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GUATEMALA

SELECTED ISSUES

June 2022

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GUATEMALA

SELECTED ISSUES

May 16, 2022

Approved By
Western Hemisphere Department

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FOSTERING EXPORT DEVELOPMENT IN GUATEMALA[1]

While favorably located close to the large North American market, Guatemala lags most other Central American countries in the level and complexity of its exports. This is a handicap to its economic development as exports growth is associated with higher productivity and GDP growth. This paper finds that underdevelopment in education, governance, and infrastructure substantially constraints Guatemala's exports development and that realistic improvements in these policy areas could generate notable improvements in its exports per capita and complexity, bringing them up to levels like those in Costa Rica and East Asian Emerging Market (EAEM) countries.

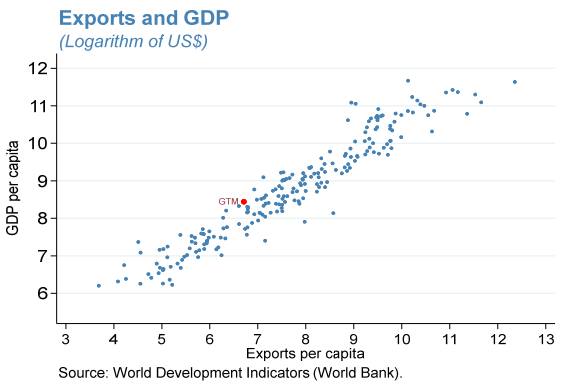
A. Introduction

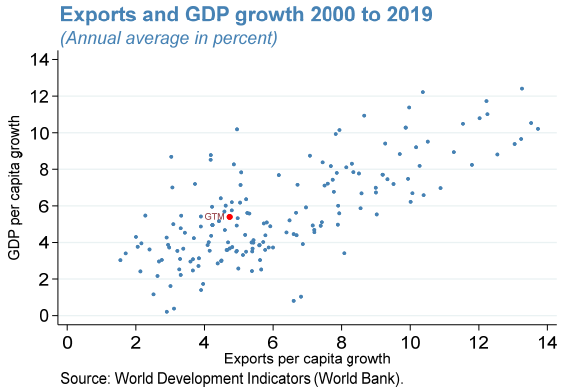
1. Relative to its development level, Guatemala has a low export per capita ratio. Despite its favorable geographical location—close to the large North American market, access to both the Atlantic and Pacific Ocean basins—and Free Trade Agreements with key economies (for example, the US, Northern Triangle countries and Mexico), Guatemala has one of the lowest export per capita ratios in Latin America, a region that considerably lags other Emerging Market regions such as East Asia and Eastern Europe. Moreover, the level of export per capita is low relative to Guatemala's income level. This suggests that non-geographic export determinants in Guatemala are weak, and this paper seeks to identify and quantify these possible weaknesses based on the existing literature on export determinants.

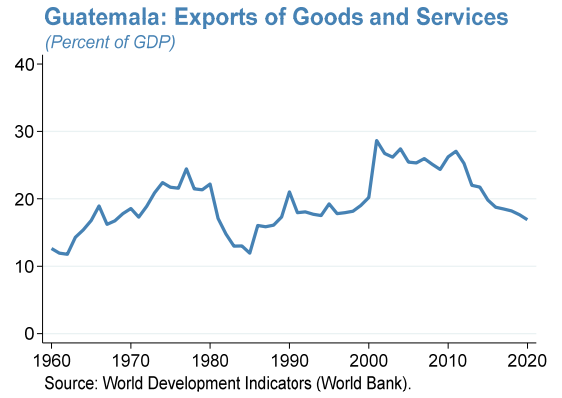
2. Guatemala's key export industries have stagnated lately. Improvements in non-hydrocarbon/mineral (NHM) exports would benefit the economy at large, especially if driven by more complex exports (in the Hidalgo and Hausmann, 2009, sense) as those exports are usually related with higher productivity and GDP per capita growth. Indeed, export performance is typically key to raise output growth, as inferred, for example, from the strong cross-country association between exports and GDP (see Figure 1). Rapid export growth can boost productivity growth both through learning-by-doing and economies of scale. In the case of Guatemala, both below-world-average exports per capita and GDP per capita have been observed in recent years. And while experiencing significant export growth in recent decades, Guatemala's growth and exports per capita remain considerably below the world average. Moreover, exports of goods and services have declined as a share of GDP in the last twenty years (Figure 1), reflecting a decline in the share of GDP of goods exports, while the share of service exports has broadly remained stable. This decline is consistent with the low contribution of total factor productivity over the last twenty years (IMF Country Report 16/282). Moreover, an increasing share of NHM exports would represent a more stable source of export growth for Guatemala, less dependent on their availability and international commodity prices.

[1] Prepared by Gonzalo Salinas.

Figure 1. Guatemala: Export Performance





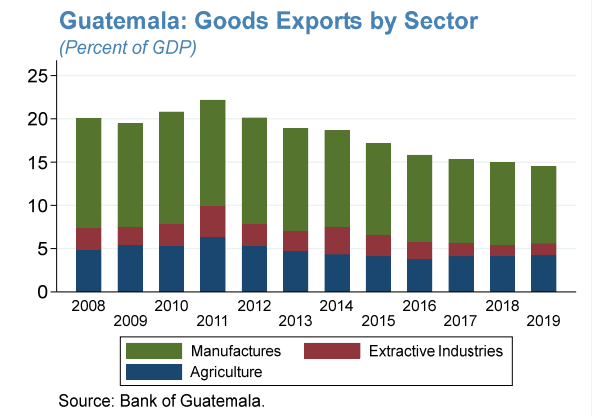


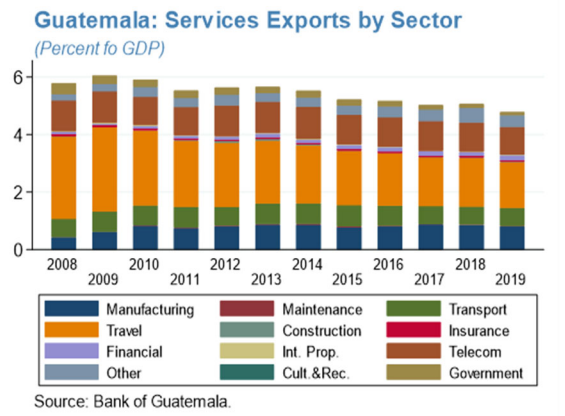
B. On the Drivers of Recent Export Developments

3. The rest of the paper looks at the drivers of the recent export growth performance, focusing on different categories of NHM exports in Guatemala—notably those of higher complexity—and comparing them against similar countries. The paper then assesses the country's performance with respect to policies supportive of the development of NHM and complex exports to identify areas that can be strengthened to accelerate these exports. Finally, the paper estimates the potential payoffs from reforms in the identified areas.

4. The decline in exports as a share of GDP in Guatemala reflects declines across most sectors (Figure 2). In the case of goods exports, the largest fall was seen in manufacturing exports, which fell by about 5 percentage points of GDP during the last decade, while extractive industries' exports declined by about 1-2 percent of GDP as a result of a significant contraction in petroleum exports following the 2014-15 oil price slump. Agriculture exports fluctuated around 4-6 percent of GDP throughout the last decade. Services exports as percent of GDP also declined with contractions in travel services accounting for most of the overall decline.

Figure 2. Guatemala: Export Performance by Sector





5. Although Guatemala has a highly diversified economy relative to its comparators, its level of NHM exports is much lower[2]. Guatemala's export concentration (diversification) is very low (high) as indicated by its Herfindahl-Hirschman index (see Figure 3, upper left chart). Nonetheless, this high diversification is not the result of successful export development, as Guatemala's NHM exports are quite below comparators. In other words, Guatemala's exports basket is diversified on many sectors, but all of them are relatively small and sum up to low total exports per capita. This is consistent with the prevalence of small and typically informal firms in the economy.

6. Manufacturing and services exports per capita are remarkably below comparators. A particularly interesting comparator is Costa Rica, which is geographically further away from the U.S. but produces multiple times more manufacturing and services per capita than Guatemala. Additionally, even though Guatemala has a similarly attractive natural landscape as Costa Rica and precious Mayan sites across its territory it attracts only a fraction of tourism per capita as Costa Rica.

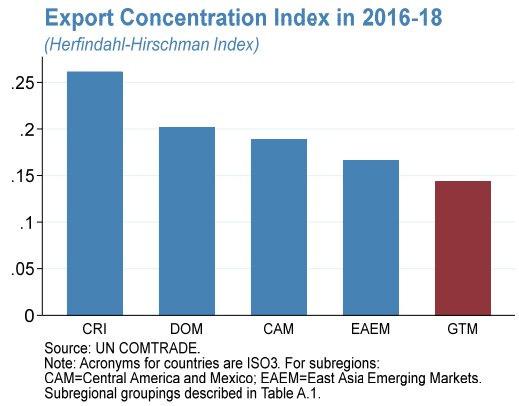
7. Crucially, Guatemala has also low complex exports per capita, and this ratio has stagnated over the last few decades. Remarkably, unlike other developing countries, Guatemala's low export complexity occurs despite an export basket that is not dominated by hydrocarbon or mineral exports (which have low complexity). For instance, some resource abundant countries like Chile have a low Economic Complexity Index (ECI)[3] due to the large share of natural resource exports even though they export large amounts of complex products. Guatemala, on the other hand, does not export much of natural resources but has a low ECI because it exports a low amount of complex products. This despite the rapidly growing manufacturing exports in 1990-2010, suggesting that the

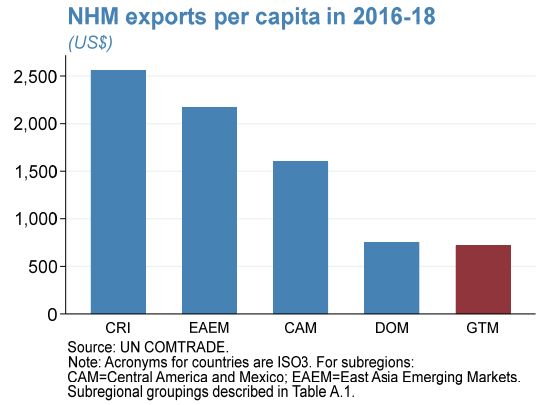
[2] Comparator regions/countries include remote countries as international trade theory and empirics indicate that distant countries are exogenously expected to have less exports per capita

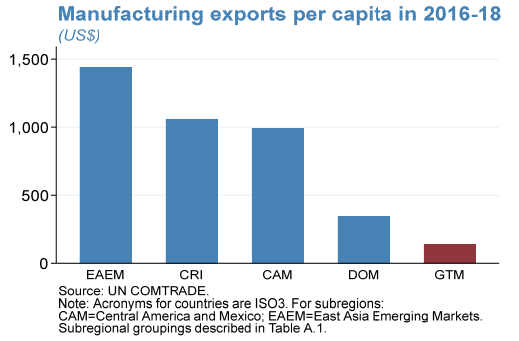
[3] This country index is defined in Hidalgo and Hausmann (2009) and is related to the complexity of the products in a country's export basket.

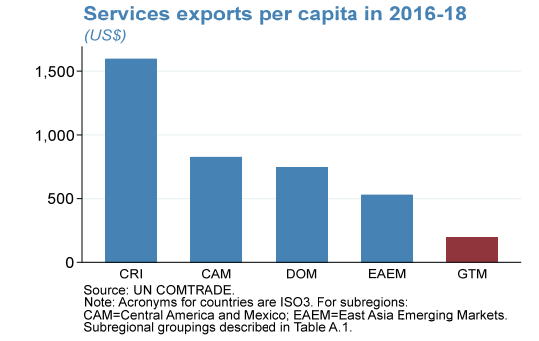
dynamic manufactured exports of Guatemala were not centered on very complex products. Noteworthy also, manufacturing exports per capita stagnated and even declined during the last decade.

Figure 3. Guatemala: Guatemala and Comparators: Export Diversification and Per Capita Levels



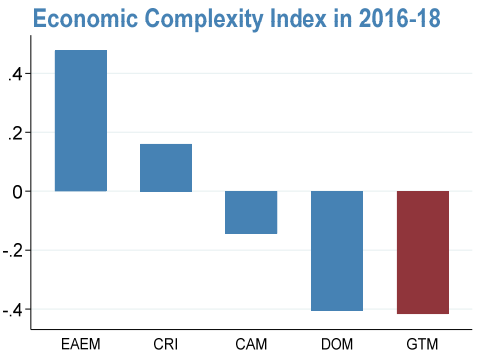




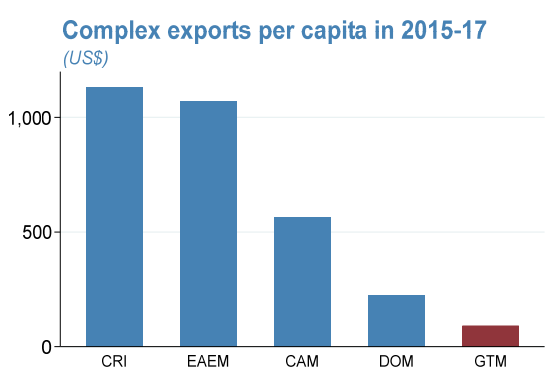


8. When considering the ten highest complex exports, Guatemala has a much lower average Product Complexity Index (PCI) than comparators Costa Rica and Mexico (0.47 compared to 0.89 and 0.92, respectively). Guatemala's most complex export (Table 1), which shows the ten most complex exports) is Alcohol (PCI of 1.48) and Heating and Cooling equipment (PCI of 1.26), whereas Costa Rica's are Optical elements (PCI of 2.21) and Mexico's are Measuring, Controlling, and Scientific Instruments (PCI of 2.01).

Figure 4. Guatemala: Guatemala and Comparators: Export Complexity



Source: Hausmann and others (2013).
Note: Acronyms for countries are ISO3. For subregions:
CAM=Central America and Mexico; EAEM=East Asia Emerging Markets.
Subregional groupings described in Table A.1.



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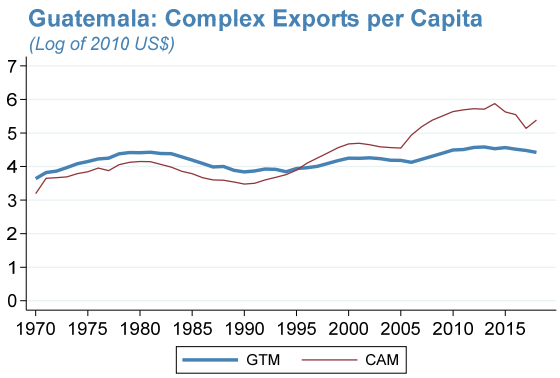
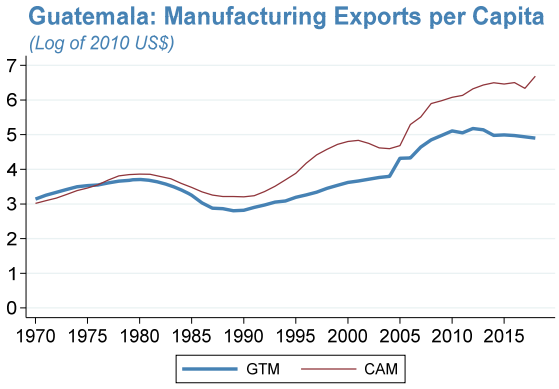


Source: UN COMTRADE



Source: UN COMTRADE

Table 1. Guatemala: Complex Exports in Selected Countries

Largest Complex Exports by Country in 2019 1/

	Product	US$ m	US$ per capita	Product Complexity Index
Guatemala	Medicaments	232.8	21.5	0.38
	Perfumery & cosmetics,dentifrices etc.	136.5	12.6	0.06
	Alcohols,phenols,phenol alcohols,glycerine	134.8	12.4	1.48
	Surface acting agents and washing preparations	117.6	10.8	-0.04
	Heating and cooling equipment	48.7	4.5	1.26
	Chocolate & other food prep. Of cocoa	48.0	4.4	-0.04
	Fabrics, woven, of synthetic fibres	42.8	3.9	0.62
	Builders woodwork & prefab. Buildings of wood	39.2	3.6	-0.05
	Chemical products and preparations,nes	38.6	3.6	0.53
	Polishes,pastes,powder for polishing/preserving	31.3	2.9	0.47
Costa Rica	Medical instruments, nes	2597.1	877.1	0.43
	Orthopadic appl.,hearing aids,artif.parts/body	680.0	229.7	0.96
	Rubber tyres & tubes for vehicles and aircraft	197.3	66.6	0.33
	Electro medical apparatus	195.6	66.0	1.78
	Apparatus for electrical circuits	179.9	60.8	0.56
	Medicaments	164.7	55.6	0.38
	Optical elements	139.4	47.1	2.20
	Articles of base metals, nes	60.8	20.5	0.35
	Measuring,controlling & scientific instruments	38.9	13.1	2.01
	Surface acting agents and washing preparations	32.3	10.9	-0.04
Mexico	Bodies & parts motor vehicles ex motorcycles	30750.0	24404.8	0.51
	Apparatus for electrical circuits	10700.1	8492.1	0.56
	Medical instruments, nes	7855.8	6234.8	0.43
	Road tractors for tractor trailer combinations	7502.7	5954.5	0.46
	Heating and cooling equipment	6027.1	4783.4	1.26
	Measuring,controlling & scientific instruments	5471.5	4342.5	2.01
	Articles of artif.plastic materials,n.e.s.	5076.8	4029.2	0.22
	Automotive electrical equipment	4814.7	3821.2	1.47
	Electrical machinery and apparatus, nes	4611.5	3659.9	1.48
	Telecommunications equipment nes	4180.7	3318.1	0.79

Source: UNCTAD Comtrade

1/ Complex exports are those with Product Complexity Index (PCI) above zero. The PCI in 2019 had mean zero and standard deviation one.

C. How to Foster Export Development and Complexity

9. To address the low and stagnant level of Guatemala's per capita exports, notably its low level of complexity, it is important to identify reforms that cannot only reverse such performance but accelerate it. To do so this section examines various factors that can play a role.

Determinants of Export Development

10. The economic literature has found that location and "horizontal policies"[4] are key factors in explaining export development. Countries that are closer to larger economies and have better economy wide policies (such as better education and governance) tend to have higher and

[4] Horizontal" policies target broad sectors by improving their business environment, for example by improving governance, education, or infrastructure.

more complex exports. Whether industrial policies[5] *boost* export growth is not yet clear. [6]

11. Distance to market remains an important export determinant. In line with the empirical international trade literature, Salinas (2021) finds that distance to international markets and standard gravity equation variables are significantly associated to export categories that can diversify the typically commodity-dependent export baskets of developing countries, such as NHM, manufacturing, and complex exports (see Table A.2). This is corroborated by empirical studies in the Global Value Chain (GVC) literature (for example, Cadestin and others, 2016, and Raei and others, 2019), which conclude that gravity equation variables are key determinants of GVC participation. In fact, Salinas (2021) finds that a Proximity to Markets (PM) index measuring a country's geographic proximity to international markets on its own explains about a quarter of the variation in NHM, manufacturing, and crucially complex exports per capita. As expected, in the absence of significant transport costs, the PM index explains less of the variation of services.

Text Table 1. Guatemala: OLS Regressions of Exports per Capita on Proximity to Markets

Dependent Variable: Log of	Per capita non-hydrocarbon/ mineral exports	Per capita complex exports	Per capita service exports
log(Proximity to Markets)	2.72	3.50	2.30
	0.00	0.00	0.00
Observations	7006	6904	2408
R-Squared	0.23	0.31	0.21

Source: Salinas (2021)
Note: P-values below coefficients. Period 2000-2017. Proximity to Markets is the sum of GDP of trading partners weighted by the inverse of distance to the trading partner. Year and country fixed effects included.

12. In addition, the empirical literature has identified several determinants of export diversification and complexity that can help offset remoteness. Ding and Hadzi-Vaskov, (2017); Giri and others (2019); Salinas (2021) statistically associate export diversification and export complexity with higher educational attainment, stronger governance and institutional development, lower barriers to trade, and higher physical infrastructure development.[7] By adding these policy variables to PM, Salinas (2021) explains up to 80-90 percent of cross-country variation in NHM and complex exports. The point-estimates for the impact of changes in policy variables on NHM, manufacturing, and complex exports are substantial. Increasing schooling attainment by one standard deviation, more than doubles these exports; enhancing governance by one standard deviation increases them by about 30-40 percent; improving infrastructure by one standard deviation increases them by about a third; and cutting tariffs from 15 to 5 percent increases them by almost half.

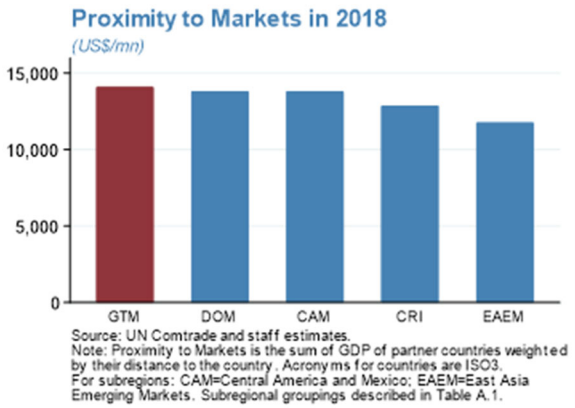
[5] Industrial policy is defined as government intervention in a specific sector which is designed to boost the growth prospects of that sector.

[6] As suggested in a recent review of the empirical evidence on the effectiveness of these policies Rodrik (2019), it is too early to suggest that research on the effectiveness of industrial policies has taken off. For sure, there is yet no cross-country statistical evidence supporting their contribution.

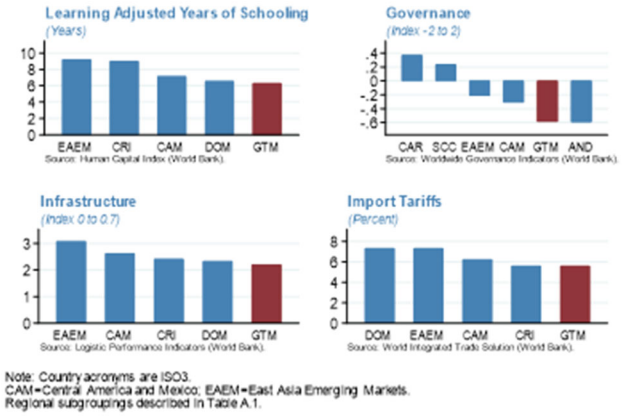
[7] *Population* data in this paper is Total Population in World Bank's World Development Indicators. *Governance* is approximated by World Bank's Worldwide Governance Indicators, *Education* by the United Nations' Human Development Report Education Index, which is an average of mean years of schooling and expected years of schooling. *Infrastructure* by the World Economic Forum's Global Competitiveness Report 12th pillar. *Tariff* is the simple average tariff in the World Bank's World Integrated Trade Solution.

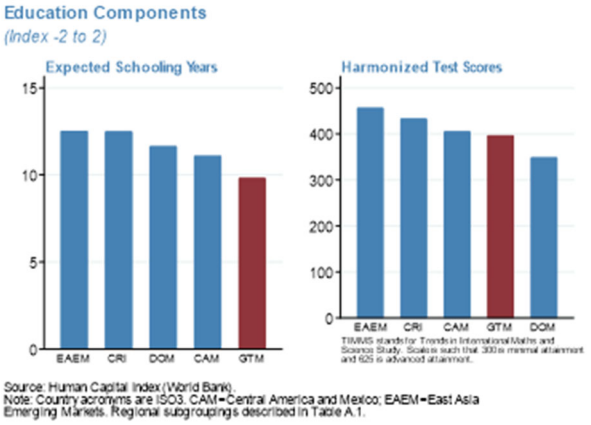
Guatemala's Export Determinants

13. Location is one of Guatemala's main assets for export development. In fact, an index of Proximity to Markets (PM) that aggregates the size of its trading partners divided by their distance to Guatemala, is higher than the PM index of all its comparators shown in the charts.[8] This privileged location suggests that Guatemala's relative weakness on export development must be related in part to some of its horizontal policies.



14. Guatemala's horizontal policy areas are important determinants of weak export development. The rest of this section examines horizontal policy areas such as governance, education, infrastructure, and trade policy openness. Other factors such as labor costs[9] and Guatemalan specific factors such as crime are also examined. All these areas have been previously identified as being key to lift productivity and output growth (IMF Country Report 16/282 and 18/155). A glance at broad measures of education, governance, infrastructure, and trade policy openness, highlights relative weaknesses in the first three export determinants. Governance is very low compared with other Emerging Market subregions, including regions in Latin America and the Caribbean. Moreover, Guatemala's Learning Adjusted Years of Schooling, a measure the combines access to and quality of education, is below most comparators including the average for Caribbean countries and is especially low relative to Costa Rica and the EAEM region. Learning Adjusted Years of Schooling are low in Guatemala because of





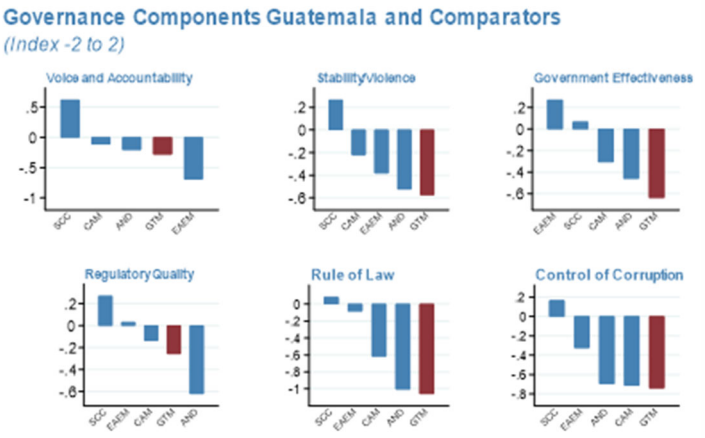
[8] East Asian Emerging Markets have a high PM because they are part of the large East Asian economic agglomeration, including the large Japanese, South Korean, and Chinese economies. Besides the relatively short distance among them, their connection is sea-based (a most efficient means of transportation).

[9] Minimum wages to GDP are used to approximate labor costs (a key determinant in international trade models) in the absence of comprehensive cross-country data on overall wages. The last figure in Figure Panel A.1. shows that there is a significant relation between minimum wage-to-GDP per capita and complex exports per capita.

both low expected years of school and low harmonized test scores.

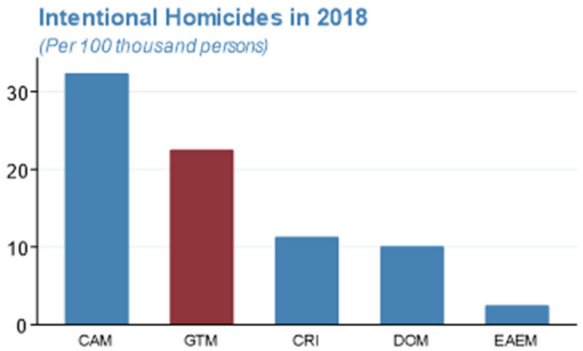
15. Empirical estimates of the positive impact of stronger education on export development suggests Guatemala's relative weakness in education is a major drawback. Based on Salinas (2021) estimates that an increase in the United Nations Education Index of one standard deviation across all sample countries is associated with an increase of 150 percent in NHM exports. Those estimates suggest that matching Costa Rica's Education Index could increase Guatemala's complex exports by about 230 percent.

16. Governance is another significant contributor to export weakness. Guatemala's weakness on governance is not only significant relative to Caribbean (CAR) and Southern Cone Countries (SCC), but also to the nearby Central America and Mexico (CAM) region, which has notably high crime and often experience corruption scandals. Among governance-related aspects in the World Bank's Worldwide Governance Indicators, Guatemala is weaker in Political Stability and Absence of Violence, Government Effectiveness, Rule of Law, and Control of Corruption.[10]



Source: Worldwide Governance Indicators (World Bank).
Note: Country acronyms are ISO3. CAM=Central America and Mexico; EAEM=East Asia Emerging Markets.
Regional subgroupings described in Table A.1.

17. The significant weakness on Absence of Violence is related to Guatemala's very high crime as measured by the intentional homicide rate. IADB cross-country statistical analysis suggests that crime-related costs in Guatemala could be up to 3 percent of GDP, likely eroding its cost competitiveness (Jaitman and Torre, 2017).[11] Scatter plots in Panel Figure A.1. show that homicide rates are negatively related to non-commodity exports. The estimated coefficient of the homicide rate in panel regression analysis in Table A.2. implies that if Guatemala were to reduce this rate from its current 22.5 homicide per 100,000 people to the



Source: World Development Indicators (World Bank).
Note: Acronyms for countries are ISO3. For subregions CAM=Central America and Mexico; EAEM=East Asia Emerging Markets.
Subregional groupings described in Table A.1.

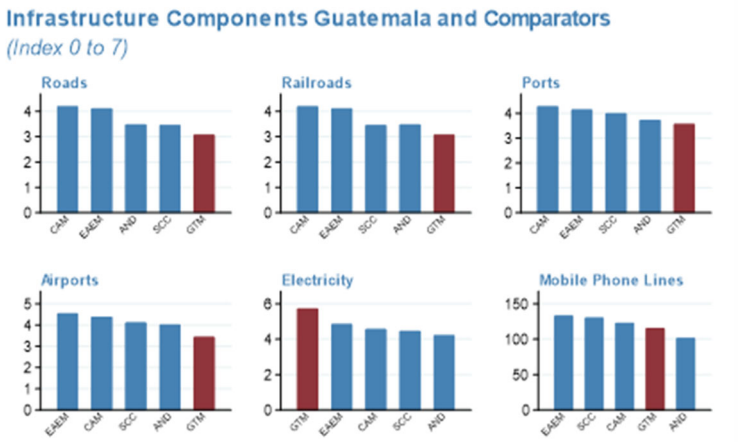
[10] Unfortunately, control of corruption has been falling considerably throughout the 2010s. Salinas (2021) finds that Government Effectiveness and Control of Corruption are the two governance areas most significantly statistically related to exports development and complexity.

[11] Interestingly, Plotnikov (2020) finds that opposite causality also holds: lower economic growth results in higher crime (<https://blogs.imf.org/2020/02/24/higher-growth-lower-crime/>)

world average of 7, it could be associated with an increase in NHM export complexity of 25 percent. Auspiciously, Guatemala has already substantially reduced the homicide rate from 45 per 100,000 people in 2009.

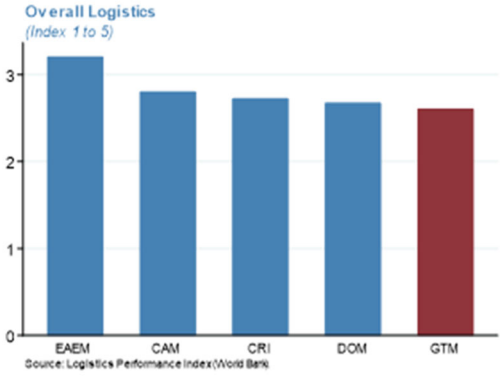
18. Guatemala could realistically aim to strengthen its governance to match other middle-income countries like those of the Caribbean with a substantial impact on exports. Based on estimated payoffs of governance changes on exports in Salinas (2021), if Guatemala were able to bring up its governance standards to CAR levels it could increase its complex exports by 70 percent. IMF Country Report 18/155 also finds that weak governance weights down on growth and proposes several reform avenues to strengthen governance, including through anti-corruption measures in the fiscal, law enforcement, market regulation, financial sector oversight, and public order and enforcement domains.[12]

19. Guatemala also has very weak infrastructure development relative to competitors especially compared to East Asian Emerging Markets. Guatemala's weak infrastructure seems to be acute on its roads, railroads, ports, and airports infrastructure. The weakness in road infrastructure is particularly detrimental to exports of agricultural goods as most of them are produced in the south and require considerably transportation to reach ports. Based on estimates from Salinas (2021), NHM exports per capita in Guatemala would increase by 45 percent if its infrastructure were to match that of EAEMs.



Source: Global Competitiveness Report (World Economic Forum).
Note: Country acronyms are ISO3. CAM=Central America and Mexico;
EAEM=East Asia Emerging Markets
Regional subgroupings described in Table A.1. Values are averages of years 2016-2018

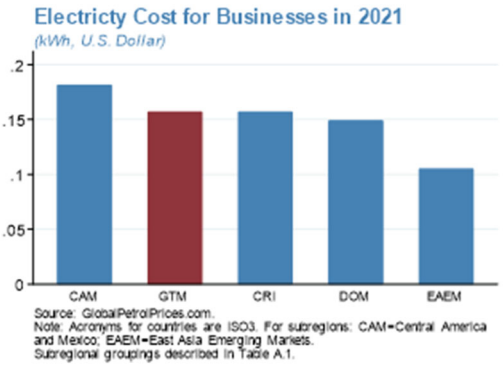
20. Weak logistics exacerbate Guatemala's infrastructure weakness on export development. The World Bank's Logistics Performance Index points weaknesses not only relative to East Asian Emerging Markets but also relative to peers in Central America. In this index, Guatemala ranks unfavorably to all comparators in quality of Customs, Logistics Services Quality, Tracking and Tracing, and Ease of International Shipments.

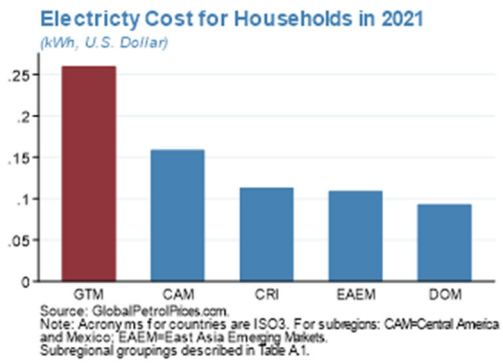


Source: Logistics Performance Index (World Bank)

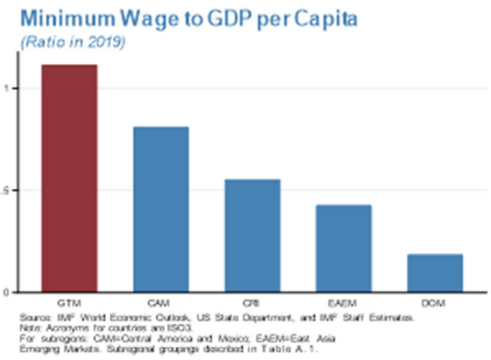
[12] The analysis estimated that if Guatemala were to close its governance gap with the world average it would increase its per capita real GDP growth by between 0.2 and 0.8 percentage points.

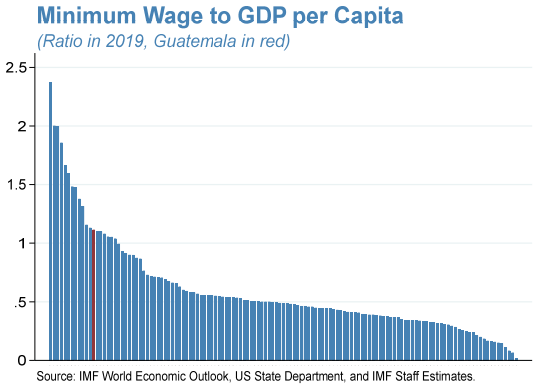
21. While the quality of electricity supply is apparently better than in comparators[13], electricity costs for households are notoriously high. The average electricity cost to firms in Guatemala at US$0.16 per kWh is not significantly different from the cost in other countries near the North American market, but it is considerably higher than for EAEM countries. Notably, the electricity costs faced by Guatemalan households exceed those in its comparators and rank 15th highest in the world in 2021. Increasing living costs for the labor force has an important indirect effect on firms' costs as households increase their reservation wage further eroding export competitiveness.





22. Also importantly, labor costs for low skilled workers appear particularly high in Guatemala relative to comparators. The minimum wage to GDP per capita ratio in Guatemala (a broad proxy for unit labor costs, especially of formal low skilled workers) is not only much higher than in comparator regions/countries but also one of the highest among middle income countries. They are particularly high compared to nearby manufacturing exporters Dominican Republic and Costa Rica, which compete with GTM for the North American market. Panel Figure A.1. shows a strong negative relation between the minimum wage per capita ratio and per capita exports.[14]





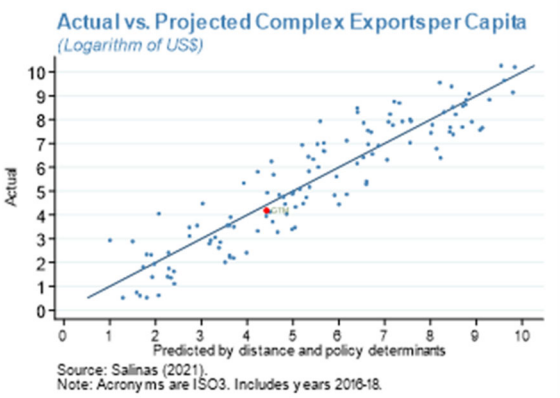
[13] According to World Economic Forum survey respondents.

[14] As suggested in most international trade models (for example, Eaton and Kortum (2002) export development is expected to be negatively affected by high unit labor cost. In the absence of more refined cross-country indicators of unit labor costs we can compare Guatemala's minimum wage to GDP per capita to those of other relevant countries

23. Guatemala's export level is aligned to its geographic location and four horizontal policy areas. Rounding up the analysis we note that based on Salinas (2021), the relative standing of Guatemala on proximity to markets, education attainment, governance, infrastructure, and tariff openness, together predict well Guatemala's current level of NHM Exports per Capita.

D. Conclusions

24. A review of Guatemala's export determinants points at strengths and weaknesses in its export development framework, which can help design policy strategies to reinforce them. Location wise, Guatemala benefits from its close proximity to the large North American market, which makes it an ideal location for a potential nearshoring of North American value chains. Another strength is its relatively open trade policy regime and FTAs with countries in the Americas, which enhances its markets access to these economies. The most significant constraints to export development and complexity appear to be its weak governance (particularly related to high crime, low government effectiveness, and weak control of corruption), low access and quality of education, and weak infrastructure (particularly related to roads, railroads, ports, and airports).



Source: Salinas (2021).
Note: Acronyms are ISO3. Includes years 2016-18.

25. Although strengthening its export determinants will require substantial efforts, the analysis above suggests these could have major payoffs. For example, that the combined effect of bringing education, governance, and infrastructure to the levels in Costa Rica would generate a sixfold increase in Guatemala's total exports and a ninefold increase in its complex exports. This would allow Guatemala to match the export per capita level and complexity of Costa Rica and EAEM countries, and thus more fully take advantage of its proximity to the United States and other large economies, while boosting productivity and growth.[15]

26. Many countries have stronger policies than expected given their per capita income (see charts in Panel Figure A.2.) and can serve as role models. But Guatemala's governance, education, and infrastructure indicators are considerably below levels expected by its income per capita (Guatemala appears way below the fitted line in Panel Figure A.2.), thus suggesting significant room for improvement independently of increases in economic resources. Overall, Guatemala could fivefold increase its total exports and sevenfold increase in complex exports if it improved its education, governance, and infrastructure to levels commensurate to its per capita income.

[15] The Guatemalan government is implementing important reforms in these areas, including conditional transfers on education, digital transparency, crime reduction, promotion of PPPs for infrastructure development, among others. It is also considering important Labor reforms on part-time work and minimum wage to better align wages to productivity.

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Annex I. Regional Classification of Countries

Table AI.1. Guatemala: Regional Classification of Countries

Region	Region Code	Country	Region	Region Code	Country	Region	Region Code	Country
Andean	AND	Bolivia	Eastern Europe	EE	Albania	Pacific Isl.	PAC	Tonga
		Colombia			Bosnia Herz.			Tuvalu
		Ecuador			Bulgaria			Vanuatu
		Peru			Croatia	South Asia	SAR	Afghanistan
		Venezuela			Cyprus			Bangladesh
Arab	ARB	Bahrain			Czechia			Bhutan
		Brunei			Estonia			Nepal
		Kuwait			Georgia			Pakistan
		Oman			Hungary			Sri Lanka
		Qatar			Latvia			Timor-Leste
		Saudi Arabia			Lithuania	Southern Cone	SCC	Argentina
		UAE			Montenegro			Brazil
		Yemen			N. Macedonia			Chile
Central Asia	CA	Armenia			Poland			Paraguay
		Azerbaijan			Moldova			Uruguay
		Belarus			Romania	Scandinavia	SCN	Denmark
		Kazakhstan			Russia			Finland
		Kyrgyzstan			Serbia			Iceland
		Tajikistan			Serb. and Mont.			Norway
		Turkmenistan			Slovakia			Sweden
		Uzbekistan			Slovenia	Sub-Saharan Africa	SSA	Angola
Central Am. & Mexico	CAM	Costa Rica			Turkey			Benin
		El Salvador			Ukraine			Botswana
		Guatemala	European Union	EU	Andorra			Burkina Faso
		Honduras			Austria			Burundi
		Mexico			Belgium			Cabo Verde
		Nicaragua			France			Cameroon
		Panama			Germany			Central African Rep.
Caribbean	CAR	Anguilla			Greece			Chad
		Antig. & Barb.			Greenland			Comoros
		Aruba			Ireland			Congo
		Bahamas			Italy			Cote d'Ivoire
		Barbados			Luxembourg			D.R. Congo
		Belize			Malta			Djibouti
		Bermuda			Netherlands			Eritrea
		Cayman Isds			Portugal			Ethiopia
		Cuba			Spain			Gabon
		Dominica			Switzerland			Gambia
		Dominican Rep.			UK			Ghana
		French Guiana	India	IND	India			Guinea
		Grenada	Middle East	ME	Iran			Guinea-Bissau
		Guadeloupe			Iraq			Kenya
		Guyana			Israel			Lesotho
		Haiti			Jordan			Liberia
		Jamaica			Lebanon			Madagascar
		Martinique			Syria			Malawi
		Montserrat	North Africa	NA	Algeria			Mali
		St. Kitts & Nevis			Egypt			Mauritania
		Saint Lucia			Libya			Mauritius
		St. Vct. & Gren.			Morocco			Mayotte
		Suriname			Tunisia			Mozambique
		Trinidad & Tob.	North America	NAM	Canada			Namibia
East Asia Emerging	EAEM	China			USA			Niger
		China, Macao SAR	Oceania	OCE	Australia			Nigeria
		Indonesia			New Zealand			Rwanda
		Malaysia	Pacific Isl.	PAC	Cook Isds			Sao Tome & Princ.
		Philippines			FS Micronesia			Senegal
		Thailand			Faeroe Isds			Seychelles
		Viet Nam			Fiji			Sierra Leone
East Asia High Income	EAHI	China, Hong Kong			French Polynesia			Somalia
		Japan			Kiribati			South Africa
		Singapore			Maldives			Sudan
		South Korea			New Caledonia			Togo
East Asia Others	EAOTH	Cambodia			Palau			Uganda
		Lao PDR			Pap. New Gn.			Tanzania
		Mongolia			Samoa			Zambia
		Myanmar			Solomon Isds			Zimbabwe

Annex II. Determinants of Complex Exports

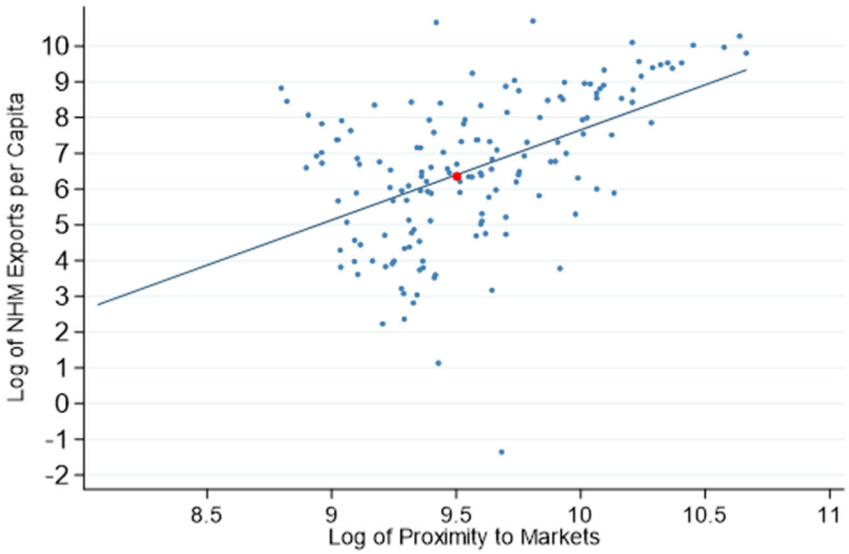
Table AII.1. Guatemala: Determinants of Complex Exports

Dependent Variable: Log NHM exports	(1)	(2)	(3)
Log distance	-1.081***	-1.458***	-1.478***
Governance (WB Index)	0.558***	0.546***	0.794***
Education (UN Index)	5.744***	5.041***	4.430***
Infrastructure (GCR Index)	0.176***	0.211***	0.104***
Average Tariff (percent)	-0.0323***	-0.0317***	-0.0250***
Small states dummy (1 if population below 1 million)		0.388***	-0.059
Remittances (% of GDP)			-0.0339***
Homicide rate (per 100,000 persons)			-0.0949***
Constant	2.61	-5.735**	3.63
Observations	46,994	46,994	40,746
Rho	0.93	0.92	0.95

Notes: * p<0.1, ** p<0.05, *** p<0.01. Panel regressions based on Hausman and Taylor (1981) technique with groups consisting of all combinations of reporter and partner countries in UN Comtrade database. Observations are non-overlapping 5-year averages within the 1962-2018 period, depending on data availability. Regression specification based on equation (7). Multilateral resistance terms and partner country's policy variables included (coefficients not reported). Dependent variable is the logarithm of the value of complex exports, defined as exports of products with a Product Complexity Index (PCI) above zero according to Hausmann and others (2013).

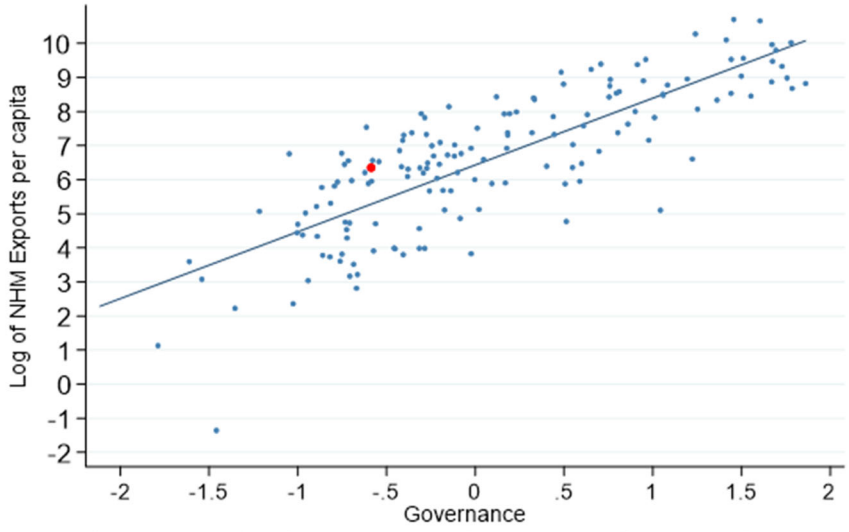
Annex III. Export Complexity and Proximity

Figure AIII.1. Guatemala: Export Complexity and Proximity to Other Markets
(Guatemala in red, fitted line in blue)



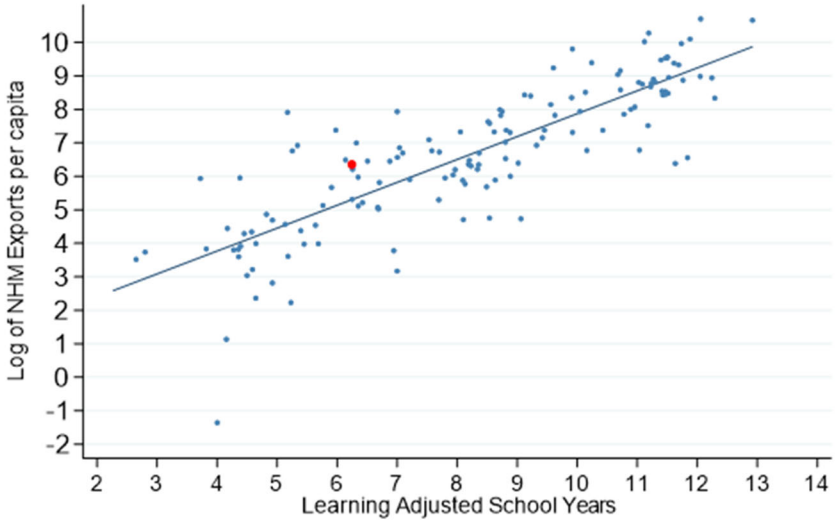
Source: UN Comtrade database.
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIII.2. Guatemala: Export Complexity and Governance
(Guatemala in red, fitted line in blue)



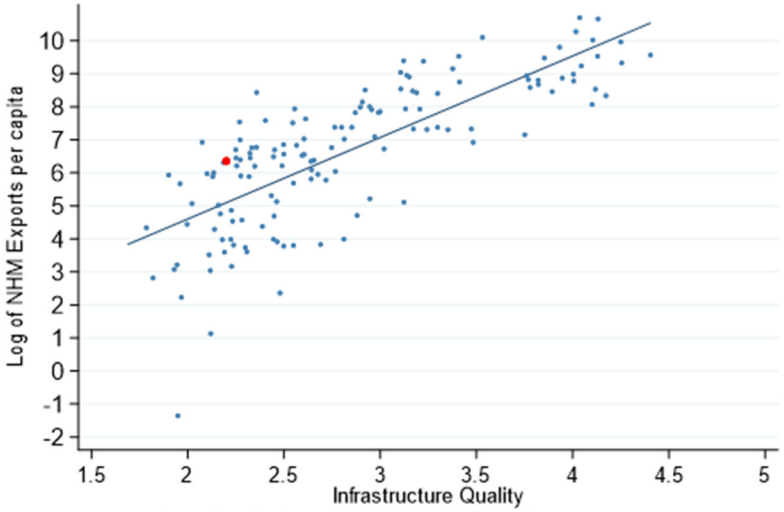
Source: Worldwide Governance Indicators and World Development Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIII.3. Guatemala: Export Complexity and Education
(Guatemala in red, fitted line in blue)



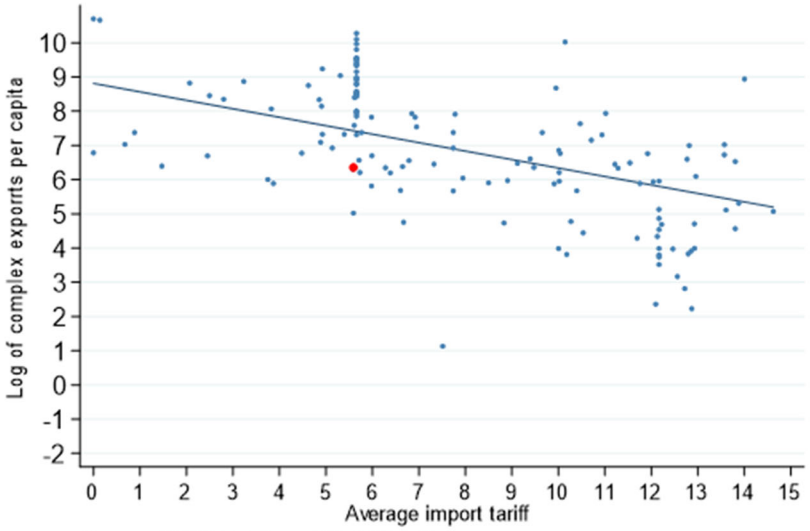
Source: Human Capital Indicators and World Development Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIII.4. Guatemala: Export Complexity and Infrastructure
(Guatemala in red, fitted line in blue)



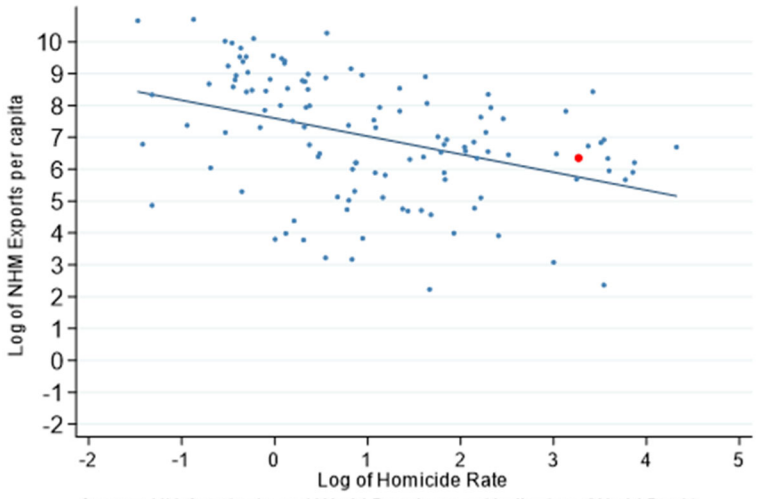
Source: Logistics Performance Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIII.5. Guatemala: Export Complexity and Import Tariffs
(Guatemala in red, fitted line in blue)



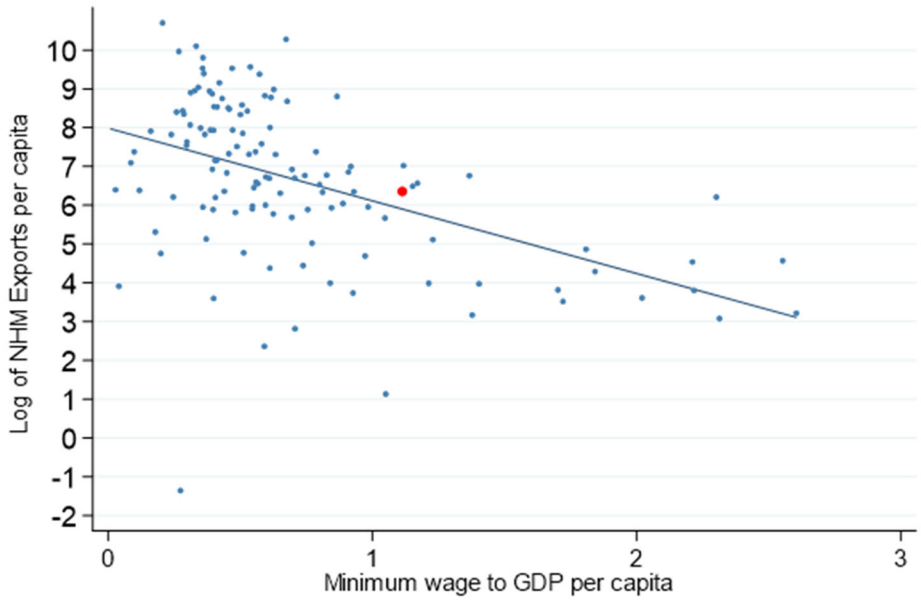
Source: WITS Database (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIII.6. Guatemala: Export Complexity and Crime
(Guatemala in red, fitted line in blue)



Source: UN Comtrade and World Development Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

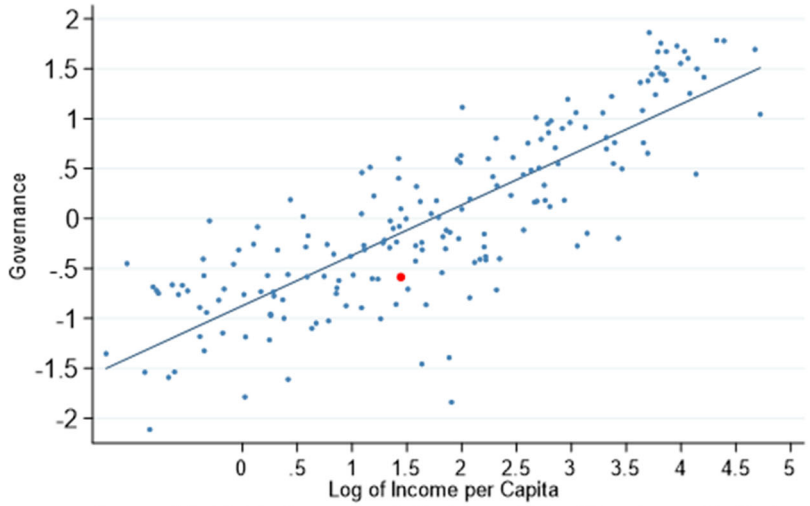
Figure AIII.7. Guatemala: Export Complexity and Labor Costs
(Guatemala in red, fitted line in blue)



Source: UN Comtrade and U.S. State Department.
Note: Acronyms are ISO3. Values are averages of years 2016-18.

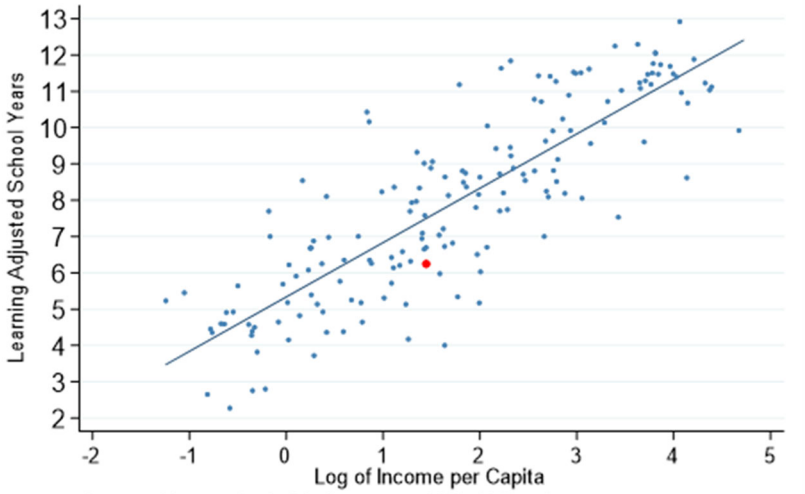
Annex IV. Export Determinants and Income per Capita

Figure AIV.1. Guatemala: Governance and Income per Capita
(Guatemala in red, fitted line in blue)



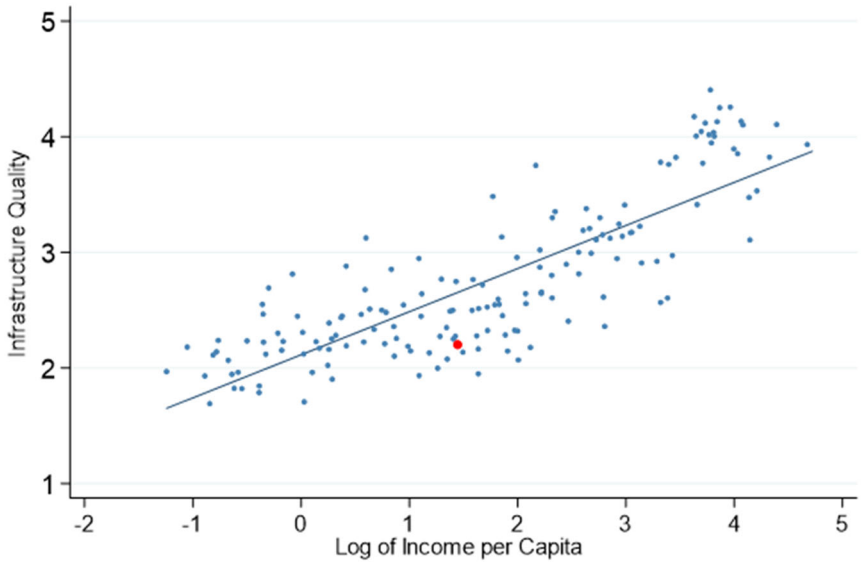
Source: Worldwide Governance Indicators and World Development Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIV.2. Guatemala: Education and Income per Capita
(Guatemala in red, fitted line in blue)



Source: Human Capital Indicators and World Development Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

Figure AIV.3. Guatemala: Infrastructure and Income per Capita
(Guatemala in red, fitted line in blue)



Source: Logistics Performance Indicators (World Bank).
Note: Acronyms are ISO3. Values are averages of years 2016-18.

CHARACTERIZING RECENT INFLATION DYNAMICS IN GUATEMALA[1]

This analysis aims to characterize some specific features of Guatemala's recent inflation dynamics, shedding light on the differences in inflation rates across income groups of the population, and the importance of global vs. local factors. First, it shows that the inflation rate for the bottom-income quintile has likely been considerably different from the inflation rate facing the top-income quintile in the post-pandemic period. Second, it suggests that the impact of local food prices in Guatemala appears disconnected from global food prices. Third, it presents evidence that inflation dynamics are mainly driven by local rather than global factors.

A. Inflation Across Income Quintiles

1. Global inflation rates have been on the rise since the second half of 2021. Such inflation dynamics, which have affected both advanced as well as emerging and developing economies, have been driven by a strong demand recovery amid continued disruptions of global supply chains, which have put pressure on prices for various products. These pressures, which were already exercising considerable impact on inflation by the beginning of 2022 have been exacerbated by the war in Ukraine, which has led to important increases in the global prices of some commodities, especially fuels and food. In Guatemala, inflationary pressures were contained in 2021, although some signs of external price forces appear in the latest data prints.

2. Rising prices are likely to have had heterogeneous impact across economic sectors and segments of the population. For instance, the series of supply disruptions and increases in energy prices especially affected specific manufacturing industries and energy-intensive sectors. Moreover, the imposition of lockdowns and restrictions to collective transportation resulted in higher prices for specific sectors, such as transport. In turn, these sectoral heterogeneities in price movements have been reflected into different inflation rates across various population groups in light of their different consumption patterns. Moreover, recent rises in food prices have hit the most vulnerable segments of the population especially hard, given the prevalence of food products in their consumption baskets.

3. How different have been inflation rates facing the richer and the poorer segments of the Guatemalan population? This analysis attempts to shed light on this question through the construction of separate consumer price indices for the different income quintiles of the population. The analysis is based on the heterogeneity in consumption patterns across the income quintiles, such as the relatively higher weight of food and other necessities in the consumption basket of the bottom-income quintile or the relatively higher weight of sumptuous products in the consumption basket of the top-income quintile.

[1] Prepared by Emilio Fernandez-Corugedo, Metodij Hadzi-Vaskov, and Luis Carlos Ibanez Thomae

CPIs based on Income Quintiles

4. CPIs for different income-quintiles of the Guatemalan population are proxied by the weights employed by the Dominican Republic. While CPIs for the different income segments of Guatemala's population are not officially available, the analysis makes use of the example from the Dominican Republic, which is the only country in the Central America, Panama, and the Dominican Republic (CAPDR) region that produces official CPIs for the five income quintiles of its population. Given the broad similarities of the economies in the CAPDR region, we assume that the consumption patterns across income quintiles in the Dominican Republic serve as a proxy for the consumption patterns across income quintiles in Guatemala and construct the proxies for income-based CPIs by applying the expenditure weights (12 expenditure divisions) used by the Central Bank of the Dominican Republic.

5. We construct monthly CPI for each income quintile *i* in Guatemala according to the following equation:

$$\boldsymbol{CPI_{qi}} = \sum_{\boldsymbol{j=1}}^{\boldsymbol{12}} (\boldsymbol{w_{ij}} * \frac{\boldsymbol{x_j}}{\boldsymbol{\overline{w}_j}}) * \boldsymbol{CPI_{j,2020}}$$

Where:

$\boldsymbol{CPI_{qi}}$ represents the Consumer Price Index for income quintile *i*.

$\boldsymbol{w_{ij}}$ represents the weight that expenditure division *j* has for quintile *i* for Dominican Republic.

$\boldsymbol{x_j}$ represents the weight that expenditure division *j* has for Guatemalan CPI.

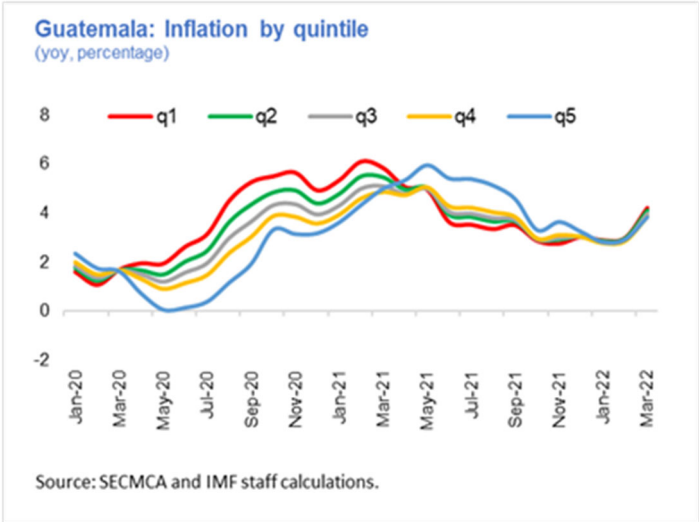
$\boldsymbol{\overline{w}_j}$ represents the average weight that expenditure division *j* has for all quintiles in Dominican Republic.

$\boldsymbol{CPI_{j,2020}}$ represents the CPI for the expenditure division *j* in Guatemala considering January 2020 as the base period.

Recent Evolution of Quintile-Based Inflation Rates

6. There has been considerable heterogeneity across inflation rates facing different income quintiles. Figure 1 shows that annual inflation rates differed markedly since the start of the pandemic, particularly between the bottom-income quintile (q1) and the top-income quintile (q5), with the remaining quintiles falling in-between. For instance, the second half of 2020 saw differences in annual inflation of over 3 percentage points between the poorest and richest quintiles.

Figure 1. Guatemala: Inflation by Income Quintile



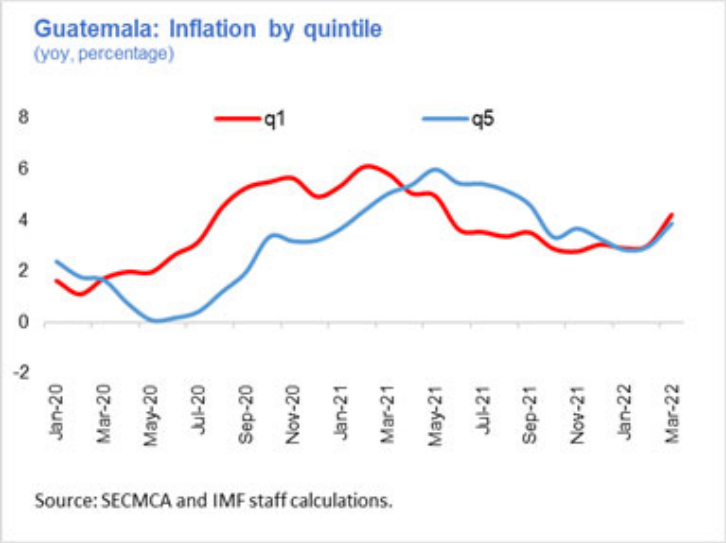
7. Three phases can be identified in the evolution of the inflation rates facing the poorest and richest quintiles since the onset of the pandemic.

- First, Figure2 suggests that the bottom-income quintile faced considerably higher inflation than the top-income quintile from the pandemic outbreak until the second quarter of 2021. The difference is due to the decline in fuel prices (relatively more important for the top income quintile) in the initial stages of the pandemic as well as the higher rise in food prices (relatively more important for bottom quintile), due to the series of natural disasters (Eta and Iota) and pandemic-related food disruptions that affected Guatemala in 2020.

- Second, the economic recovery implied a reversal in 2021, as the fuel price rebound amid a moderation in food prices resulted in higher inflation for top-income quintile relative to the bottom-income quintile (from 2021Q2 to 2021Q4).

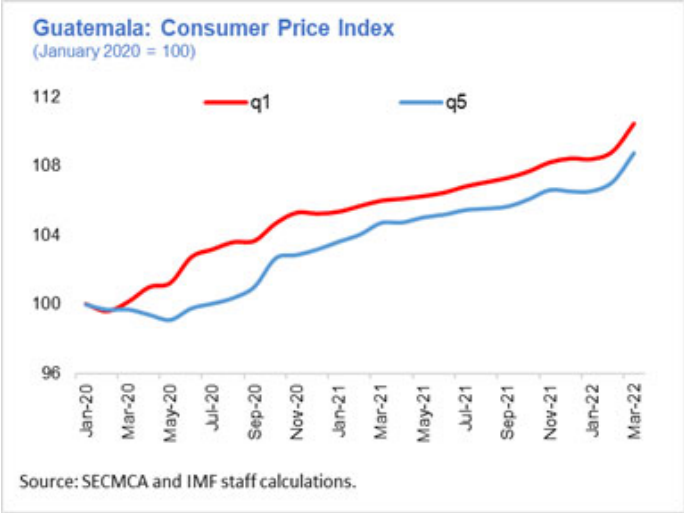
- Third, inflation rates for both income quintiles have increased in recent months against a backdrop of higher food, fuel, and other prices. This development is suggestive that the purchasing power of the poorest has declined more relative to the richest quintile, which could, among others, affect poverty levels.

Figure 2. Guatemala: Comparison of Inflation Rates for Bottom-Income and Top-Income Quintiles



8. The different inflation dynamics across these three phases has translated into a CPI gap between the poorest and the richest quintiles. Figure 3 shows that the poorest quintile has faced a higher price level since the pandemic outbreak. While this gap narrowed during 2021, reflecting the reversal in inflation rates described above, it showed some tendency to widen again in the most recent period.

Figure 3. Guatemala: Comparison of Price Levels for Bottom-Income and Top-Income Quintiles



Explaining Differences in Inflation Rates between Bottom and Top-Income Quintile

9. Having presented evidence on the different inflation rates for income quintiles, the following analysis examines the factors accounting for these differences. One possibility are the factors driving some of the increase in global inflation such as global food (FD_t) and fuel prices (FL_t). Formally, the importance of these factors on the inflation differential between the bottom-income and the top-income quintile (d_t) is examined using the following simple specification:

$$d_t = \alpha + \beta_1 FD_t + \beta_2 FL_t + \varepsilon_t \quad (1)$$

Table 1 presents results from the set of regressions that seek to explain the impact of global fuel and food prices on the differential between the inflation rate of the bottom-income quintile (q1) and the top-income quintile (q5) for Guatemala as well as CAPDR regional peers. There are two key findings from Table 1. First, as expected, higher global fuel prices lead to a lower inflation differential as they affect the inflation rate for top-income quintile q5 relatively more than the one for the bottom-income quintile q1 inflation. This result is significant at the 1 percent level for Guatemala as well as all regional peers. Second, global food prices generally lead to a larger differential for most countries. To the extent that global food prices are related to local country-specific food prices, this result should not be surprising given that food products are relatively more important for the bottom-income quintile than for the top-income quintile. Nonetheless, while global food prices are indeed found to be contributing to a larger q1-q5 inflation differential for the regional peers, the opposite result holds for Guatemala.

Table 1. Guatemala: Explaining Inflation Differential Between Bottom and Top Income Quintile

	CAPDR	CRI	SLV	GTM	HND	NIC	DOM	PAN
Fuel prices	-0.0192***	-0.0178***	-0.0209***	-0.00592**	-0.0169***	-0.0205***	-0.0230***	-0.0135***
	(0)	(5.23e-06)	(0)	(0.0299)	(7.84e-09)	(1.27e-06)	(0.000448)	(3.13e-08)
Food prices	0.0313***	0.0426***	0.0296***	-0.0585***	0.0370***	0.0466***	0.0173	0.0124
	(0)	(1.32e-06)	(1.51e-06)	(1.59e-08)	(6.71e-08)	(1.98e-06)	(0.258)	(0.162)
Constant	0.453***	0.336***	0.312***	1.904***	-0.166*	0.455***	0.620***	0.0926
	(0)	(0.00586)	(8.74e-06)	(0)	(0.0642)	(0.000607)	(0.00264)	(0.245)
Observations	1,247	173	143	116	251	239	251	74
R-squared	0.092	0.140	0.432	0.568	0.140	0.110	0.058	0.464

Note: Dependent variable is the difference between inflation rates facing the bottom quintile and the top quintile of the income distirbution. Global fuel prices are measured through the WTI, and global food prices through the FAO food price index. P-values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

10. What could be explaining this seemingly counterintuitive result? One conjecture is that this result points at a likely "disconnect" between global food prices and local food prices in Guatemala. The next section focuses on exploring the importance of global vs local factors in explaining inflation dynamics in Guatemala more formally.

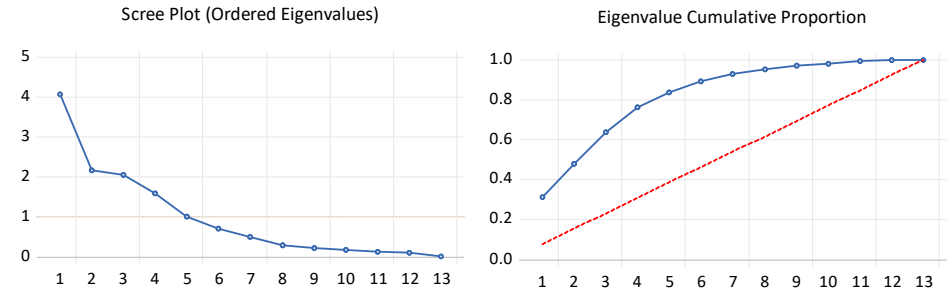
B. Principal Components Analysis

11. A principal components (PC) analysis is conducted to highlight the limited impact of global factors in explaining inflation dynamics in Guatemala. The above analysis suggests that unlike other countries in the region, the difference in the inflation rates experienced by the top and bottom quintiles is negatively correlated with global food factors. One explanation for this finding is that global factors may not be important drivers of inflation in Guatemala. To evaluate this hypothesis, PC analysis is conducted on Guatemalan and global data. More specifically, PCs are extracted from the overall CPI and twelve inflation divisions in Guatemala.[2] We also extract PCs using non-Guatemalan data, namely various inflation measures from the United States (overall CPI, food inflation, energy inflation, core inflation, core goods and core services) and global prices (oil, energy, metal and food, Baltic Price Index) as well as global activity measures (global industrial production and global imports from the Netherlands Bureau for Economic Policy Analysis). Given that monthly data is very volatile, we employ quarterly data from 2012Q1 to 2022Q1.

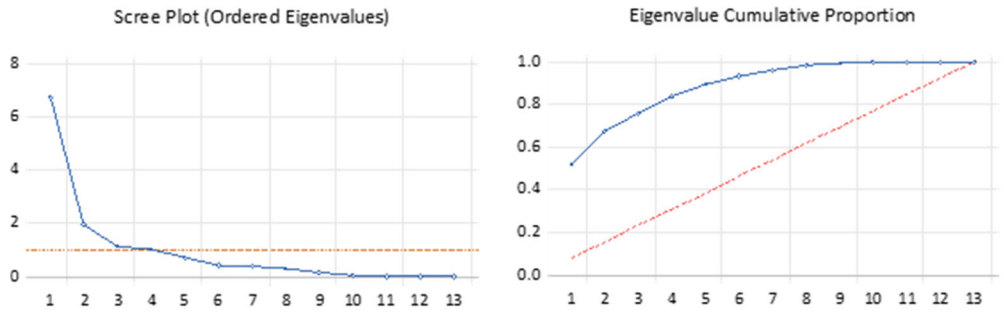
12. As commonly found in the literature, relatively few PCs explain a large share of the variation of Guatemalan inflation and of the global factors. Figure 4 shows that the first three PCs explain around 65 percent of the variation of the 13 quarterly inflation series, with five PCs (with eigenvalues exceeding 1) explaining around 85 percent. In the case of the global series, the four PCs explain around 85 percent of the variation of all of the series.

Figure 4. Guatemala: Principal Components

Principal Components Extracted with Guatemalan inflation



Principal Components Extracted with Global Data



[2] These subcomponents are: food and nonalcoholic beverages; alcoholic beverages and tobacco; clothing and footwear; housing, rent water, electricity and gas; household furnishings and equipment; health; transportation; communication; recreation and culture; restaurants and hotels; education; and Miscellaneous and other goods and services.

13. While PCs extracted from Guatemalan data explain a large share of the inflation variance in Guatemala, they do not tend to explain global variables. Moreover, PCs extracted from global variables do not have an important role explaining Guatemalan inflation. The key results are formally shown in Tables 2 and 3, which present the estimates of simple regressions of various inflation subcomponents on the extracted principal components. The regressions are of the form:

$$x_t = \alpha + \sum_{i=1}^{n} \beta_i PC_{i,t}^{j} + \varepsilon_t \qquad (2)$$

where *x* is the variable of interest (inflation in Guatemala or elsewhere), and PC stand for principal components extracted with Guatemala data (*j*=GTM) or non-Guatemalan data (*j*=*). The number of PCs selected is up to five for $PC^{GTM,}$ or four, when PC*, consistent with Figure 4. The results shown in Table 2 suggest that the first three PCs largely reflect Guatemala-specific factors since these explain a large variation of CPI and food inflation in Guatemala[3] but do not explain much of the variation of energy-related inflation in Guatemala, or inflation in the US or other global inflationary developments. The next two PCs, include global factors (the R^2 of US inflation, global oil and food prices increases notably), but provide only some additional explanatory power for Guatemalan CPI and Guatemalan food inflation.

Table 2. Guatemala: Guatemalan Extracted Components (PC^{GTM})

	CPI	CPI	Food	Food	Energy	Energy	US CPI	US CPI	Global Oil	Global Oil	Global Food	Global Food
α	0.927***	0.927***	0.058***	0.058***	0.364***	0.364***	0.554***	0.554***	1.274	1.274	0.539	0.539
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0.63)	(0.54)	(0.62)	(0.50)
β_1	0.078***	0.078***	-0.618**	-0.618**	0.046	0.046	0.032	0.032	0.752	0.752	-0.284	-0.284
	(0)	(0)	(0.07)	(0.07)	(0.56)	(0.39)	(0.51)	(0.35)	(0.57)	(0.47)	(0.60)	(0.48)
β_2	-0.086***	-0.086***	0.458***	0.458***	0.422***	0.422***	0.121**	0.121**	4.381**	4.381***	1.081	1.081*
	(0)	(0)	(0)	(0)	(0)	(0)	(0.07)	(0.01)	(0.02)	(0.00)	(0.15)	(0.05)
β_3	0.264***	0.264***		-0.161***	0.330***	0.330***	-0.075	-0.075	1.064	1.064	-0.499	-0.499
	(0)	(0)		(0)	(0)	(0)	(0.28)	(0.13)	(0.56)	(0.46)	(0.52)	(0.37)
β_4		0.089***		-0.210***		0.551***		0.329***		7.934***		3.202***
		(0)		(0)		(0)		(0)		(0.0)		(0.0)
β_5		-0.037		0.312***		-0.121		0.076		1.377		2.247***
		(0.113)		(0)		(0.27)		(0.28)		(0.51)		(0.0)
R-squared	0.853	0.917	0.900	0.961	0.411	0.74	0.122	0.581	0.158	0.508	0.073	0.534

P-values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

14. Global PCs explain a large share of variation in global variables, but not for Guatemalan inflation. To complement the previous results, similar regressions are estimated for Guatemalan CPI, food and energy inflation, as well as global variables, using the PCs extracted from global variables. The PCs extracted using global variables play an important role in explaining non-Guatemalan data. However, these PCs do not explain much of the variation of Guatemalan inflation variables and only the first PC is significant in the food and energy equations.

[3] IMF Country report 16/282 and 18/155 point to a large role of domestic-related factors explaining food inflation developments in Guatemala.

Table 3. Guatemala: PC Extracted Using Non-Guatemalan Variables (PC*)

	CPI	Food	Energy	US CPI	Global Oil	Global Food	Baltic Dry Index	Global IP	Global Imports
α	0.929***	1.858***	0.354*	0.512***	0.738	0.207	10.233***	0.532***	0.660***
	(0.0)	(0.0)	(0.07)	(0.0)	(0.48)	(0.73)	(0.0)	(0.00)	(0.0)
β_1	0.016	-0.200***	0.19**	0.196***	5.740***	1.552***	5.294***	0.563***	0.7951***
	(0.58)	(0.0)	(0.01)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
β_2	-0.075	-0.113	-0.032	0.140***	-2.708***	-0.389	-2.321	-0.643***	-0.676***
	(0.17)	(0.39)	(0.81)	(0.0)	(0.0)	(0.37)	(0.16)	(0.00)	(0.0)
β_3	0.100	0.089	0.068	-0.033	3.325***	-1.563***	25.736***	-1.731	-0.285
	(0.16)	(0.61)	(0.70)	(0.19)	(0.0)	(0.00)	(0.0)	(0.25)	(0.12)
β_4	0.058	-0.001	0.232	0.051*	1.583	3.323***	-16.435***	-0.384**	-0.591***
	(0.44)	(0.97)	(0.22)	(0.05)	(0.13)	(0.0)	(0.0)	(0.02)	(0.0)
R-squared	0.127	0.212	0.200	0.928	0.875	0.713	0.876	0.787	0.817

P-values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

C. Concluding Remarks

15. The proxies for quintile-based inflation rates in this analysis pointed at important differences in inflation rates facing the bottom-income quintile and the top-income quintile of the Guatemalan population since the start of the pandemic. Moreover, the income-quintile part of the analysis indicated that the impact of global fuel prices on the inter-quintile inflation differential in Guatemala varies considerably from regional peers, suggesting that the impact of local food prices in Guatemala may be disconnected from global food prices. The principal components part of the analysis provided further support to this conjecture, highlighting the prevalence of local rather than global factors in explaining inflation dynamics in Guatemala.

References

IMF (2016), "Guatemala: Selected Issues and Analytical Notes", IMF Country Report 16/282.

IMF (2018), "Guatemala: Selected Issues Paper", IMF Country Report 18/155.