (the mean value plus two standard deviations of NPLs over the last decade); and sectoral shocks of 6½ percent in the trade, manufacturing and non-bank financial sectors—which account together for almost 40 percent of total loans. Consistent with the composition of banks' balance-sheet data, results suggest that credit risk losses from a credit shock, both system-wide and sectoral, would materially affect banks capital adequacy, but losses would be limited: on average the CAR for the system would fall by 1.4 and 1 percent following the system-wide and sectoral shocks respectively, but would in both cases remain above

13 percent on average and the minimum 10 percent requirement for individual banks (Figure 1 and Table 2).

- The *interest rate risk shock* assumes a nominal interest rate increase of 2 percentage point. The analysis includes: (i) the flow impact from the gap between interest sensitive assets and liabilities; and (ii) the stock impact from bond repricing. While the simulated increase in interest rates would result in virtually no change in interest income as the system has on average balanced cumulative interest sensitive positions across maturity buckets, valuation losses on sovereign bond holdings would reduce the system-wide CAR by 3 percent, and the CAR of two banks would fall below the minimum 10 percent (Figure 1 and Table 2). However, this vulnerability is mitigated by current accounting standards requiring banks to value securities issued by the Central Bank and the Ministry of Finance at their acquisition cost.
- The *FX risk shock* assumes a 12 percent nominal depreciation of the bilateral exchange rate with the US dollar, calibrated to match the difference between the current exchange rate and its most depreciated value since 2000, and looks at: (i) the direct exchange rate risk effect on FX exposures; and (ii) the indirect effect through credit risk considering that 44 percent of loans denominated in foreign currency are extended to borrowers without natural edges. Results indicate that the simulated FX depreciation would marginally improve banks capitalization as a result of their net long position in FX which would be more than offset by indirect losses through a deterioration of credit quality. Overall, the CAR for the whole system would marginally decrease by half percentage point but remain above the regulatory minimum, and so would the capital adequacy of individual banks (Figure 1 and Table 2).

6. A combined solvency shock would require recapitalization of some banks, although the system would satisfy minimum CAR requirements. The combined shock includes: (i) the proportional increase in NPLs, (ii) the interest rate shock, and (iii) the FX risk shock. It should be noted that such combined shock represents a very extreme tail risk scenario with low probability of occurrence. Results show that, even subject to such extreme shock, the aggregate CAR would fall by almost 5 percentage points just below the 10 percent regulatory minimum. Eight individual banks would fall short of the minimum regulatory CAR thus requiring some recapitalization. However, even after such a severe shock, the identified capital shortfalls would amount to just 0.4 percent of 2016 GDP. Moreover, if profits are used for defense, only three banks would have CAR below the 10 percent regulatory minimum and total recapitalization needs would fall to just 0.1 percent of GDP (Figure 1 and Table 2).

7. Contagion risks stemming from domestic interbank exposures are limited and there is no second-round effect following the combined macro-shock. Contagion risks are assessed using a matrix of interbank exposures comprising, for each bank, the net credit to every other bank in the system. The exercise illustrates what happens to other banks when one bank fails to repay its obligations in the interbank market as a result of the combined shock. Results show that there is no contagion stemming from domestic interbank exposures through second-round effects. This is because interbank lending in Guatemala is very thin.

Figure 1. Guatemala: Solvency Stress Test



Sources: SIB; and IMF staff estimates.

Note: The credit risk assumes 3.3 percent of performing loans becoming non-performing in the system-wide shock and 6.5 percent on the sectoral shock to the manufacturing, trade, and non-bank financial sectors. The interest rate risk assumes a 2 percent increase in the nominal interest rates. The exchange rate risk assumes a 12 percent depreciation of the bilateral USD exchange rate. The combined shock assumes all of the above. The liquidity shock assumes a 10 percent per day withdrawal of demand deposits and a 3 percent per day withdrawal of time deposits.

Table 2. Guatemala: Solvency Stress Test
(September 2017)

	All banks
<i>Capital Adequacy Ratio (CAR) pre-shock</i>	14.8
Credit Risk 1/	
<i>1. System-wide proportional increase in NPLs</i>	
Post-shock CAR (percent)	13.4
CAR change (pct points)	-1.4
<i>2. Sectoral Shock</i>	
Post-shock CAR (percent)	13.8
CAR change (pct points)	-1.0
Interest rate Risk 2/	
<i>1. Net Interest Income (NII) impact</i>	
Post-shock CAR (percent)	14.8
CAR change (pct points)	0.0
<i>2. Repricing impact</i>	
Post-shock CAR (percent)	11.9
CAR change (pct points)	-2.9
Overall change in CAR (NII and repricing)	-2.9
FX Risk 3/	
<i>1. Direct FX impact</i>	
Post-shock CAR (percent)	15.1
CAR change (pct points)	0.3
<i>2. Indirect FX impact (through credit risk)</i>	
Post-shock CAR (percent)	14.2
CAR change (pct points)	-0.9
Overall change in CAR (direct and indirect)	-0.6
Combined Shock 4/	
Post-shock CAR (percent)	9.9
CAR change (pct points)	-4.9
Interbank Contagion	
CAR after macroshocks	9.9
CAR after contagion	
Reverse Stress Test (implied increase in NPLs, percent of performing loans)	
System CAR < 10	11.2
1/2 market share with CAR <10	10.0
9 banks with CAR <10	14.4
Liquidity 5/	
Post-shock liquid assets/total assets	19.4
Post shock liquid assets/short-term liabilities	47.2
# of liquid banks after 5 days	18

Source: SIB; and IMF staff estimates.

1/ Assumes 3.3 percent of performing loans becoming non-performing in the system-wide shock and 6.5 percent on the sectoral shock to the manufacturing, trade, and non-bank financial sectors.

2/ Assumes a 2 percent increase in the nominal interest rates.

3/ Assumes a 12 percent depreciation of the bilateral USD exchange rate.

4/ Assumes a combination of the system-wide credit shock, interest rate, and FX shock.

5/ Assumes a 10 percent per day withdrawal of demand deposits and a 3 percent per day withdrawal of time deposits.

8. The reverse test indicates that system-wide NPLs would need to increase substantially for the system-wide CAR to fall below minimum requirements. The reverse stress test indicates what would have to be the NPL increase necessary for: (i) the system-wide CAR, (ii) the CAR of at least nine banks (half of total), and (iii) the CAR for 50 percent of the total market share, to fall all below the regulatory minimum of 10 percent. While an NPL increase to 11 percent would be necessary for the system-wide CAR to fall below 10 percent, NPLs would need to increase to 9 and 16 percent of currently performing loans for half of the total market share or nine banks respectively to fall below the 10 percent regulatory minimum (Figure 1 and Table 2).

9. The liquidity stress test suggests that liquidity shortfalls following a short-lived drain on deposits would be manageable. The liquidity stress test assumes a widespread liquidity drain of 10 and 3 percent per day of demand and time deposits respectively, affecting all banks in the system proportionally, without liquidity contagion. Results indicates that, although the share of liquid assets would tumble, all banks would remain liquid after 5 days, with no need for outside liquidity support (from other banks or the central bank) mainly because of maturing assets being rolled off and converted into new cash inflows (Figure 1 and Table 2).

C. Liquidity Stress Test on Foreign Currency Flows

10. A medium-term liquidity stress test is used to gauge resilience of the system to a severe and protracted loss of foreign funding. The analysis uses bank-by-bank data by maturity buckets for the six largest banks—which accounts for over 90 percent of the total market share—as of end-September 2017. Such scenario can be used also to simulate the effect of a protracted withdrawal of Corresponding Banking Relationships (CBR) which are used to execute foreign transactions, including remittance flows. The analysis only considers funding in foreign currency, since the Central Bank could technically provide unlimited LOLR assistance to cover shortages in local currency. FX cash flows are converted in domestic currency at the bilateral exchange rate of 7.3 Quetzales/USD.

11. The test assumes severe run-off rates on bank foreign currency denominated cash flows. Cash outflows are assumed to be protracted, lasting beyond one year, but run-off rates decline over time. In general, run-off rates applied to retail funding sources and funding secured by high-quality collateral are lower than those applied to wholesale and unsecured funding, and they increase progressively with the degree of “institutionalization” of the funding provider. Arguably, the assumed run-off of funding is severe though in line with international experience during banking panic and liquidity crises in developing and emerging market economies.

12. The test considers four layers of liquidity to meet projected cash outflows:

- *Inflows from maturing investments and lending operations, with roll-off rates (or share of usable inflows) decreasing with maturity;*
- *The stock of cash and interbank loans, although the latter is very thin in Guatemala overall, and virtually non-existent is foreign currency;*

- *Sale of securities with longer residual maturity*, subject to fire-sale haircuts; and
- *Required bank reserves*.

13. The first item represents banks’ direct liquidity buffer, and the last three their counterbalancing capacity, i.e., the set of instruments with high liquidity generation capacity by which banks can cope with funding gaps. These four layers of liquidity are assumed to be accessed in a sequential way to cover any shortfall left by the previous layer. Any remaining shortfall after the sale of securities and use of required reserves makes banks illiquid. Offset of liquidity shortfalls by excess liquidity at longer horizons is not permissible, hence outflows in each bucket must be met with the available liquidity in the same bucket. This could result in banks being consider illiquid even if its position would theoretically turn liquid again at longer horizons.

Table 3. Guatemala: Medium-Term Liquidity Stress Scenario Assumptions

Stress scenario - assumptions						
Run-off rates						
	1	2	3	4	5	6
	1 to 7 days	8 to 15 days	16 to 30 days	31 to 90 days	91 to 180 days	More than 180 days
Retail funding: sight deposits						
Stable	8%	4%	4%	3.5%	0%	0%
Unstable	12%	6%	6%	2.5%	0%	0%
Retail funding: savings deposits						
Stable	8%	4%	4%	4%	0%	0%
Unstable	12%	6%	6%	3%	0%	0%
Retail funding: term deposits	35%	35%	35%	30%	25%	20%
Other deposits	35%	35%	35%	30%	25%	20%
Secured wholesale funding from other financial institutions	25%	25%	25%	25%	25%	25%
Unsecured wholesale funding from other financial institutions	75%	75%	75%	30%	30%	20%
Outflows from derivatives	100%	100%	100%	100%	100%	100%
Other obligations	100%	100%	100%	100%	100%	100%
Undrawn volume of committed credit/liquidity lines	10%	5%	5%	10%	20%	0%
Roll-off rates						
	1	2	3	4	5	6
	1 to 7 days	8 to 15 days	16 to 30 days	31 to 90 days	91 to 180 days	More than 180 days
Securities in trading book	100%	100%	100%	100%	100%	100%
Securities available for sale	100%	100%	100%	100%	100%	100%
Securities held to maturity	100%	100%	100%	100%	100%	100%
Inflows from derivatives	100%	100%	100%	100%	100%	100%
Loans maturing	50%	50%	50%	50%	50%	50%
Other	80%	80%	80%	80%	80%	80%
Haircuts						
Cash items	0.0%					
Securities in trading book	10.0%					
Securities available for sale	10.0%					
Securities held to maturity	10.0%					

14. The maturity distribution of the banking system FX funding and assets points to vulnerabilities stemming from cash-flow mismatches. Consistent with the banks’ maturity transformation function, the banking system presents short-term liabilities in excess of assets, as 70 percent of the latter matures beyond six months. Accordingly, FX liabilities exceed assets at almost all maturities below six months, except for the 8-15 days bucket. The share of assets to liabilities averages about 80 percent across maturities of up to six months, and increases to 116 percent at horizons beyond six months (Figure 2).

15. The funding structure and asset composition only partially mitigates such risks.

Although deposits and secured funding (as opposed to unsecured funding and other obligations, including from derivatives) account for the bulk of total liabilities, the share of wholesale funding, which tends to be more volatile than retail, increases significantly with maturity, ranging from about 3 percent at the one-week horizon to over 90 at horizons beyond 6 months. At the same time, on the assets side, while highly liquid cash items and securities available for sale account for over 90 and 40 percent of total assets at the shortest horizons, loans and other assets make up for most of assets at longer maturities. This suggests that, although assets exceed liabilities at maturities beyond six months, for the system as a whole there is a shift towards more volatile liabilities and less liquid assets (Figure 2).

16. Results show that funding gaps would emerge at maturities of up to one month for the whole system, although individual banks would experience funding gaps at longer maturities as well.

Under the assumed run-off and roll-off rates, total cash outflows would exceed cash inflows for the 0-30 days maturity bucket resulting in moderate funding shortfalls. For maturities longer than one month, cash inflows more than offset simulated outflows and substantial excess liquidity materialize beyond six months. At the individual bank level, most banks would experience liquidity shortfalls in the first three buckets and surplus afterwards, one bank would stay liquid at all maturities, and one bank would present a funding gap even at maturities beyond six months (Figure 2).

17. However, liquidity shortfalls could be met using counterbalancing capacity across all maturities.

For both the system as a whole and individual banks, the initial funding gaps could be met by utilizing the available stock of cash, securities under the assumed haircut rates, and reserves. At one-week maturity the system-wide funding needs can be covered using cash items, while securities and reserves would need to be accessed in later maturities of up to one month. The available stock of cash would also be sufficient to cover bank-specific gaps at maturities beyond six months. Although all banks included in the exercise remains liquid after using their counterbalancing capacity and pass the test, this outcome rests on the assumptions used in the stress scenario. Hence, it is recommended that the authorities take measures to mitigate vulnerabilities stemming from the identified maturity mismatches, including by adopting the Basel III LCR in U.S. dollars for monitoring purposes, which would enhance banks' management of liquidity risk.

Figure 2. Guatemala: Liquidity Stress Test
(Foreign Currency Flows expressed in millions of quetzales)



Sources: SIB and IMF staff estimates.

TAIL-RISK SCENARIOS FOR REMITTANCES IN GUATEMALA¹

Leaning against the exchange rate depreciation under a tail-risk scenario of abrupt falls in remittances would require a significant tightening of monetary policy, further depressing domestic activity. To reap the benefits of exchange rate flexibility in absorbing such a shock, it is important that the economy be resilient to the impacts of exchange rate depreciation.

1. Remittances have become an increasingly important source of income to Guatemalans since the early 2000s. In 2017, remittance flows accounted for over 11 percent of GDP and benefited more than 1.5 million households. The anti-immigration measures taken since President Trump comes to office, including the termination of the Temporary Protected Status (TPS) and the Central American Minors (CAM) programs, the likely termination of the Deferred Action for Childhood Arrivals (DACA), and a more recent claim to end the Diversity Visa Lottery, have made it more difficult for immigrants to come to or stay in the U.S. Any upscaling in anti-immigration and remittance control measures represents a tail-risk scenario for Guatemala.

2. To examine the potential risk events that could materialize for Guatemala under a tail-risk scenario, we adopt the Western Hemisphere Module (WHDMOD) of the Flexible System of Global Models (FSGM). The FSGM is developed by our Research Department (RES) and is routinely used for simulation as well as global and regional spillover analysis. It represents a system of annual, multi-region, general equilibrium models, combining both micro-founded and reduced form formulations of various economic sectors. Monetary and fiscal policy is governed by endogenous rules in the model. The WHDMOD is calibrated to the economies in the Western Hemisphere. International linkages are modeled in aggregate for the region. Simulation of the risk events using the FSGM helps explore complex transmission channels and net economic effects of the potential shocks.

3. We study two risk events that may materialize under a tail-risk scenario. The first one entails an immediate and permanent decline in remittances by one-third due to more stringent U.S. policies on money transfers by illegal immigrants.² Should this materialize, it may cause an increase in the risk premium and the monetary policy to respond by leaning against the exchange rate depreciation. The second risk involves a step-up of deportations of illegal immigrants back to Guatemala. We assume that one-fifth of the illegal Guatemalan immigrants in the U.S. are deported

¹ Michal Andrle, Esther Perez and Jasmin Sin.

² The U.S. government could require proof of immigration status to remit funds abroad if restriction policies are in place. Currently, about 75 percent of Guatemalan immigrants in the U.S. are illegal. Considering that controls on remittances are often difficult to enforce, we assume remittances to fall by one third under the tail-risk scenario.

over four years.³ While the likelihood that these scenarios would ever materialize is marginal, a study of these events can help structure policy discussions on contingency planning around the expected speed and size of exchange rate depreciation, as well as the expected pass through to future inflation and the appropriate monetary policy and FX intervention responses.

A. Risk Event #1: Pronounced Falls in Remittances

4. The impact on Guatemala’s output and welfare is negative, permanent, and sizeable (Figure 1). Output is lower by 1 percent after five years and 2 percent in the long run (indicated by the steady state, “SS”). The impact on private consumption is even larger, with a decline of 8 percent after 5 years and 10 percent in the long run.

5. A permanent loss of real income requires the structure of the economy to adjust. Domestic absorption and imports need to decline to lower the import bill and exports revenues must increase to pay for the remaining imports previously financed with remittances. To help achieve this, the real exchange rate depreciates towards a new lower level, with a transitory overshooting to overcome short-term rigidities in the economy.

- On impact, the real exchange rate depreciates by just over 12 percent and then gradually adjusts to its new long-run equilibrium roughly 5 percent below its previous level. The nominal exchange rate depreciates by a similar extent.
- Private consumption and investment depress owing to the loss of remittance income and real exports increase due to the real exchange rate depreciation.
- Headline inflation temporarily rises due to the sizeable exchange rate depreciation, but the effect of the negative demand pressures quickly dominates the inflation process, and both headline and core inflation fall below the baseline. Consistent with its mandate and the decline in core inflation, the monetary authority lowers the nominal policy rate to dampen the impact on the economy and return inflation to its target rate.

Variants: Possible Adjustment in the Risk Premium and Monetary Policy Deliberations

6. The remittance shock is further combined with a transitory increase in the risk premium of 150 basis points faced by corporates, households and the sovereign. As the assumed permanent reduction in remittance flows leads to a sharp depreciation in the currency, it may cause an increase in debt-service costs for firms with unhedged USD liabilities and a general increase in uncertainty about the overall health of the economy (Figure 1, red dash lines). It is assumed that firms will respond and gradually reduce their currency mismatches and, consequently, the increase in the risk premium is assumed to be transitory, leaving the long-run equilibrium unchanged. But in the short run, the economy is more depressed as financing costs rise. Real private

³ The model does not distinguish between legal and illegal immigrants. The assumption that 20-percent of the illegal immigrants are deported effectively means a 15-percent drop in the total stock of Guatemalan immigrants in the U.S. (as 75 percent of them are illegal).

investment, consumption, and imports drop further, with additional exchange rate depreciation reflecting further easing in monetary policy.

7. Leaning against the exchange rate depreciation under a tail-risk scenario of abrupt falls in remittances would further depress economic activity. Even under an inflation targeting regime, concerns about rising foreign-currency liabilities might lead the monetary authority, under these tail-risk circumstances, to supplement rule-based FX intervention with policy rate increases with a view of dampening excessive exchange rate volatility. To illustrate the potential effects of leaning against the exchange rate depreciation due to a permanent decline in remittances and a transitory increase in the risk premium faced by all domestic agents, a scenario variant is considered with monetary policy attempting to mitigate the nominal exchange rate depreciation (Figure 1, black lines).

- Proportional to the size of nominal depreciation avoided, the risk premium decreases in response to the central bank's reaction. Still, eliminating a few percentage points of nominal exchange rate depreciation via the uncovered interest parity condition requires a significant tightening of monetary policy, further depressing domestic activity, and thus inducing additional excess supply and a larger decline in inflation.
- The effectiveness of intervening against the exchange rate depreciation very much depends on what is driving the exchange rate. The source of exchange rate depreciation in this case is a fundamental shock that requires a long-term change in the real exchange rate to rebalance the economy, with permanently lower remittance income. If the nominal exchange rate is not allowed to dominate the change in the real exchange rate, a key relative price in the economy, the real exchange rate will adjust via domestic disinflation or deflation, requiring additional weakness in the domestic economy.
- To reap the benefits of a flexible nominal exchange rate policy, it is important that the economy be resilient to a certain degree of exchange rate volatility. For instance, foreign-currency indebted firms should either have the natural hedge of foreign-currency incomes or use financial markets hedging contracts.

B. Risk Event #2: Increased Deportations

8. Assumptions

- It is assumed that one-fifth of the illegal immigrants are deported.
- It is assumed that the returning migrants are not absorbed into the domestic labor market, so there are no positive benefits on Guatemala's potential output. Since the effect of more deportations comes through in the loss of remittance income, this risk event is rather similar to that of a remittance fall, differing mainly in the timing of the shock and per-capita consequences for the economy.

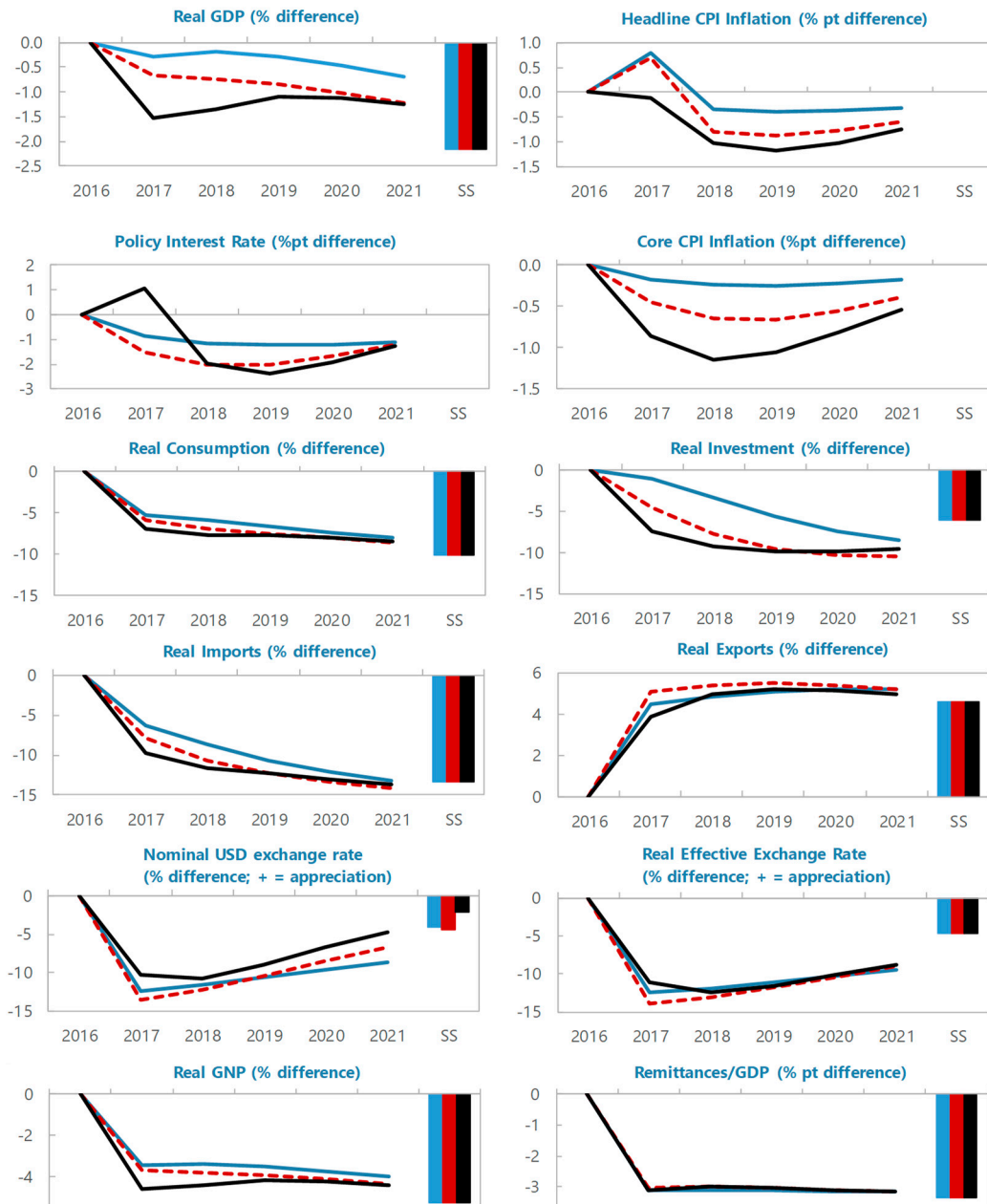
9. Real GDP declines by almost 0.2 percent after five years (0.8 percent in the long run).

The gradual drop in remittances depresses disposable income and private consumption of households, with the per-capita consumption drop being even larger. With lower demand for domestic goods and services, private firms lower investment activity. Given the reduction in domestic demand and the need to export more to pay for imports previously financed with remittances, the economy's focus shifts to exports. Gradual depreciation of the real effective exchange rate helps the economy to adjust to a new equilibrium with permanently lower remittance income by dampening import demand and raising demand for Guatemala's exports.

10. Eventually, it is likely to expect migrants to enter the labor force to some extent, making this risk event a lower-bound on the possible macroeconomic outcome. To mitigate the adverse impact of this risk event, the national strategy for prevention and attention to migrants should be well equipped to face the surge in the labor force. Programs such as "Bienvenido a casa" and "Quedate" should be expanded or reviewed to help integrate the returned workers.

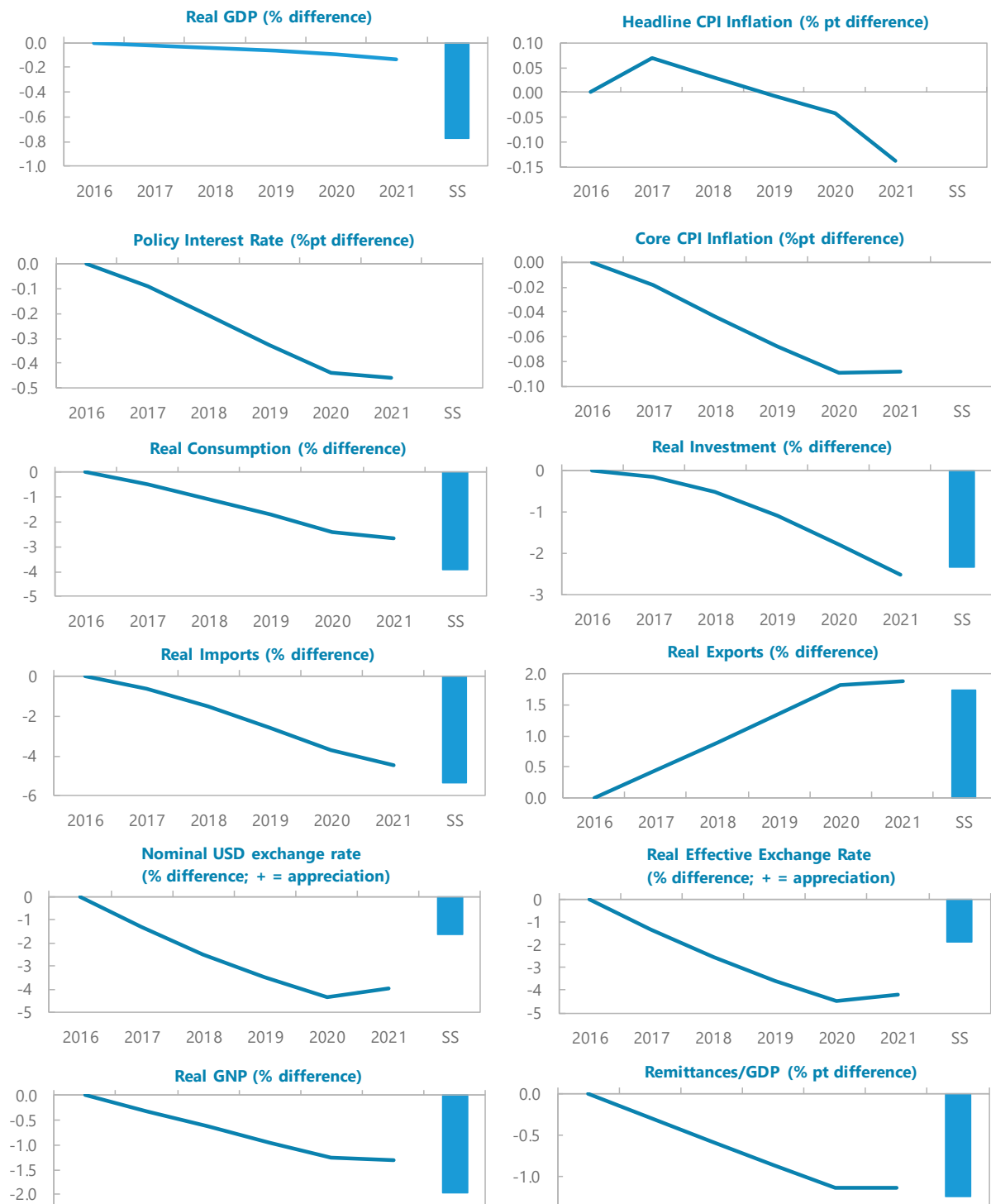
Figure 1. Guatemala: Remittances

— Remittances
 - - - Remittances and Risk
 — Remittances, Risk and ER Policy



Source: FSGM simulators.

Figure 2. Guatemala: Migration



Source: FSGM simulators.

Reference

Andrle et al., 2015, "The Flexible System of Global Models - FSGM," IMF Working Paper 15/64 (Washington: International Monetary Fund).