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Applying Structural Equation Modeling to Analyze the Mutual Causality between Corruption and Trust and the Impact of *Lava Jato*: Evidence from Brazil and Mexico

THESIS

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by

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DEDICATION

To my spouse, Ludmilla Alencar,

in recognition of her unwavering love, support, and willing sacrifice

To my parents and friends

in recognition of their worth

"The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy."

Dr. Martin Luther King, Jr.

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ABSTRACT OF THE THESIS

Applying Structural Equation Modeling to Analyze the Mutual Causality between Corruption and Trust and the Impact of Lava Jato: Evidence from Brazil and Mexico

by

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Professor John Hipp, Chair

Based on data from the 2012 and 2016 America Barometer studies, this study explores the relationship linking corruption experience and trust in local government in Brazil and selected countries, and accesses the effect of the anti-corruption investigation, called Lava Jato operation, on those variables. It is employed a simultaneous equation model using instrumental variables and accounting for missing values. The findings suggest no mutual causality between citizens' experience with corruption and their trust in the local government. However, corruption perception has a significant negative impact on trust in local government for Brazil and countries not involved in Lava Jato. Moreover, results show that respondents with leftist political ideology tend to have less trust in local government and citizens' experience with corruption and their trust in the local government do not appear to have been significantly impacted by Lava Jato. At the time this study was conducted, there were no systematic studies on the effect of the *Lava Jato* operation on indicators such as corruption experience and trust in local government.

1. INTRODUCTION

The existing literature makes clear how corruption affects the economic development of nations, thus reducing market efficiency, eroding the quality of public services, and contributing to the increase of poverty and social inequality (Jain, 2001; Kessing, Konrad, & Kotsogiannis, 2007; and Mauro, 1995). In several studies, researchers have demonstrated the relationships between corruption, economic growth, informality, illicit activities, violence/drugs, and inequality and poverty (Hameed, Magpile, & Runde, 2014; Kar & LeBlanc, 2013; and McNair et al., 2014). Corruption indisputably reduces welfare and has multiple causes and complicated dynamics that are seemingly difficult to access and address, but the risks of not acting are high (Kreuter et al., 2004). Also, corruption "involves a most intricate and elaborate labyrinth of human moral, cognitive and social processes" (Sabet, 2012, p.70) and it is an old, widespread, and multifaceted phenomenon (Sekkat, 2018) that is difficult-to-solve. Hence, the complex nature of corruption may be the reason why several anticorruption policies failed to deal with it.

The estimate of the cost of corruption is also a challenge. The International Monetary Fund claims that corruption costs $1 trillion in tax revenue globally (IMF, April 2019). According to the United Nations, every year, those illicit transactions cost at least 5% of GDP, or around USD 3.6 trillion[1], every year. Corrupt activities can lead to leakages of public money. As a consequence, governments will collect smaller tax revenues and/or pay higher values for goods, services or investment projects. However, the cost of corruption is larger than the sum of the lost money. According to the IMF report, distortions in spending priorities under-mine the ability of the state to promote sustainable and inclusive growth (IMF, April 2019).

Corruption not only increases the cost to the economy, but also reduces the key functions of the public sector, such as tax collection or expenditure choices. If, in exchange for bribes, corrupt politicians or even civil servants facilitate tax evasion for some people or firms, others will end up facing higher tax rates, and the government may be unable to generate enough revenue to pay for productive spending. Likewise, the quality of public services and infrastructure suffer when project selection reflects opportunities for bribery or nepotism. Bribery of foreign

[1] https://www.weforum.org/agenda/2018/12/the-global-economy-loses-3-6-trillion-to-corruption-each-year-says-u-n

officials by multinationals and the use of obscure financial centers, or secrecy jurisdictions, either to hide corrupt gains or to evade taxes add a global dimension to the challenge. Against this backdrop, and by contributing to growing inequality, corruption undermines trust in government and can lead to social and political instability.

1.1. Corruption in Brazil and *Operação Lava Jato* (Operation Car Wash)

Brazil is a country that has had a decades-long history of corruption. Since the beginning and development of an anticorruption operation known as *Operação Lava Jato* (Operation Car Wash) and its reverberations in 61 other countries[2], corruption scandals began to gain space in the news with unprecedented political and judicial repercussions. Lava Jato is a Brazilian anticorruption investigation related to the Petrobras' corporation, a Brazilian oil company, that has been under investigation by a federal judge since March 17, 2014. This operation started with an investigation of money laundering and turned out to be the biggest corruption scandal in Brazil's history and one of the largest in the world (BBC, 2017; Watts, 2017; Ministério Público Federal, 2017).

With a total requested reimbursement amount of BRL 20.5 billion (around 5 billion USD in 2018-dollar value), criminal charges against 221 people, and 204 convicted people, including politicians, top-level corporate executives and a former president[3], Lava Jato can be considered a milestone in Brazilian history. Queiroz (2015) estimated that the socio-economic impact of corruption in Brazil is over 2.5% of its GDP, or around US$ 50 billion, in addition to 13% of GDP owing to tax evasion[4]. Those resources could be used to improve, for example, the public services (health, education, transportation, security), social or environmental programs, or even be applied to university research.

Carson and Prado (2014) confirm the corrosive impact of corruption on political trust, the legitimacy of Brazilian institutions and economic growth. They emphasize that, in Brazil, the greatest challenge posed by corruption lies in the systems and institutions that have allowed grand corruption to persist as a plague that weakens social and political trust and undermines

[2] http://www.mpf.mp.br/grandes-casos/lava-jato/efeitos-no-exterior
[3] http://www.mpf.mp.br/grandes-casos/lava-jato/resultados accessed on 11/20/19
[4] www.fiesp.com.br/mobile/noticia/?id=13345

economic growth. Based on the Latin American Public Opinion Project (LAPOP), between 2012 and 2016, corruption perception means rose from 3.6 to 4.2; and all trust indicators dropped.

1.2. Corruption in Mexico

Corruption is also high in countries like Mexico. In a study from 2015, in which Mexican participants were asked to state the first words that came into their mind, the word corruption ranked in the top three words stated (UNAM 2015).

Mexico is one of the countries that was impacted by the Lava Jato. According to the Odebrecht Plea Agreement from the United States Department of Justice (2016, p.7), the Brazilian construction company Odebrecht "paid approximately $788 million in bribes in association with more than 100 projects in 12 countries, including Angola, Argentina, Brazil, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Mozambique, Panama, Peru and Venezuela". More specifically, Odebrecht paid US$10.5 million in bribes to Mexican officials between 2010 and 2014 (Gonzalez-Ocantos & Hidalgo, 2019).

My interest in Mexico is also related to the work of Morris and Klesner (2010), who empirically explored the relationship linking corruption and trust in Mexico based on data from the 2004 Americas Barometer survey. The researchers found a simultaneous relationship between two types of corruption indicators (experience and perception) and institutional trust. In their research, corruption perception refers to perception if different agents are corrupt (congressmen, mayors, police, judges, political parties' leaders, NGO leaders) based on LAPOP for 2004. However, it is not possible to replicate their model using updated LAPOP surveys because those indicators for each agent are not available after 2004. Also, variables of trust in the Attorney General Office, Supreme Court and National Commission on Human Rights were not surveyed after 2004.

1.3. Corruption in American countries not involved in Lava Jato

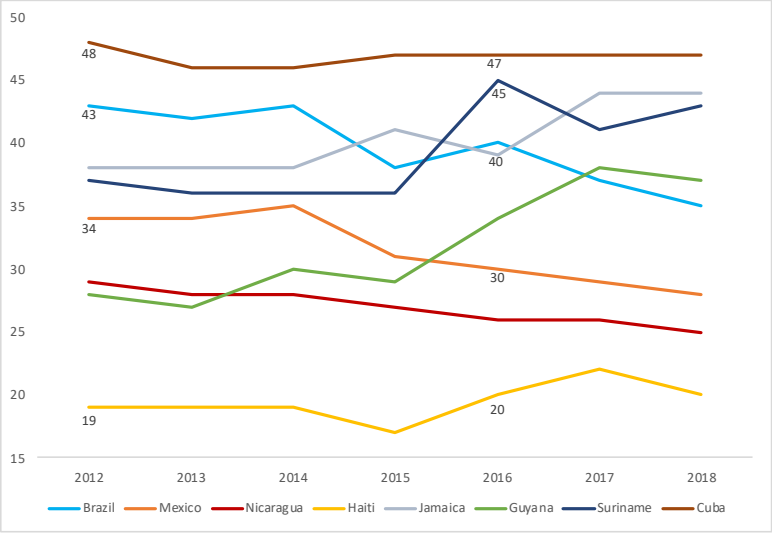
Considering the information provided by the Brazilian authorities[5], the investigation representatives didn't request international cooperation from Belize, Cuba, French Guyana,

[5] http://www.mpf.mp.br/grandes-casos/lava-jato/efeitos-no-exterior

Guyana, Haiti, Jamaica, Nicaragua, or Suriname. Because LAPOP[6] has no information for Cuba and French Guyana, those countries are not included in the group of countries not exposed by the Lava Jato operation. However, this does not necessarily mean that those countries are free of corruption.

One known measure related to corruption is the Corruption Perception Index (CPI), which ranks countries by "their perceived levels of public sector corruption according to experts and businesspeople" and goes from 0 to 100, where 0 means highly corrupt and 100 means very clean. Considering this index, all the countries considered in this study have a score of less than 50, which reveals a considerably high level of corruption perception, as shown in Figure 1.

Figure 1 – Corruption Perception Index (2012 - 2018) for selected countries



Source: International Transparency

Haiti ranks with the worst score, around 20 between 2012 and 2018. All the countries analyzed in this study denote a high level of corruption perception. Suriname, Jamaica, and Guyana improved their perception of corruption scores. On the other hand, citizens from Brazil, Mexico, and Nicaragua increased their perception of corruption. Cuba and Haiti had the lowest variation between 2012 and 2018.

Belize suffers from corruption, nepotism, and conflicts of interest. The adoption of an Ombudsman Act in 1994 and the Office of the Ombudsman in 1999 tried to stimulate citizens to report corruption incidents. However, it seems to be necessary to revamp the country's strategy

[6] Latin American Public Opinion Project (LAPOP), Vanderbilt University. Available at http://datasets.americasbarometer.org/database/index.php#

to fight corruption more effectively (Mahung, 2019). According to Díaz-Briquets & Pérez-López (2006), Cubans with strong social networks can bypass the bureaucracy of socialism and access to scarce goods and services. Although there is not much information about corruption in French Guiana, the World Bank's Control of Corruption score ranks the country considerably well due to the oversight from Paris (Warf, 2019). In the case of Guyana, Clegg (2014) posits that is difficult to assess the true extent of corruption in the country. Furthermore, the scholar states the government has a big challenge to overcome corruption, illegality, and discrimination.

In the case of Haiti and Jamaica, corruption is still a problem to be addressed. Joseph and Phillips (2016) assert that Haitian high levels of corruption are the consequence of ineffective judiciary and police that amplify the culture of impunity. In the case of Jamaica, the citizens view their government institutions as corrupt, and the police as the most corrupt institution (Warf, 2019). In addition, Warf states that the country suffers from frequent scandals and violence in electoral politics, aggravated by the strong influence of drug barons on politicians and police officers (McGreal, 2010). Young (2014) adds that Jamaica remains vulnerable to corruption and contends the main reasons for Jamaica's weakness in fighting corruption relate to poor legislation and lack of political will to enforce anti-money laundering.

Nicaragua and Suriname are not different in struggles to fight corruption. Cruz et al. (2018) consider that Nicaragua levels of corruption threaten democracy and political stability, affecting state capacity to improve human development and reduce poverty. In the same vein, the CPI indicates that Suriname also has substantial levels of corruption perception.

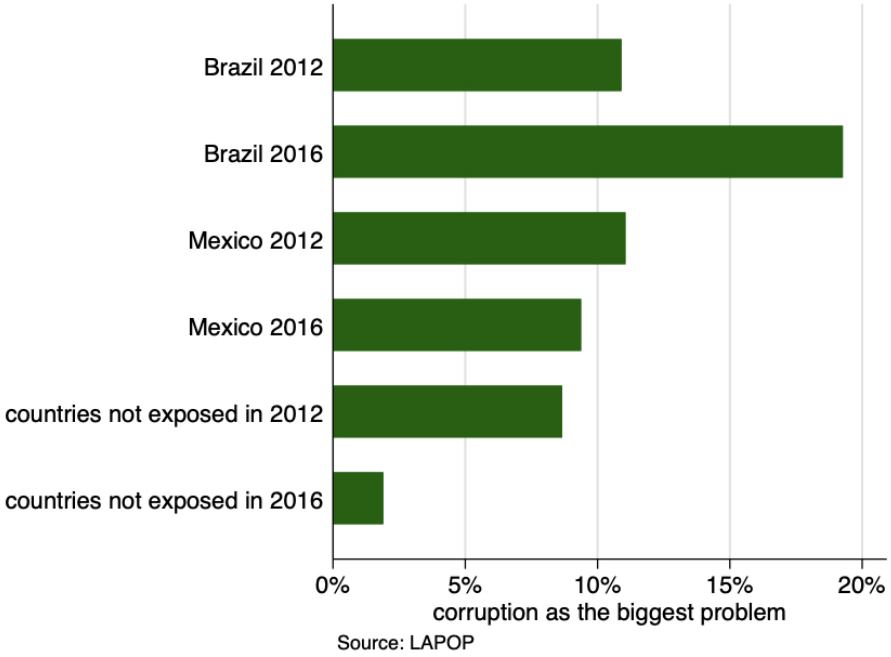
Table 1 – Respondents who consider corruption as the main problem in the country

	2012		2016	
	responses	percentage	responses	percentage
Brazil	163	11%	290	19%
Mexico	86	11%	143	9%
Nicaragua	25	3%	20	2%
Haiti	22	2%	35	2%
Jamaica	46	7%	16	1%
Guyana	146	19%	49	4%
Belize	122	NA	NA	NA
Suriname	28	NA	NA	NA
Cuba	NA	NA	NA	NA
French Guiana	NA	NA	NA	NA

Source: LAPOP

Table 1 presents responses provided by LAPOP for the question: what is the most important problem in your country? It seems that corruption is a problem that affects some of the countries of interest. Considering 2012, 19% of respondents of Guyana consider corruption the main issue to be addressed and, for 2016, Brazil has the highest proportion. LAPOP has no information for Cuba and French Guiana. Additionally, considering figure 2, the proportion of citizens who consider corruption as the most important problem, the cluster of American countries not involved by the Lava Jato dropped from 8.6% to 1.9%, and from 11% to 9% in Mexico. Although, the Brazil indicator rose from 11% to 19%.

Figure 2 – Percentage of respondents who consider corruption as the main problem by selected countries (2012 and 2016)



Source: LAPOP

1.4. Research Question and Hypotheses

As we will see, there are differing interpretations as to the likely relationship between corruption and trust, and no obvious consensus emerges. In this study, I differentiate between corruption perception, corruption experience (also corruption exposure or participation) and corruption tolerance, and include these dimensions into the investigation. Moreover, I include these corruption dimensions in models to capture two different types of corruption: petty and grand corruption. Considering both Chang and Chu (2006) and Morris & Klesner (2010), I the apply structural equations model (SEM) to assess petty corruption, treating corruption

experience and trust in local government as endogenous variables in the equations that predict the other. In the case of assessing grand corruption, I consider corruption perception as a proxy to grand corruption.

For instance, my first research question **(Q1)**: "Is there a strongly endogenous (simultaneous) relationship linking corruption experience and trust in the local government, and what factors explain corruption and trust?". Therefore, I formulate my hypotheses:

H_1: trust in local government leads to a decrease in corruption experience (petty corruption).

H_2: corruption experience leads to a decrease in trust in the local government ("sands the wheels" hypothesis).

My analysis tests distinct causal paths leading from the corruption experience to the trust in the local government. I model the direct causal influence between those two variables and test the model's causal effect of the instrumental variables.

I am also particularly interested in the effect of the *Lava Jato* operation on corruption and trust. Therefore, it is highly plausible that countries exposed to a high level of corruption scandals and that are under investigation by this operation (like Brazil and Mexico), *ceteris paribus*, may acquire a different orientation toward the relationship between corruption and trust in comparison to countries that are not involved. And I would expect that these countries exposed by the *Lava Jato* operation may have a stronger relationship linking corruption experience and trust in the local government if compared to the countries not exposed. Hence, this leads me to my second research question **(Q2)**: "Does the *Lava Jato* operation influence corruption and trust in Brazil and Mexico?". When comparing the countries exposed and those not exposed by the *Lava Jato* operation concerning the hypotheses mentioned above, it is additionally expected that:

H_3: the relationships are stronger in countries being investigated by Operation Car Wash (i.e., Brazil and Mexico).

To empirically examine this hypothesis, I test the following secondary hypothesis:

H_{3a}: the structural weights observed in the countries involved in the *Lava Jato* operation are higher than in those ones not involved.

At the time this study was conducted, there were no systematic studies on the effect of the *Lava Jato* operation on indicators such as corruption experience and trust in local

government. Therefore, this study used structural equation modeling with instrumental variables in order to assess those effects. Additionally, such studies applying SEM to investigate the effect of the *Lava Jato* operation on corruption and trust are even rarer.

2. LITERATURE REVIEW

2.1. Corruption theories

Corruption is defined differently by scholars (Balán, 2011; Key, 1936; Carvalho, 1987; Nye, 1967; Heidenheimer, 1970; Huntington, 1975; Gibbons, 1990; Zaffaroni, 1990; Bobbio, Mateucci & Pasquino, 1991; Treisman, 2000; Hodess, 2004; Araújo & Sanchez, 2005; and McCann & Redlawsk, 2006). The World Bank defines corruption as "the abuse of public office for private gain" (World Bank, 1997, p.8) and Transparency International labels it as "the abuse of entrusted power for private gain"[7]. Klitgaard (1988) relies on the principal-agent perspective to propose corruption as a problem of information and asymmetric incentives. In this framework, the elected politician (principal), given his inability to personally provide most of the services demanded by the population, employs public servants (agents) empowered to deliver public services to citizens. This is a typical situation of information asymmetry problems since agents have much more information about services provision when compared to constituents. Corruption arises in this scenario when agents exploit their position of intermediaries, exercising advantages derived from the power entrusted and acting in their own interest (Klitgaard, 1988).

Uslaner (2008) distinguishes between high-level and low-level corruption and differentiates corruption according to its monetary dimensions (differentiating between "grand" and "petty" corruption). Others classify corruption based on the nature of the actors involved ("political" and "bureaucratic") (Amundsen, 1999, p.3; Khan, 2003 p.4; Andvig et al., 2000, p.13). In a similar frame of mind, Jain (2001) identifies three levels of government corruption: grand, bureaucratic and legislative corruption. Grand corruption is a phenomenon difficult to measure because it is practiced at the highest levels of government and involves an illegitimate and hidden net of power and interests. For instance, some authors try to estimate corruption as a latent variable using structural equation modeling (Nascimento et al., 2019; Dreher et al., 2007; Corrado

[7] https://www.transparency.org/what-is-corruption#define

et al., 2017; and Dell'Anno, 2018). Bureaucratic corruption refers to the acts of corruption of appointed bureaucrats in their relations with their superiors (e.g. demanding bribery for the tasks assigned to them) or with the general public (e.g. by speeding bureaucratic procedures). Finally, legislative corruption potentially occurs to the extent that legislators' voting behavior can be influenced either by lobbying or by electoral ambitions.

It can be argued that people might be capable of differentiating between the petty corruption, operationalized by corruption experience, and the grand corruption, captured by corruption perception. However, a "vast amount of literature suggests that the petty corruption experience still contributes to corruption perception" (Babos, 2015, p. 111).

In addition, according to Jain (2001), corruption occurs in the coexistence of three central elements. The first element is the discretionary power, which refers to the authority to draft and manage regulations and policies. Next, the economic benefits associated with this discretionary power and, finally, the legal/judicial system which provides a low probability of detection and/or sanctions for those who commit the crime.

While some scholars advocate that variables related to contemporary institutions influence corruption (Arikan, 2004; and Chowdhury, 2004), Treisman (2000) argues that diverse historical trajectories can affect corruption. In a recent study, Sekkat (2018) claims that demographic and economic characteristics of the population, geographical location, the nation's political and institutional systems, or even the corruption system itself are factors that cause corruption. Kolstad (2012) emphasizes that, rather than merely a marginal problem, corruption is the main constraint to progress in any society of more than minimal complexity, in which it is necessary to assign various roles to different people. However, corruption is difficult to measure and can have different conceptual definitions and indicators.

In the same way that there are complementary or even different theories of corruption, there are various proposals on how to fight it. Zuniga (2018) argues that there are two strategies to fight corruption: narrow and broader. Narrow strategy elements are presented by Klitgaard (1988) e Jain (2001), which consist of improving public governance by strengthening laws, reducing the discretion of civil servants and increasing both institutional transparency and accountability (Zuniga, 2018). Zuniga proposes a broader strategy and considers corruption as an infinite game, in which rules constantly change in response to environmental changes.

According to the scholar, the sole purpose of the players is to perpetuate the game indefinitely, and at this point, it is not possible to identify winners or losers very clearly. In his approach, corruption reinvents itself by changing the rules, extrapolating them or taking on new forms as the world (and confrontation strategies) evolves. Thus, since the corrupt cannot be defeated, the combatant, who uses only finite anti-corruption strategies, can become frustrated and give up the game due to its instability and the constant renewal of the players, thus allowing room for the intensification of corrupt practices (Zuniga, 2018). For instance, anticorruption efforts must transcend the traditional approach, including, above all, a medium and long-term strategy to foster behavior change (culture) to establish and consolidate an audit firm, thereby perpetuating values opposed to those that corruption represents (Nascimento et al., 2019).

2.2. Corruption perception, experience and tolerance, and trust indicators

In order to understand the relationship between corruption and trust, a definition of those concepts and the relevant literature should be discussed. Interpersonal trust refers to trust in other members of society, and trust in the government (also named institutional or political trust) is related to confidence in the political system, which includes politicians, civil servants, the rule of law and the three branches of government (executive, legislative and judiciary).

Corruption perception, corruption experience (corruption exposure or corruption participation) and corruption tolerance have different meanings. The first relies on how individuals perceive the level of corruption, and the second refers to the personal exposure or participation in corruption acts. The third concept, corruption tolerance, could be the citizen's willingness to engage in corruption (Pozsgai, 2015), or the citizen's support for corrupt politicians (Pozsgai, 2014). Some surveys, such as the Global Corruption Barometer, the Corruption Perceptions Index, the Global Competitiveness Report, or the International Country Risk Guide aim to capture aggregated indices of corruption, while the Latin American Public Opinion Project (LAPOP) surveys intent to capture individual level of the three types of corruption (perception, experience, and tolerance). Corruption perception provides a reliable indicator of the corruption that exists in society (Rose & Mishler, 2010). Furthermore, surveys that distinguish between corruption experiences and individual's corruption perceptions could provide a justification for

why citizens may show signs of dissatisfaction with democracy. However, the definition of experience with corruption has its own limitations, since it usually does not capture grand corruption (Charron, 2016).

Although there are several surveys that propose to capture corruption, growing literature arises doubts about the strength of those surveys to measure it. Scholars assert that perception indices may be misleading because perception data is not a reliable proxy of corruption experience (Andersson & Heywood, 2009; Charron, 2016; Donchev & Ujhelyi, 2014; Heywood & Rose, 2014; Melgar et al., 2010; Ning, 2016; Olken, 2009; Razafindrakoto & Roubaud, 2010; Rose & Mishler, 2010; Treisman, 2015). Furthermore, surveys usually have the limitation of capturing self-reported perceptions that could be divergent from real behavior. Such changes in behavior occur because of respondents' awareness that they are being studied or observed.

Melgar et al. (2010) claim that personal characteristics shape the individual's perception of corruption, making this variable biased. According to their findings, gender, marital status, education, social class and even the job sector (public or private) affects how corruption is perceived. The scholars argue that women, unmarried persons, people with less years of education, people working in the private sector, and individuals from lower socio-economic status are more likely to perceive a higher level of corruption. Miller (2006, p. 178) claims that images of corruption may "reflect generalized gossip about corruption, or media scandals/allegations rather than anything more personal to the individual".

While some studies point at a unidirectional relationship from trust to corruption (Bjornskov, 2003; Graeff & Svendsen, 2013; Hakhverdian & Mayne, 2012; and Uneke, 2010), other scholars reverse the causal arrow, connecting trust and corruption, and envision corruption as influencing the level of trust (Anderson & Tverdova, 2003; Chang & Chu, 2006; Della Porta, 2000; and Doig & Theobald, 2000). However, the growing empirical literature on political corruption shows trust as both cause and consequence of corruption (Morris & Klesner, 2010). Della Porta & Vannucci (1999) present a vicious cycle between distrust and corruption. According to these scholars, misadministration leads to mistrust in the implementation of policies, which encourages individuals to find a way to solve their problems, including the possibility of bribery. As a result, it created a demand for corruption, which increases misadministration. This vicious cycle occurs in countries suffering from systemic corruption (Manion, 2004; and Wesberry, 2004).

Another relevant debate concerns the impacts of corruption and distrust on society. It is clear that one of the most important factors affecting trust is corruption; however, the literature signs that this impact is controversial (Habibov et al., 2017). On one hand, most scholars support the "sand the wheels" theory, which states that corruption has a negative effect on trust is supported by most scholars (Aidt, 2009). Corruption and distrust not only degrade the quality of institutions and public service satisfaction but also increases social inequality, limits economic growth, and worsen life satisfaction. On the other hand, there are scholars posting the "grease the wheels" hypothesis, in which corruption could alleviate the distortions produced by bureaucratic procedures (Leff, 1964; and Leys, 1965). Consequently, bribes and gifts are used to access scarce government resources and could accelerate bureaucratic procedures (Aidt, 2009). There is also the speculation of no significant effect of corruption on trust, considering the "trust begets an honest political system" hypothesis (Habibov et al., 2017).

Alesina & Angeletos (2005) found that redistributive policies intended to reduce inequality could even increase corruption opportunities. As a result, small governments struggle to correct for market inequalities, while large governments escalate corruption and rent seeking. Regarding the relation between corruption and economic growth, several scholars confirm the robust negative correlation between these variables (Mo, 2001; and Swaleheen, 2011). Furthermore, Kurakin & Sukharenko (2018) investigated this phenomenon in the BRICS countries (Brazil, Russia, India, China, and South Africa) and concluded that corruption may negatively impact economic growth and sustainable development. Ciziceno & Travaglino (2018) investigated the role of institutional trust in explaining the relationship between individuals' perceived corruption and life satisfaction. They conclude that perceived corruption undermines confidence in institutions and indirectly affects individuals' satisfaction with life.

One relevant concern in assessing trust occurs when drivers are also measured through self-reported data. According to the OECD Guidelines on Measuring Trust (2017), "self-report biases (including social desirability biases, response styles, cultural bias, etc.) can inflate the estimated impact of self-reported drivers relative to those measured through other means" (p.181). In order to address this issue of self-report bias, the use of longitudinal data is encouraged to control the individual fixed effects. Another option suggested by OECD would be to use non-self-reported measures of constructs of interest (OECD, 2017).

Another relevant point is that corruption is a variable that cannot be measured directly (Dreher et al., 2007); however, some measures could be used to capture, at least partially, this latent variable. Political factors, for example, can capture the democratic setting of a country and the effectiveness of its judicial system. Dreher and colleagues (2007) argue that the relationship between corruption and the political system is widely believed. It is also reasonable to assume that democracy promotes political competition and increases transparency and accountability, providing barriers to corruption. Treisman (2007) investigated the role of democracy in corruption. This scholar found a significant negative relation between democracy and corruption; however, the result is sensitive to the democracy index used in estimations.

Although the existing empirical evidence on the impact of democracy and press freedom is at best mixed, Besley & Burgess (2002) advocate the role of both democracy and press freedom in India. Chowdhury (2004) also concludes that democracy and press freedom can have a significant impact on corruption. In the opposite vein, Treisman (2000) reports that prolonged exposure to democracy reduces corruption, but the current degree of democracy is not significant to reduce corruption. Brunetti & Weder (2003) are also skeptical about the impact of democracy on corruption in a cross-country analysis.

Based on La Porta et al. (1997) findings, the sense of religious belonging could also be a determinant of corruption arguing that hierarchical religions (e.g. Catholicism) often act in symbiosis with the government and dissuade horizontal trust and civic participation which, as a result, increases corruption. The scholars quarrel that such religions emphasize vertical bonds of authority rather than the horizontal networks between citizens that promote cooperation, trust and civic engagement. However, Lambsdorff (2006), and Dimant & Tosato (2018) provide an overview of the empirical literature that suggests ambiguous results.

As we can see, there are different definitions of corruption and a wide range of interpretations on how this variable interacts with trust indicators. Although each definition has its pros and cons, the importance of continuing with studies on the relationship between corruption and trust is evident. In order to contribute with this debate, this study deepens the analysis of petty corruption (captured by the corruption experience indicator), trust in the local government, and the impact of the *Lava Jato* operation on those variables.

3. DATA

This study focuses on the individual level of analysis on Brazil, Mexico and Latin American countries not involved in Lava Jato (Belize, Nicaragua, Guyana, Haiti, Jamaica, and Suriname) to sort out how corruption and trust are connected. Another goal of this study is to investigate the effect of Lava Jato on corruption and trust.

In order to consider data before and after this anti-corruption operation, which started on March 17, 2014, I consider Latin American Public Opinion Project's (LAPOP) data collected in 2012 and 2016[8]. The survey applied in Brazil used a national probability sample design of voting-age adults, with a total sample size of 1,499 respondents in 2012 and 1,532 people in 2016, with face-to-face interviews conducted in Portuguese. The survey applied in Mexico used the same sampling approach, with a total sample size of 1,560 people in 2012 and 1,563 in 2016, involving face-to-face interviews conducted in Spanish. The countries not exposed by Lava Jato and that were surveyed in 2012 and 2016 are Belize, Guyana, Haiti, Jamaica, Nicaragua, and Suriname. In total, those six countries have a sample size of 9,553 in 2012 and 6,872 in 2016, also with the interviews led in Spanish. The surveys used a complex sample design, taking into account stratification and clustering. As a result, it is suggested to report statistics or statistical analyses adjusted for the design effect due to the complex design of the sample[9]. In the case of using Stata, the svy commands should be applied. However, because stratification usually makes standard errors smaller, ignoring stratification is usually conservative[10].

4. MODEL SPECIFICATION

Ordinary least squares (OLS) regressions are the most common econometric approach (Greene, 2003; Stock and Watson, 2003). However, this technique has trouble to address endogeneity, which is the correlation between the regressor and the error term. The main

[8] There is no data for LAPOP 2013 and 2015. I didn't consider LAPOP 2014 because was the first year of Lava Jato and I considered LAPOP 2016 because respondents may be more informed about Lava Jato.
[9] For more information visit http://www.vanderbilt.edu/lapop/survey-designs.php
[10] https://www.stata.com/manuals13/svy.pdf, page 91

problem is that endogeneity violates the most important OLS estimation assumption, the exogeneity condition (Bascle, 2008).

The three-stage least squares method (3SLS) is one approach that can handle endogeneity, it considers by default covariance between endogenous variables. However, it has the limitation of not accounting for missing data. Another point to consider is the assumption of normality. For instance, I assume normality to use maximum likelihood estimation. According to Acock (2013), this alternative is often the best and robust, even if some violation of normality occurs. For those reasons, I applied SEM[11] (full information maximum likelihood estimator accounting for missing values). The data analysis was conducted using the SEM function on Stata/IC 15.1 and the multigroup analysis considering the total sample was ran on Stata/SE 14.2.

I employed structural equation modeling to estimate the strength of the expected relationships. According to Hoyle (1995), this method is especially appropriate in situations when the reverse causation and/or latent factors are present in the analysis. In order to model and estimate the reverse causation, I used instrumental variables (IV). This approach addresses "econometric problems with observational data, such as when the outcome and explanatory variables are simultaneously determined" (Larcker & Rusticus, 2010, p.186).

Indeed, it is critical to assess the quality of IVs in non-recursive models. Usually, good IVs are based on the assumption that they (1) are not correlated with the disturbance term and (2) are correlated with the endogenous variable (Paxton, Hipp & Marquart-Pyatt, 2011). Table 4 in the appendix presents descriptive statistics of the variables used in this study.

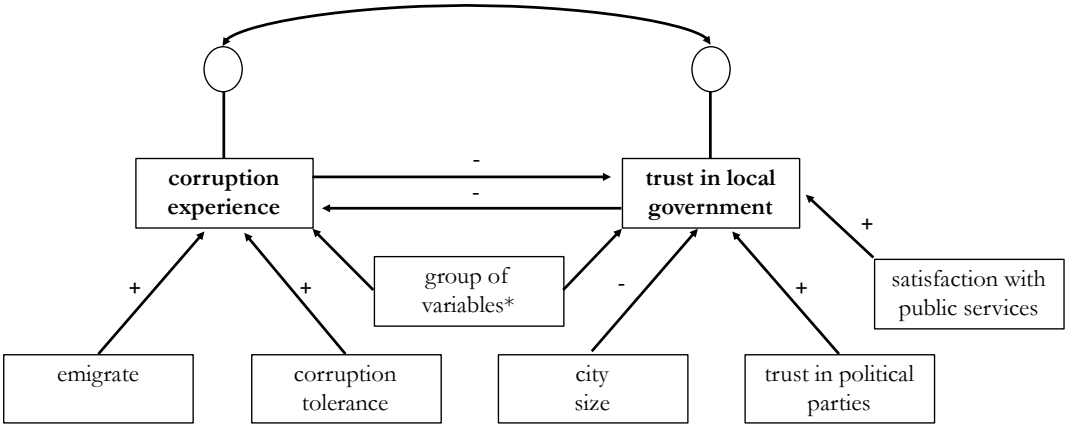
The model for capturing petty corruption is illustrated in Figure 3 with the respective expected signs. In order to simplify the visualization, the variables that affect both the endogenous variables are shown in only one box. In this model, the endogenous variables are corruption experience and trust in local government. ***Corruption experience*** was generated as described in Morris & Klesner (2010)[12] and is a joint index constructed from responses (no = 0 and yes = 1) to the questions based on experience with corruption among public officials, courts, public health services, educations services, police, armed forces, municipal government, and at

[11] SEM fits models to single-level data, responses are continuous, and models are linear regression. However, GSEM (3SLS) works better for categorical variables.

[12] See the online appendix, available at http://documents.kenyon.edu/polsci/Morris-Klesner-CPS-Oct10-APPENDIX.pdf

work; summed and rescaled to 0-8 scale. Cronbach's alpha is 0.7365. ***Trust in local government*** captures respondents' level (seven-point scale, where 1 = "not at all" and 7= "a lot") of trust in local government.

Figure 3 – Petty corruption model



*group of variables: corruption perception, interpersonal trust, years of education, female, age, organizational involvement, country's economic situation, ideology, black, and non-public servant

I included in the estimations the following control variables. ***Corruption perception*** measures the amount of corruption among politicians and ranges from 1 (low perception) to 5 (high perception). ***Interpersonal trust*** captures respondent perceptions about the level of confidence of the community, ranging from untrustworthy (0) to very trustworthy (100). ***Organizational involvement***, with ranges from 0 to 0.7012, was built applying a principal components analysis of five variables (if respondents attended at least one meeting per year in a religious organization, parent association community, improvement group, political movements or parties, or women's group)[13] Cronbach's alpha for organizational involvement is 0.5928. The ***country's economic situation*** describes the respondent's perception of the country's economic situation compared to 12 months ago (1 "worse" 2 "same" 3 "better"). I included the dummy variable **leftist *ideology*** because political ideology could strengthen beliefs about the behavior of bureaucrats, politicians and even the president (Fraiha, 2014), affecting the trust in local government. Ideology could also affect how the individual deals with corruption. This aspect could particularly be relevant in the case of Brazil. Considering that the left ideology led the

[13] I have created a factor score for organizational involvement because the loadings of the variables vary. The loadings are 0. 3830 for a religious organization, 0. 4704 for a parent association community, 0. 7012 for an improvement group, 0. 6774 for an association of professionals, traders or farmers, 0. 4594 for a political movements or parties, 0. 6690 for women's group and 0. 5280 for sporting or recreational groups

Brazilian government for a reasonable period (from 2002 until 2018), I argue that constituents of the group in charge usually have more confidence in the government and less tendency to perceive corruption, if compared to the opposition groups. Socio-demographic variables, like ***race (black), gender (female), age, years of education*** and occupation (if the respondent is not a public servant) were also included in the model. More specifically, I included the variable ***non-public servant*** because public officers have access to sensitive information in the government and there is a risk that they could use that information to personal gain. Public servants also might have more knowledge about government corruption.

The variables *emigrate* and corruption tolerance was used as instruments for corruption experience. ***Willing to emigrate*** get the information if the respondent aims to live or work abroad (1 for yes and 0 for no). Ivlevs & King (2014) argue that the process of preparation for emigration can expose people to be more prone to corruption in order to secure speedy delivery of passport, visa or certificate of health. I argue that is more likely that people willing to emigrate will be more exposed to corruption because they will require interactions with both the home and the destination countries. According to these scholars, may "exist unobserved characteristics of people (and/or households) that are correlated with both the willingness to migrate and the propensity to bribe public officials" (p. 3). Höckel, Silva and Stöhr (2017, p.19) analyze the effect of emigration on petty corruption in education, arguing that "the widening of migrants' horizons may be the main driver of the reduction in petty corruption". On the other hand, I argue that it is less likely that people exposed to corruption will actually lead to increase the desire to emigrate, as the immigration process is costly, difficult and not accessible to a large part of the population. In addition, I hypothesize that if a citizen is planning to emigrate, his level of trust in the local government would change just if he had to pay a bribe to get his emigration documents approved.

Corruption tolerance gets information if the respondent thinks given the way things are, sometimes paying a bribe is justified (zero for no and 1 for yes). I follow Chang and Huang (2016) findings that corruption experience undermines institutional trust, while corruption tolerance mitigates such a detrimental effect. The reasoning is that citizens who experience corrupt practices may maintain trust in the local government if they can put up with unscrupulous acts. Additionally, Morris & Klesner (2010) argument those more tolerant of corruption tend to be

more likely to participate in it and less likely to perceive corruption.

For trust in local government, I included trust in political parties, city size, and satisfaction with public service as instruments. ***Trust in political parties*** has a seven-point scale, where 1 refers to "not at all" and 7 refers "a lot" of trust in political parties. The rationale is that local governors, as politicians, are affiliated to political parties and citizens' trust in the political parties influences the trust in the local governor. Moreover, we could expect that in smaller cities the citizens have more interaction and information about the local government than bigger cities, influencing directly the trust in local government and indirectly the corruption experience. ***City size*** is defined as small (less than 50,000 habitants and gets a value of 1), medium (between 50,000 and 499,000 hab. and gets a value of 2), or large (more than 500,000 and a value of 3). I propose that, in small and medium cities, citizens tend to have more trust in their local government due to the proximity of government activity and authorities. Furthermore, I argue that city size doesn't affect corruption experience directly. Instead, behavioral factors and individual characteristics (such as interpersonal trust, years of education, gender, age, and race) may directly influence people's exposure to corruption. ***Satisfaction with public services*** captures respondent perceptions about the quality of streets, public schools and public medical services, ranging from (1) very dissatisfied to (12) very satisfied. I included satisfaction with public services as an instrumental variable for trust in the local government because as much satisfied with public services, people theoretically would increase their trust in the government.

5. STRUCTURAL EQUATION MODEL RESULTS

The following analysis is based on table 2, which presents the results for this overidentified model, and figure 4, which presents the statistically significant sign results, using data from Brazil 2016. First, for my key research question regarding the reciprocal relationship between corruption experience and trust in local government (hypothesis H_1 and H_2), the substantive conclusion based on the data is that there is no evidence that corruption experience affects the trust in local government and vice-versa, as the estimated coefficients are nonsignificant at the 0.05 level.

For the corruption experience equation, the variables female, organizational involvement and country's economic situation are statistically significant at the 0.05 level, although practical

significance seems to be questionable. If the respondent is female, corruption experience would, on average, decrease 0.15, ceteris paribus. Similarly, one unit increase in the country's economic situation would decrease corruption experience by 0.06. On the other hand, a tenth unit increase in organizational involvement would increase, on average, corruption experience by 0.04 unit.

Table 2 - SEM estimation for petty corruption model (Brazil 2016)

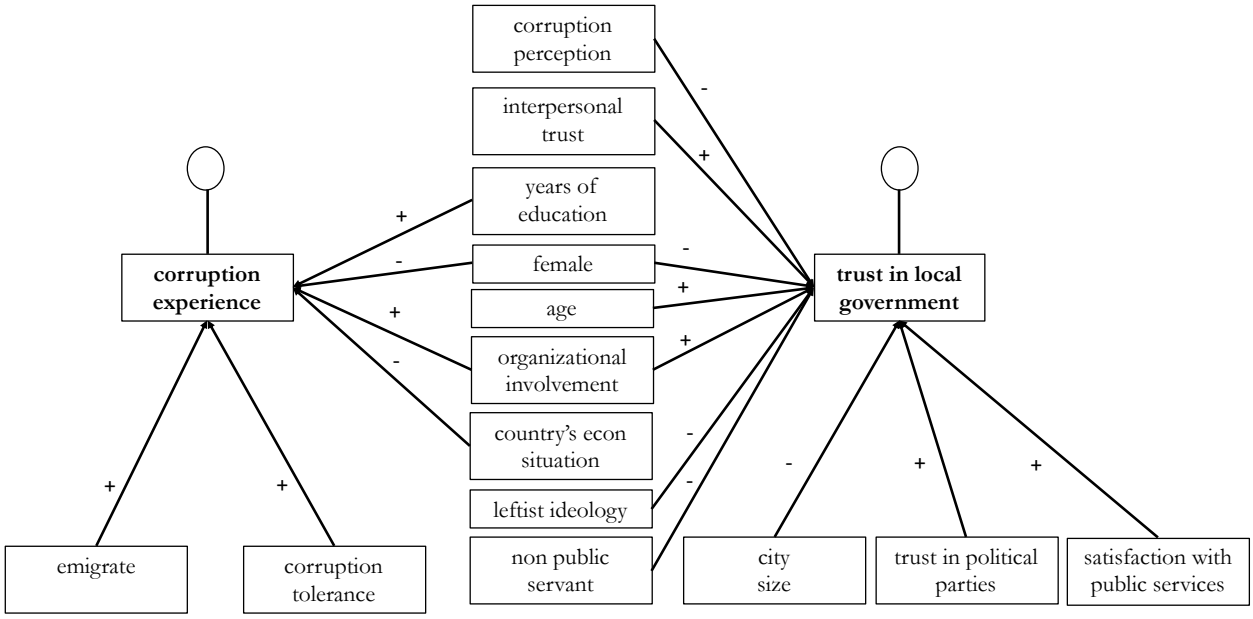
	Coef.	Std. Err.	z	P>z	95% Conf.	Interval]	Beta
Structural							
corruption experience							
trust in the local government	-0.025	0.018	-1.38	0.167	-0.061	0.010	-0.085
corruption perception	0.009	0.019	0.46	0.647	-0.029	0.046	0.013
interpersonal trust	0.000	0.001	-0.62	0.535	-0.001	0.001	-0.017
years of education	0.008	0.004	1.69	0.09	-0.001	0.016	0.047
female	-0.154	0.029	-5.23	0	-0.211	-0.096	-0.134
age	-0.001	0.001	-0.51	0.612	-0.003	0.001	-0.014
organizational involvement	0.430	0.111	3.88	0	0.213	0.648	0.102
country's economic situation	-0.064	0.023	-2.72	0.007	-0.110	-0.018	-0.072
leftist ideology	-0.041	0.033	-1.27	0.205	-0.105	0.023	-0.035
black	0.027	0.039	0.7	0.481	-0.049	0.104	0.018
non-public servant	0.011	0.068	0.16	0.876	-0.123	0.144	0.004
willing to emigrate	0.103	0.035	2.92	0.003	0.034	0.172	0.077
corruption tolerance	0.311	0.046	6.74	0	0.221	0.401	0.170
constant	0.232	0.159	1.46	0.145	-0.080	0.544	0.404
trust in the local government							
corruption experience	-0.390	0.400	-0.97	0.33	-1.173	0.394	-0.115
corruption perception	-0.187	0.054	-3.44	0.001	-0.293	-0.080	-0.080
interpersonal trust	0.006	0.001	3.91	0	0.003	0.009	0.092
years of education	0.011	0.014	0.78	0.434	-0.016	0.038	0.020
female	-0.198	0.109	-1.81	0.07	-0.412	0.016	-0.051
age	0.007	0.003	2.13	0.033	0.001	0.013	0.052
organizational involvement	0.821	0.380	2.16	0.03	0.078	1.565	0.057
country's economic situation	0.092	0.073	1.25	0.21	-0.052	0.236	0.031
leftist ideology	-0.344	0.097	-3.56	0	-0.534	-0.155	-0.086
black	-0.034	0.118	-0.29	0.772	-0.265	0.197	-0.007
non-public servant	-0.378	0.204	-1.85	0.064	-0.777	0.022	-0.042
city size	-0.149	0.055	-2.71	0.007	-0.256	-0.041	-0.061
trust in political parties	0.410	0.031	13.29	0	0.350	0.471	0.323
satisfaction with public services	0.204	0.024	8.51	0	0.157	0.252	0.203
constant	2.006	0.456	4.4	0	1.112	2.900	1.030

LR test of model vs. saturated: chi2(3) = 2.19, Prob > chi2 = 0.5334
Number of obs = 1,456

For the trust in the local government equation, the variables corruption perception, interpersonal trust, organizational involvement, age, ideology, and city size are statistically significant at the 0.05 level. One unit increase on corruption perception would decrease, on average, trust in local government by .19, maintaining all the other variables constant. In the same vein, having a leftist ideology would decrease, on average, trust in local government by .34.

The beta coefficients allow us to compare the relative importance of each variable in the model. For instance, corruption tolerance has the major effect on corruption experience. Additionally, trust in political parties and satisfaction with public services have the largest effects on trust in the local government.

Figure 4 – SEM statistically significant sign results for Brazil 2016



The signs for the instrumental variables (IV) in the model (emigrate, corruption tolerance, city size, trust in political parties, and satisfaction with public services) show the expected effects and are significant at the 0.05 level. For instance, as hypothesized, the intention to live or work abroad (emigrate) and/or being tolerant to corruption significantly increase the corruption experience. In the same vein, a higher level of trust in political parties report higher levels of trust in local government. Similarly, respondents more satisfied with the public services have, on average, higher trust in local government.

In the appendix, pairwise correlations are presented in table 5 and tables 6 and 7 present the equation-level goodness of fit and the overall model fit for petty corruption model. The **equation-level goodness of fit** provides R^2 values for each of the observed variables. So, the model explains 8.1% of the variance of corruption experience and 28.3% of variable trust in local government. When assessing the **overall model fit**, significant chi-square statistics reject perfect fit between data and model and are, for instance, an indication of not perfect model fit. On the other hand, nonsignificant chi-square statistics are an indication of a good fit (Paxton, Hipp & Marquart-Pyatt, 2012). The model goodness of fit reveals the chi-square, which compares our model to a saturated model that has no degrees of freedom. The chi-square is nonsignificant at the 0.01 level (2.193 with 3 degrees of freedom) and does indicate a good model fit. The RMSEA is 0.0001, the lower bound for this is 0.00001 and the upper bound is 0.04. The recommended cutoff is 0.05 for a good fit and less than 0.08 for a reasonable close fit. The root mean squared error of approximation (RMSEA; Browne & Cudeck, 1993; and Steiger & Lind, 1980) also suggests a close fit. The comparative fit index (CFI; Bentler, 1990) of 1, suggests an excellent model fit. The Tucker-Lewis Index (TLI) is 1.014, which indicates an acceptable fit.

From the **univariate tests of normality**, most of the variables do not appear to be normally distributed: p-values for skewness, kurtosis, and joint univariate test are lower than 0.01. The univariate tests of the variables education and satisfaction with public services do not lead to a rejection of the null hypothesis of normality. The bivariate tests of normality show a rejection (at the 5% level) of the null hypothesis of bivariate normality for all pairs of variables. For the four multivariate normality tests, all of them reject the null hypothesis of multivariate normality, p-value < 0.001. For non-normality, I used Satorra-Bentler adjusted chi-squared, which is based on a different scaling correction. The Satorra-Bentler adjusted chi-squared is nonsignificant at the 0.01 level (2.69 with 3 degrees of freedom) and does indicate a good model fit.

Because the models are overidentified, it's possible to test for the **validity of the overidentifying restrictions**. According to Paxton, Hipp & Marquart-Pyatt (2012), the R^2 from the first-stage equation for the overidentified model can be used as a broad indicator of the goodness of fit of the model. As reported on tables 8 and 9 in the appendix, the R^2 from the first-stage equations for the overidentified models with instruments for each equation are 0.08 for the trust

in local government equation and 0.30 for the equation with corruption experience as an outcome. Paxton and colleagues argue that "these values provide a sense of the extent to which the instrumented variable is being explained in the first-stage equation" (Paxton, Hipp & Marquart-Pyatt, 2012, p.15).

The first assumption of a good IV is that it is not correlated with the disturbance term. If this assumption is violated, it can lead to inconsistent estimates. In order to test this assumption, I use the Sargan (1958), Basmann (1960), and Hansen (1982) tests of the IVs. In this overidentified model, the instruments for the trust in local government equation (willing to emigrate and corruption tolerance) appear reasonable based on the tests introduced above. As detailed in table 8 in the appendix, the chi-square value of 0.012 with 1 degree of freedom ($p = 0.91$) for the Sargan test suggests that we are unable to reject the null hypothesis that these instruments are indeed valid. The Basmann test yields almost identical results. For the corruption experience equation, as detailed in table 9 in the appendix, the chi-square of 3.58 with 2 degrees of freedom ($p = .17$) also suggests that we should not reject the null hypothesis that the instruments are valid. The Basmann test returns the same result.

To address **heteroscedasticity and/or autocorrelation**, I ran the GMM estimator in Stata, which provides the Hansen J test presented in tables 10 and 11 in the appendix. As stated by Paxton et al., 2011, p.8) this specific test is "consistent in the presence of heteroscedasticity and autocorrelation". In the overidentified model, Hansen's J statistic is almost identical to Sargan/Basmann at .012 ($p = .91$) for the trust in local government equation and 3.2 ($p = .20$) for the corruption experience equation, suggesting that the instruments are indeed valid.

The second assumption of a good IV is that it is correlated with the endogenous variable. The violation of this assumption can lead to increased finite sample bias and inefficient estimates (Paxton et al., 2011). In order to test this second assumption, I assess the **strength of the IVs** by estimating the reduced-form equation with and without the excluded instruments (Bound et al., 1995; and Staiger & Stock, 1997). For instance, in the equation for trust in local government, I would estimate the first-stage equation in which corruption experience is regressed on corruption perception, interpersonal trust, female, age, organizational involvement, and country's economic situation, ideology, black and non-public servant (thus, none of the excluded instruments are included). For the model in which I included two identifying instruments, this

equation would be reestimated with the variables emigrate and corruption tolerance added as predictors. As presented in table 12 in the appendix, the incremental R^2, which is the difference in the r-squares of the two models, is 0.038 (0.0828-0.0444). Performing an F test of the difference in these two models, as outlined by Staiger & Stock (1997), the base model (with no excluded instruments) has a chi-squared of 4.52 with 10 degrees of freedom, while the model with the two instruments (emigrate and corruption tolerance) has a chi-squared of 4.96 with 12 degrees of freedom. The difference in the chi-squared is .44. The difference in the degrees of freedom is 12-10= 2 and a $p > .05$[14], suggesting that we have a weak instruments problem. In the corruption experience equation with three identifying instruments, as presented in table 13 in the appendix, the incremental R^2 is .1755. The difference in the chi-squared is 52.35-17.77=34.58. The difference in the degrees of freedom is 13-10= 3 and a $p < .05$. This suggests no weak instruments problem.

I also performed the Hausman-based **tests of endogeneity** to assess whether 2SLS is necessary. The results are shown in tables 14 and 15 in the appendix. In the overidentified trust in the local government equation, both the Durbin chi-square test (.129633, p = 0.72) and the Wu-Hausman F test (.128343, p = 0.72) fail to reject the null hypothesis that the variables are exogenous, suggesting that variables may be treated as exogenous. In the same vein, the corruption experience equation presents both tests as nonsignificant (Durbin: .692666, p = 0.40); Wu-Hausman: .6861, p = 0.41)), also suggesting that variables may be treated as exogenous. However, as a pretest estimator, these results need to be interpreted with caution (Guggenberger, 2010).

Although this section focused on the analysis of data from Brazil 2016, the results of the IVs considering data from Brazil 2012 are similar. Thus, the instruments for the trust in local government equation (willing to emigrate and corruption tolerance) and for the corruption experience equation (trust in political parties and satisfaction with public services) appear to be reasonable. However, the instruments for the trust in local government equation appear not to be valid for the countries not in the Operation Car Wash (2012 and 2016). The weak instrument problem also appears for the corruption experience equation considering Mexico 2016 and

[14] display chi2tail(12-10, 4.96-4.52) = .8025188

countries not in the Lava Jato (both years). A detailed analysis is provided in report 1 in the appendix.

6. MULTIGROUP ANALYSIS IN STRUCTURAL EQUATION MODELING

In this section, I continue to estimate the SEM accounting for missing data and apply multigroup analysis to investigate similarities and differences between structural parameters indicating differences in the relationship between the groups. The multigroup analysis is used to test the invariance of the hypothesized models across country/year groups. This approach is preferred over doing separate analyses for each group because it provides a test for the significance of any differences found between groups and also provides more efficient parameter estimates (Arbuckle & Wothke, 1999).

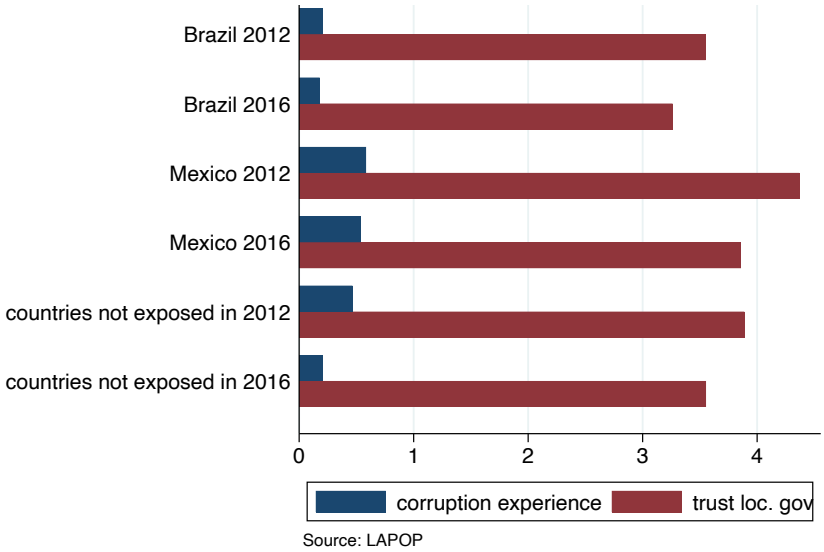
In this study, I am interested in the regression weights, and I hypothesize that countries exposed and not exposed by the Lava Jato would have different regression weights. The motivation for the group invariant regression weights is likely that perceived factors that affect trust in local government and corruption experience have different variances and covariances among exposed and not-exposed countries. Under this multigroup model, I evaluated whether a fixed unit change on an exogenous variable would, *ceteris paribus*, lead to the same change of the endogenous variable (corruption experience and trust in local government). Considering the years 2012 and 2016, I compared the results of applying the model to Brazil, Mexico, and a group of countries not exposed by the investigation. For instance, the structural form of our initial model, was subsequently tested for structural invariance across the six groups. This was done by examining a series of nested models with increasing numbers of parameter constraints between country/year groups. For instance, the models were tested using the following procedure:

1. In the unrestricted model, all parameters were unconstrained between country/year groups.
2. In the structural restricted model, all structural parameters were constrained to be equal across groups. I wish to determine whether the structural coefficients operate the same way across countries and years.

3. If the structural restricted model performs better than the unrestricted model, I would compare the structural restricted model with the model in which all parameters were constrained to be equal across groups (all restricted model). I may be interested in knowing if all the coefficients are different between the three groups of countries (Brazil, Mexico, and countries not involved in the Lava Jato) in 2012 and 2016.

In order to have a better idea of the endogenous variables in the model by groups, Figure 5 illustrates the decrease of corruption experience and trust in local government in all the six groups considered in this study. However, it is important to be aware that comparing results across countries need a careful approach. As Melgar et al. (2010) highlight, cross-national differences in corruption perception indexes may be led by socio-demographical differences in the sample composition rather than differences in levels of actual corruption among countries. For instance, it may be socio-demographical differences in our sample. For example, more than 50% of respondents from the countries not involved by Lava Jato are black. In contrast, around 15% of respondents from Brazil and only 2% from Mexico are black (table 4 in the appendix).

Figure 5 – Corruption Experience and Trust in Local Government by selected countries



Unrestricted model (Model 1). The model in Figure 3 was initially fit to the data for the six samples of observations simultaneously, using maximum likelihood with missing values (MLMV) in Stata/SE 14.2. The values of selected fit indices suggested a reasonable overall model fit: chi2 (18) = 85.949; $p < 0.000$; CFI = 0.992; RMSEA = 0.033, with the lower bound for this is 0.026 and

the upper bound is 0.040. Thus, the model can be used as a baseline model for testing invariances across the groups of observations, enabling the analysis to move on to the constrained nested models.

The compiled results of the multiple group analysis using the petty corruption model are displayed in table 3. A significant difference in chi-square ($p < 0.05$) indicated model deterioration. Thus, the parameters examined vary across the sets of countries between 2012 and 2016.

Table 3 - Multiple group analysis for Model – Petty corruption

	unrestricted model		restricted model*		Difference between models		p-value
	chi-squared	degrees of freedom	chi-squared	degrees of freedom	chi-squared	degrees of freedom	
Brazil (2012 and 2016) and Mexico (2012 and 2016)	29.128	12	287.459	93	258.331	81	2.20E-20
Brazil and Mexico (2012)	10.932	6	98.229	33	87.297	27	2.83E-08
Brazil and Mexico (2016)**	18.196	6	129.111	33	110.915	27	3.89E-12
Brazil (2012 and 2016)	12.186	6	56.912	33	44.726	27	0.017376
Brazil and countries not in Car Wash Operation (2016)	25.039	6	145.802	33	120.763	27	8.00E-14
Countries not in Car Wash Operation (2012 and 2016)	56.821	6	987.041	33	930.22	27	1.34E-178
All groups***	85.949	18	1501.923	153	1415.974	135	2.80E-212

* model with structural coefficients constrained to be equal

** used the Davidon–Fletcher–Powell (DFP) algorithm

*** Brazil, Mexico and countries not in Operation Car Wash (2012 and 2016)

We can conclude that the unrestricted model performs significantly better than the restricted model in all the different groups. For instance, the first result considers data for Brazil 2012, Brazil 2016, Mexico 2012 and Mexico 2016. I compared the results of the nested test of the model with structural coefficients constrained to be equal and the model with no parameters constrained (unrestricted). The unrestricted model has a chi-squared of 29.128 with 12 degrees of freedom, while the model with structural coefficients constrained to be equal[15] has a chi-squared of 287.459 with 93 degrees of freedom. It follows that we can conclude that the model with no invariance constraints does significantly better than a model in which structural parameters are constrained to be equal between Brazil and Mexico in 2012 and 2016 (chi-

[15] ginvariant (scoef)

square[81]= 258.331, p<0.05). I also compared the results of the nested test of the model with all coefficients constrained to be equal and the unrestricted model. The results show that the unrestricted model is preferred in all different groups if compared to the model in which the model with structural coefficients constrained to be equal. The other estimations in the table follow the same structure.

The unrestricted results, including standardized coefficients, are shown in table 16 in the appendix. Analyzing the significance and loadings for specific variables could be useful to provide a better assessment of the results. In all six different groups, there is no evidence of a simultaneous relationship between the endogenous variables (corruption experience and trust in local government).

Considering the corruption experience equation using multigroup analysis, there are some variables that have different behaviors between countries not in Lava Jato and countries involved in this investigation. Corruption perception only has a statistically significant positive impact on corruption experience for countries not involved by Lava Jato. The results for Brazil and Mexico (2012 and 2016) are not significant at .05 level. It would be necessary for further investigation to understand this result. The race also had a response only for countries not involved by the investigation; however, the result is intriguing because being black has a significant positive effect (0.2162) in those countries in 2012 and negative (-0.2036) in 2016. On the other hand, organizational involvement, willing to emigrate, and corruption tolerance are significant at .05 level for all groups.

Assessing specific results for the equation with trust in local government as the outcome, corruption experience has a statistically significant negative impact on trust for countries not involved by Lava Jato in 2012 (-0.2703) and 2016 (-1). Corruption perception has a significant negative impact on trust for Brazil and countries not involved in this anti-corruption operation.

Another intriguing result is related to political ideology. The results shown for Brazil and not investigated countries suggest that respondents with leftist political ideology tend to have less trust in local government. However, the reasoning would be not so evident because the survey doesn't provide information about the political affiliation of the local government. This information would be useful to compare with the political ideology of the respondent. It would make sense that respondents with the same ideology of the local government would have higher

trust in local government if compared to respondents with an opposite view. The instrumental variables city size, trust in political parties, and satisfaction with public services also provide interesting results. City size is significant at 0.05 level for Brazil 2016, Mexico (2012 and 2016), and countries not in Lava Jato (2016). Although we expect that bigger cites would lead to decrease trust in local government, data considering the group of countries not investigated in the operation in 2016 suggest that city size has a positive impact on trust in local government. Trust in political parties and satisfaction with public services are significant (at 0.05 level) for all the six groups.

7. CONCLUSIONS, LIMITATIONS AND EXTENSIONS

As my knowledge, there are no systematic studies on the effect of Operação Lava Jato (*Operation Car Wash*) on indicators such as corruption experience and trust in local governments. This study used structural equation modeling with instrumental variables to assess those effects.

For my key research question regarding the reciprocal relationship between corruption experience and trust in local government (hypothesis H_1 and H_2), the substantive conclusion, based on the data from all the countries (Brazil, Mexico and countries not investigated by Lava Jato) and years (2012 and 2016) used in this study, is that there is no evidence of this simultaneous relationship, as the estimated coefficients are nonsignificant at 0.05 level.

The instrumental variables (emigrate, corruption tolerance, trust in political parties, and satisfaction with public services) show the expected effects and are significant at the 0.05 level. For instance, as hypothesized, the intention to live or work abroad (emigrate) and/or being tolerant with corruption significantly increase the corruption experience. In the same vein, higher level of trust in political parties report higher levels of trust in local government. Similarly, respondents more satisfied with the public services have, on average, higher trust in local government. Additionally, considering data for Brazil 2016, corruption tolerance has the major effect on corruption experience, and trust in political parties and satisfaction with public services have the largest effects on trust in the local government.

For my research question regarding if Lava Jato influenced corruption and trust in Brazil and Mexico, I applied multigroup analysis using data for 2012 and 2016 to investigate similarities

and differences between structural parameters. In this case, I found mixed results concerning the hypothesis that the structural weights exhibited in the countries involved by the Lava Jato are higher than those ones not involved (H_{3a}).

I compared the results of applying the model to Brazil, Mexico, and a group of countries not exposed by the Brazilian investigation. The results show that the unrestricted model is preferred than the model in which all structural parameters were constrained to be equal across groups, suggesting that the structural coefficients do not operate the same way across countries and years. I would expect that the hypothesized model of petty corruption would fit more on data from these countries exposed by Lava Jato if compared to the countries not exposed by this operation. From the data collected, there is evidence that the parameters are different among groups, suggesting that the proposed theoretical model on petty corruption does not appear to have been significantly impacted by Lava Jato. A possible explanation or justification would be the fact that all the countries in this study have, in some way, considerable levels of corruption, independent of its involvement in Lava Jato.

The most promising result appear in the trust in local government equation, in which the coefficients for corruption perception and leftist ideology are stronger in Brazil than in other countries. Corruption perception has a significant negative impact on trust in local government for Brazil and countries not involved by this anticorruption operation. Another intriguing result is related to political ideology. The results shown for Brazil and not investigated countries suggest that respondents with leftist political ideology tend to have less trust in local government if compared to more conservative political profile citizens. For Brazil and the countries not in the Lava Jato, being leftist decreases trust in the local government. In the case of Brazil, most of the governors in charge in 2012 and 2016 were form left or central parties. However, one caveat is that the way the LAPOP questionnaire was applied may not correctly capture information about respondents' political profile, either because of a lack of clarity or understanding of respondents about what it means to be more left or right.

This study also provides insights that could result in policy implications. Public bodies could consider some findings to optimize their actions. For example, the data suggest that men who have an interest in living outside the country and who have some kind of organizational involvement (attend religious organization meetings, parent association community,

improvement group, movements or political parties) are more exposed to corruption. Perhaps it would be convenient to have training about ethics and corruption for this audience. Another possibility would be to identify areas or sectors that have the potential to have this type of public as a client or as a service provider to adjust auditing and oversight actions. As highlighted by Seabra (2018), audit organizations have a challenging task to design and implement 'auditing-against-corruption' strategies. Control bodies could also evaluate the incorporation of this study into their strategies, either by adjusting their internal control capacity building actions or by incorporating information from groups most exposed to corruption in the audit trails. Similarly, there is no evidence that an action plan to combat corruption segmented by race, age, political ideology, and type of employment (public or private) reduces exposure to corruption compared to a more uniform strategy.

Considering the factors that contribute to raise the level of confidence in local governments, trust in political parties and satisfaction with public services are central elements. For instance, to increase the trust in political parties it is necessary to constantly improve the tools of public transparency, compliance and communication with the society. In the same way, to improve the satisfaction with public services it is mister to improve state capacity to allocate its resources, that are limited. This allocation is driven by the decision making that involves main approaches, not mutually exclusive: *distributive policies* (Lowi, 1988), that benefit individuals and groups; *re-distributive policies* (Lowi, 1985), that provide benefit in order to compensate for inequalities; and *regulatory policies* (Lowi, 1964), that focus on rules of compliances in order to influence behavior and alleviate problems. The discussion of resource allocation also involves the definition of the government structure, that can be more interventionist in the private sector (thick government) to a less intrusive relying more on ex post actions (thin government) (Dubnick, 2003). The data also suggest that citizens who have some kind of organizational involvement have a higher level of trust in local governments. Thus, increasing confidence in local governments means deepening the level of trust of citizens in their community, whether through integration events (culture and sports), improving public safety, or improving transportation, health and safety services.

This study is not without limitations. A further problem with the LAPOP approach is that an extreme response style (ERS) can affect the response variability. As explained by Kline (2016,

p. 397), low ERS occurs when respondents tend to avoid the most extreme answers (e.g. no corruption, a lot of corruption) in favor of middling option (e.g. some corruption). This behavior may occur in groups that emphasize modesty or humility. On the other vein, high ERS tend to be present in cultures that value decisiveness and firmness (Cheung & Rensvold, 2000). These scholars posted another possible limitation that the chi-square difference test in very large samples could be statistically significant even though its absolute value differences in parameter estimates are small. This could be the case of this current study, which has a large sample and some of the absolute value differences in parameter estimates have a small magnitude. It is also important to keep in mind that "closer to fit" does not mean automatically "closer to truth". As highlighted by Kline (2016, p. 465), "close fit to the data does not "prove" the directionality specifications (causal effects) represented in the model". It would also be interesting to apply the model on other samples. For example, including other years on the analyze could provide more robust results.

Another point of consideration is related to the response rates. To assess total survey error, response rates can provide useful information for the potential for nonresponse bias (TSE; see Groves 1989). Although there is no information for LAPOP 2012, response rate for 2016/2017 round was 0.23 (Warner & Camargo-Toledo, 2019). The scholars also provide response rates by country (Brazil, 0.22; Mexico, 0.11; Guyana, 0.46; Haiti, 0.52; Jamaica, 0.55; Nicaragua, 0.30). Those response rates could lead to selection bias if more honest citizens have responded in the more corrupt countries.

I also acknowledge that there may be limits on the generalization of this study. This studied compared two types of countries (involved and not involved in the Operation Car Wash) to evaluate if there is a difference in the dynamics in my proposed model for corruption experience and trust in local government. However, corruption seems to be spread in all of those countries and not only in those affected by the Operation Car Wash. Thus, it seems that the Operation Car Wash can't be considered a structural change in the proposed model. One possibility to improve the analyses would be to include other countries not involved in Operation Car Wash and that have low levels of corruption. It would be also useful to incorporate more years in the analyzes, like the recent 2018/2019 LAPOP round. Another possibility to investigate the role of the Operation Car Wash on the corruption dynamics would be to generate a latent

construct for grand corruption and estimate a confirmatory factor analysis (CFA). Additionally, due the challenge to apply an experimental design, it would be possible to apply a quasi-experimental design to identify Lava Jato's causal effect on corruption indicators in Brazil. The synthetic control group design could be used as a comparison unit that approximates Brazil, if Lava Jato had not existed.

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APPENDIX

Table 4 – Descriptive Statistics

	Brazil 2012				Brazil 2016			
	mean	sd	min	max	mean	sd	min	max
corruption experience	0.204	0.658	0	5	0.180	0.576	0	5
corruption perception	3.629	1.214	1	5	4.180	0.840	1	5
corruption tolerance	0.091	0.287	0	1	0.110	0.312	0	1
trust in the local government	3.550	1.822	1	7	3.261	1.943	1	7
trust in political parties	2.826	1.665	1	7	2.089	1.538	1	7
interpersonal trust	58.424	28.244	0	100	46.711	31.308	0	100
years of education	9.100	3.662	1	18	8.956	3.532	1	17
female	0.503	0.500	0	1	0.504	0.500	0	1
age	37.836	14.205	17	88	38.587	15.567	16	86
organizational involvement	0.098	0.101	0	0.584	0.178	0.136	0	0.553
country's economic situation	2.046	0.657	1	3	1.358	0.646	1	3
leftist ideology	0.610	0.488	0	1	0.620	0.486	0	1
black	0.145	0.352	0	1	0.164	0.370	0	1
non-public servant	0.895	0.307	0	1	0.950	0.217	0	1
willing to emigrate	0.084	0.277	0	1	0.242	0.429	0	1
city size	1.841	0.818	1	3	2.037	0.810	1	3
satisfaction with public services	6.475	1.918	1	12	6.616	1.935	2	12

	Mexico 2012				Mexico 2016			
	mean	sd	min	max	mean	sd	min	max
corruption experience	0.585	1.028	0	8	0.536	0.979	0	6
corruption perception	4.074	0.973	1	5	4.123	0.915	1	5
corruption tolerance	0.219	0.413	0	1	0.236	0.425	0	1
trust in the local government	4.368	1.726	1	7	3.859	1.894	1	7
trust in political parties	3.374	1.756	1	7	2.364	1.626	1	7
interpersonal trust	56.765	27.557	0	100	53.761	30.542	0	100
years of education	9.081	3.946	1	18	9.705	3.972	1	18
female	0.510	0.500	0	1	0.496	0.500	0	1
age	40.050	15.676	18	93	40.570	16.272	18	88
organizational involvement	0.122	0.111	0	0.555	0.168	0.137	0	0.614
country's economic situation	1.612	0.624	1	3	1.193	0.445	1	3
leftist ideology	0.505	0.500	0	1	0.648	0.478	0	1
black	0.006	0.075	0	1	0.027	0.162	0	1
non-public servant	0.949	0.219	0	1	0.939	0.239	0	1
willing to emigrate	0.095	0.293	0	1	0.184	0.388	0	1
city size	2.138	0.875	1	3	2.553	0.703	1	3
satisfaction with public services	7.657	1.802	0	12	7.262	1.861	0	12

	countries not involved 2012				countries not involved 2016			
	mean	sd	min	max	mean	sd	min	max
corruption experience	0.465	0.967	0	7	0.205	0.589	0	7
corruption perception	3.629	1.213	1	5	3.474	1.169	1	5
corruption tolerance	0.251	0.434	0	1	0.309	0.462	0	1
trust in the local government	3.888	1.755	1	7	3.554	2.022	1	7
trust in political parties	3.657	1.809	1	7	2.958	1.920	1	7
interpersonal trust	57.992	29.573	0	100	53.543	33.072	0	100
years of education	9.379	3.495	1	18	10.287	3.465	1	18
female	0.499	0.500	0	1	0.499	0.500	0	1
age	39.608	15.507	16	95	38.712	15.708	16	98
organizational involvement	0.169	0.141	0.000	0.584	0.192	0.149	0.000	0.701
country's economic situation	1.852	0.702	1	3	1.731	0.818	1	3
leftist ideology	0.547	0.498	0	1	0.514	0.500	0	1
black	0.535	0.499	0	1	0.612	0.487	0	1
non-public servant	0.906	0.291	0	1	0.933	0.250	0	1
willing to emigrate	0.305	0.461	0	1	0.452	0.498	0	1
city size	2.145	0.802	1	3	2.193	0.766	1	3
satisfaction with public services	7.162	1.947	0	12	6.941	2.121	0	12

	Total Sample				
	mean	sd	min	max	Obs
corruption experience	0.363	0.845	0	8	22,579
corruption perception	3.711	1.163	1	5	19,235
corruption tolerance	0.240	0.427	0	1	20,359
trust in the local government	3.767	1.871	1	7	20,231
trust in political parties	3.188	1.864	1	7	20,359
interpersonal trust	55.532	30.789	0	100	21,853
years of education	9.606	3.601	1	18	21,267
female	0.500	0.500	0	1	22,579
age	39.243	15.569	16	98	22,400
organizational involvement	0.169	0.141	0	0.701	22,560
country's economic situation	1.731	0.743	1	3	21,806
leftist ideology	0.554	0.497	0	1	16,449
black	0.431	0.495	0	1	19,687
non-public servant	0.922	0.268	0	1	22,579
willing to emigrate	0.306	0.461	0	1	21,807
city size	2.161	0.804	1	3	21,089
satisfaction with public services	7.053	2.002	0	12	22,579

Table 5 - Pairwise correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
corruption experience (1)	1								
corruption perception (2)	0.0294	1							
	(0.2532)								
corruption tolerance (3)	0.1889*	0.014	1						
	(0)	(0.5863)							
trust in the local government (4)	-0.0548*	-0.2177*	-0.0329	1					
	(0.0322)	(0)	(0.1995)						
trust in political parties (5)	-0.0142	-0.2491*	-0.0109	0.4296*	1				
	(0.5783)	(0)	(0.672)	(0)					
interpersonal trust (6)	-0.0337	-0.0978*	-0.0263	0.1798*	0.0808*	1			
	(0.1918)	(0.0002)	(0.3091)	(0)	(0.0018)				
years of education (7)	0.0721*	0.0377	0.0258	-0.0678*	-0.1134*	0.0488	1		
	(0.0057)	(0.1501)	(0.3231)	(0.0095)	(0)	(0.0642)			
female (8)	-0.1351*	0.0535*	-0.0462	-0.0709*	-0.0137	-0.0653*	-0.0314	1	
	(0)	(0.0375)	(0.0715)	(0.0056)	(0.5926)	(0.0114)	(0.2296)		
age (9)	-0.0624*	0.015	-0.0670*	0.0793*	-0.0157	0.0898*	-0.2879*	-0.015	1
	(0.0146)	(0.5607)	(0.0088)	(0.0019)	(0.5414)	(0.0005)	(0)	(0.558)	
organizational involvement (10)	0.1248*	-0.0221	0.0700*	0.1028*	0.1330*	0.0092	0.0308	-0.02	0.0283
	(0)	(0.3892)	(0.0063)	(0.0001)	(0)	(0.7217)	(0.2372)	(0.4343)	(0.2675)
country's economic situation (11)	-0.0635*	-0.1267*	0.0397	0.1383*	0.0828*	0.1197*	0.0443	-0.1214*	0.0144
	(0.0132)	(0)	(0.1225)	(0)	(0.0013)	(0)	(0.0908)	(0)	(0.5754)
leftist ideology (12)	-0.0145	0.1041*	0.0342	-0.1783*	-0.1504*	-0.1028*	0.0954*	0.0246	-0.1588*
	(0.5867)	(0.0001)	(0.2007)	(0)	(0)	(0.0001)	(0.0004)	(0.3567)	(0)
black (13)	0.0368	-0.0079	0.02	-0.0121	0.0114	0.004	-0.0402	0.0212	-0.0695*
	(0.1528)	(0.7604)	(0.4391)	(0.6375)	(0.6573)	(0.8771)	(0.1253)	(0.4101)	(0.0069)
non-public servant (14)	-0.0123	-0.0049	-0.0065	-0.0396	0.0269	0.0166	-0.1650*	0.0138	-0.0074
	(0.6301)	(0.8495)	(0.7987)	(0.1218)	(0.2938)	(0.5202)	(0)	(0.589)	(0.772)
willing to emigrate (15)	0.1229*	0.0142	0.0620*	-0.0525*	0.0177	-0.0761*	0.1548*	-0.04	-0.2834*
	(0)	(0.5802)	(0.0156)	(0.0406)	(0.4908)	(0.0033)	(0)	(0.1181)	(0)
city size (16)	-0.0071	0.0768*	-0.0202	-0.1310*	-0.0581*	-0.0234	0.1248*	-0.0036	-0.0063
	(0.782)	(0.0028)	(0.43)	(0)	(0.0233)	(0.365)	(0)	(0.8887)	(0.8049)
satisfaction with public services (17)	-0.0652*	-0.1222*	-0.0139	0.3378*	0.2562*	0.1385*	-0.1274*	-0.0919*	0.0575*
	(0.0107)	(0)	(0.5874)	(0)	(0)	(0)	(0)	(0.0003)	(0.0245)

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
organizational involvement (10)	1							
country's economic situation (11)	-0.0182	1						
	(0.4789)							
leftist ideology (12)	-0.0537*	-0.1039*	1					
	(0.0443)	(0.0001)						
black (13)	0.0112	-0.0267	-0.0257	1				
	(0.6623)	(0.3002)	(0.3379)					
non-public servant (14)	-0.0716*	-0.0084	0.0017	-0.0072	1			
	(0.005)	(0.7428)	(0.9497)	(0.7794)				
willing to emigrate (15)	0.0691*	-0.0209	0.0315	0.0086	0.0066	1		
	(0.0069)	(0.415)	(0.2382)	(0.7393)	(0.7959)			
city size (16)	-0.0178	-0.0254	0.0657*	0.0133	0.0623*	0.0683*	1	
	(0.4853)	(0.3214)	(0.0138)	(0.6064)	(0.0147)	(0.0076)		
satisfaction with public services (17)	0.048	0.1525*	-0.0819*	0.0099	0.023	-0.0945*	-0.1899*	1
	(0.0603)	(0)	(0.0021)	(0.701)	(0.3689)	(0.0002)	(0)	

Table 6 - Equation-level goodness of fit for model 1 (petty corruption)

depvars	fitted	Variance predicted	residual	R-squared	mc	mc2
observed						
corruption experience	0.330198	0.028804	0.303282	0.081516	0.285674	0.08161
trust in local government	3.79098	1.141709	2.717925	0.283055	0.532285	0.283327
overall				0.359119		

mc = correlation between depvar and its prediction
mc2 = mc^2 is the Bentler-Raykov squared multiple correlation coefficient

Table 7 - Overall model fit for model 1 (petty corruption)

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(3)	2.193	model vs. saturated
p > chi2	0.533	
chi2_bs(31)	623.613	baseline vs. saturated
p > chi2	0	
Population error		
RMSEA	0	Root mean squared error of approximation
90% CI, lower bound	0	
upper bound	0.039	
pclose	0.989	Probability RMSEA <= 0.05
Information criteria		
AIC	68004.54	Akaike's information criterion
BIC	68886.87	Bayesian information criterion
Baseline comparison		
CFI	1	Comparative fit index
TLI	1.014	Tucker-Lewis index
Size of residuals		
CD	0.359	Coefficient of determination

Note: SRMR is not reported because of missing values.

Table 8 – Results for model 1 (petty corruption), trust in local government equation

First-stage regressions

Number of obs	1,294
F(12, 1281)	9.63
Prob > F	0
R-squared	0.0828
Adj R-squared	0.0742
Root MSE	0.565

corruption experience	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
corruption perception	0.018	0.019	0.92	0.357	-0.020	0.056
interpersonal trust	-0.001	0.001	-1.03	0.304	-0.002	0.000
years of education	0.008	0.005	1.74	0.083	-0.001	0.018
female	-0.161	0.032	-5.06	0	-0.224	-0.099
age	-0.001	0.001	-0.49	0.622	-0.003	0.002
organizational involvement	0.372	0.117	3.17	0.002	0.142	0.602
country's economic situation	-0.071	0.025	-2.81	0.005	-0.120	-0.021
leftist ideology	-0.027	0.033	-0.81	0.418	-0.092	0.038
black	0.019	0.042	0.44	0.657	-0.064	0.101
non-public servant	0.013	0.072	0.18	0.859	-0.128	0.153
willing to emigrate	0.088	0.038	2.3	0.022	0.013	0.164
corruption tolerance	0.338	0.049	6.85	0	0.241	0.434
constant	0.134	0.141	0.95	0.34	-0.142	0.410

Instrumental variables (2SLS) regression

Number of obs	1,294
Wald chi2(11)	174.57
Prob > chi2	0
R-squared	0.1181
Root MSE	1.823

trust in the local government	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
corruption experience	-0.286	0.441	-0.65	0.517	-1.150	0.579
corruption perception	-0.415	0.063	-6.6	0	-0.538	-0.292
interpersonal trust	0.008	0.002	4.95	0	0.005	0.012
years of education	-0.031	0.016	-1.92	0.054	-0.062	0.001
female	-0.203	0.129	-1.58	0.115	-0.455	0.049
age	0.003	0.004	0.96	0.338	-0.004	0.011
organizational involvement	1.542	0.424	3.64	0	0.711	2.373
country's economic situation	0.208	0.086	2.41	0.016	0.039	0.377
leftist ideology	-0.472	0.108	-4.37	0	-0.683	-0.260
black	-0.080	0.136	-0.59	0.558	-0.347	0.187
non-public servant	-0.478	0.231	-2.07	0.038	-0.931	-0.026
constant	5.122	0.459	11.15	0	4.222	6.022

Instrumented: corruption experience

Instruments: corruption perception, interpersonal trust, years of education, female, age, organizational involvement, country's economic situation, leftist ideology, black, non-public servant, willing to emigrate, corruption tolerance

Tests of overidentifying restrictions:

Sargan (score) chi2(1) = .011859 (p = 0.9133)

Basmann chi2(1) = .01174 (p = 0.9137)

Table 9 – Results for model 1 (petty corruption), corruption experience equation

First-stage regressions

Number of obs	1,299
F(13, 1285)	41.58
Prob > F	0
R-squared	0.2961
Adj R-squared	0.289
Root MSE	1.6341

trust in the local government	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
corruption perception	-0.184	0.057	-3.21	0.001	-0.297	-0.072
interpersonal trust	0.005	0.002	3.51	0	0.002	0.008
years of education	0.013	0.014	0.9	0.366	-0.015	0.040
female	-0.165	0.092	-1.8	0.072	-0.346	0.015
age	0.007	0.003	2.1	0.036	0.000	0.013
organizational involvement	0.671	0.340	1.97	0.049	0.004	1.338
country's economic situation	0.093	0.073	1.27	0.203	-0.050	0.237
leftist ideology	-0.313	0.097	-3.23	0.001	-0.502	-0.123
black	-0.054	0.122	-0.44	0.657	-0.293	0.185
non-public servant	-0.469	0.207	-2.27	0.023	-0.875	-0.064
city size	-0.190	0.058	-3.26	0.001	-0.305	-0.076
trust in political parties	0.423	0.032	13.09	0	0.360	0.487
satisfaction with public services	0.205	0.026	8.04	0	0.155	0.255
constant	2.047	0.460	4.45	0	1.145	2.949

Instrumental variables (2SLS) regression

Number of obs	1,299
Wald chi2(11)	62.53
Prob > chi2	0
R-squared	0.0441
Root MSE	0.57289

corruption experience	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
trust in the local government	-0.028	0.020	-1.41	0.159	-0.066	0.011
corruption perception	0.009	0.021	0.42	0.677	-0.033	0.050
interpersonal trust	0.000	0.001	-0.86	0.392	-0.002	0.001
years of education	0.009	0.005	1.82	0.068	-0.001	0.018
female	-0.180	0.032	-5.59	0	-0.243	-0.117
age	-0.002	0.001	-1.35	0.176	-0.004	0.001
organizational involvement	0.484	0.121	3.99	0	0.246	0.722
country's economic situation	-0.060	0.026	-2.32	0.02	-0.111	-0.009
leftist ideology	-0.037	0.035	-1.06	0.291	-0.105	0.032
black	0.020	0.043	0.46	0.642	-0.064	0.103
non-public servant	0.004	0.073	0.06	0.954	-0.138	0.147
constant	0.339	0.173	1.96	0.05	0.000	0.679

Instrumented: trust in the local government

Instruments: corruption perception, interpersonal trust, years of education, female, age, organizational involvement, country's economic situation, leftist ideology, black, non-public servant, willing to emigrate, corruption tolerance

Tests of overidentifying restrictions:

Sargan (score) chi2(2) = 3.58301 (p = 0.1667)

Basmann chi2(2) = 3.5542 (p = 0.1691)

Table 10 – Model 1 (petty corruption), assessing the validity of the IVs emigrate and corruption tolerance

2-Step GMM estimation

Estimates efficient for arbitrary heteroskedasticity
Statistics robust to heteroskedasticity

Number of obs	1294
F(11, 1282)	15.86
Prob > F	0
Centered R2	0.118
Uncentered R2	0.771
Root MSE	1.823
Total (centered) SS	4876
Total (uncentered) SS	18756
Residual SS	4300

trust in the local government	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
corruption experience	-0.284	0.431	-0.66	0.511	-1.129	0.562
corruption perception	-0.415	0.068	-6.14	0	-0.548	-0.283
interpersonal trust	0.008	0.002	4.61	0	0.005	0.012
years of education	-0.031	0.016	-1.94	0.052	-0.061	0.000
female	-0.202	0.128	-1.58	0.115	-0.453	0.049
age	0.003	0.004	0.95	0.343	-0.004	0.011
organizational involvement	1.542	0.444	3.47	0.001	0.672	2.412
country's economic situation	0.208	0.088	2.35	0.019	0.035	0.382
leftist ideology	-0.472	0.109	-4.34	0	-0.685	-0.259
black	-0.080	0.138	-0.58	0.563	-0.351	0.191
non-public servant	-0.478	0.226	-2.12	0.034	-0.921	-0.036
constant	5.119	0.470	10.89	0	4.198	6.040

Underidentification test (Kleibergen-Paap rk LM statistic):	20.11
Chi-sq(2) P-val =	0
Weak identification test (Kleibergen-Paap rk Wald F statistic):	11.32
Stock-Yogo weak ID test critical values: 10% maximal IV size	19.93
15% maximal IV size	11.59
20% maximal IV size	8.75
25% maximal IV size	7.25
Source: Stock-Yogo (2005). Reproduced by permission.	
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.	
Hansen J statistic (overidentification test of all instruments):	0.012
Chi-sq(1) P-val =	0.912

Instrumented: corruption experience
Instruments: corruption perception, interpersonal trust, years of education, female, age, organizational involvement, country's economic situation, leftist ideology, black, non-public servant
Excluded instruments: willing to emigrate, corruption tolerance

Table 11 – Model (petty corruption), assessing the validity of the IVs city size and trust in political parties

2-Step GMM estimation

Estimates efficient for arbitrary heteroskedasticity
Statistics robust to heteroskedasticity

Number of obs	1299
F(11, 1287)	4.09
Prob > F	0
Centered R2	0.045
Uncentered R2	0.136
Root MSE	0.573
Total (centered) SS	446
Total (uncentered) SS	493
Residual SS	426.1

corruption experience	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
trust in the local government	-0.023	0.018	-1.29	0.196	-0.058	0.012
corruption perception	0.011	0.021	0.55	0.579	-0.029	0.052
interpersonal trust	0.000	0.001	-0.55	0.58	-0.001	0.001
years of education	0.007	0.006	1.22	0.222	-0.004	0.018
female	-0.171	0.033	-5.13	0	-0.237	-0.106
age	-0.002	0.001	-1.58	0.115	-0.004	0.000
organizational involvement	0.475	0.135	3.51	0	0.210	0.739
country's economic situation	-0.055	0.021	-2.61	0.009	-0.097	-0.014
leftist ideology	-0.040	0.032	-1.25	0.212	-0.104	0.023
black	0.025	0.043	0.58	0.562	-0.060	0.110
non-public servant	0.007	0.071	0.1	0.924	-0.133	0.147
constant	0.307	0.184	1.67	0.094	-0.053	0.667

Underidentification test (Kleibergen-Paap rk LM statistic):	177.9
Chi-sq(2) P-val =	0
Weak identification test (Kleibergen-Paap rk Wald F statistic):	108.8
Stock-Yogo weak ID test critical values: 5% maximal IV relative bias	13.91
10% maximal IV relative bias	9.08
20% maximal IV relative bias	6.46
30% maximal IV relative bias	5.39
10% maximal IV size	22.3
15% maximal IV size	12.83
20% maximal IV size	9.54
25% maximal IV size	7.8
Source: Stock-Yogo (2005). Reproduced by permission.	
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.	
Hansen J statistic (overidentification test of all instruments):	3.255
Chi-sq(1) P-val =	0.197

Instrumented: trust in the local government
Instruments: corruption perception, interpersonal trust, years of education, female, age, organizational involvement, country's economic situation, leftist ideology, black, non-public servant
Excluded instruments: city size, trust in political parties, satisfaction with public services

Table 12 - Reduced-form equation[16] without and with the excluded instruments (emigrate and corruption tolerance)

Linear regression - without the excluded instruments

corruption experience	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
corruption perception	0.021	0.019	1.10	0.269	-0.016	0.057	
interpersonal trust	-0.001	0.001	-1.35	0.178	-0.002	0.000	
years of education	0.010	0.006	1.72	0.085	-0.001	0.021	*
female	-0.175	0.034	-5.20	0.000	-0.242	-0.109	***
age	-0.002	0.001	-1.59	0.111	-0.004	0.000	
organizational involvement	0.444	0.138	3.21	0.001	0.173	0.715	***
country's economic situation	-0.066	0.022	-3.04	0.002	-0.109	-0.024	***
left ideology	-0.024	0.032	-0.74	0.461	-0.087	0.040	
black	0.024	0.044	0.53	0.596	-0.063	0.110	
non-public employee	0.014	0.071	0.20	0.841	-0.125	0.154	
constant	0.201	0.138	1.46	0.145	-0.070	0.472	

Mean dependent var	0.190	SD dependent var	0.587
R-squared	0.044	Number of obs	1297.000
F-test	4.517	Prob > F	0.000
Akaike crit. (AIC)	2259.176	Bayesian crit. (BIC)	2316.021

*** p<0.01, ** p<0.05, * p<0.1*

Linear regression - with the excluded instruments

corruption experience	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
corruption perception	0.017	0.019	0.93	0.352	-0.019	0.054	
interpersonal trust	-0.001	0.001	-1.05	0.292	-0.002	0.000	
years of education	0.008	0.005	1.54	0.123	-0.002	0.019	
female	-0.161	0.033	-4.90	0.000	-0.225	-0.096	***
age	-0.001	0.001	-0.50	0.615	-0.003	0.002	
organizational involvement	0.372	0.137	2.72	0.007	0.104	0.640	***
country's economic situation	-0.071	0.021	-3.37	0.001	-0.112	-0.030	***
left ideology	-0.027	0.032	-0.86	0.389	-0.089	0.035	
black	0.019	0.044	0.43	0.666	-0.068	0.106	
non-public employee	0.013	0.068	0.18	0.854	-0.120	0.146	
emigrate	0.088	0.044	2.00	0.046	0.002	0.175	**
corruption tolerance	0.338	0.072	4.70	0.000	0.197	0.479	***
constant	0.136	0.141	0.96	0.335	-0.140	0.412	

Mean dependent var	0.190	SD dependent var	0.587
R-squared	0.083	Number of obs	1297.000
F-test	4.962	Prob > F	0.000
Akaike crit. (AIC)	2209.943	Bayesian crit. (BIC)	2277.125

*** p<0.01, ** p<0.05, * p<0.1*

[16] Stata command: reg correxp corrperc iptrust edu female age oinv soceva ideoleft black pvoc emigrate corrtol if group==2, robust
gen strenght_model1a = e(sample)
reg correxp corrperc iptrust edu female age oinv soceva ideoleft black pvoc if group==2 & strenght_model1a==1, robust

Table 13 - Reduced-form equation without and with the excluded instruments (city size, trust in political parties and satisfaction with public services)

Linear regression - without the excluded instruments

trust in local government	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
corruption perception	-0.427	0.067	-6.38	0.000	-0.559	-0.296	***
interpersonal trust	0.008	0.002	4.74	0.000	0.005	0.012	***
years of education	-0.033	0.015	-2.16	0.031	-0.063	-0.003	**
female	-0.155	0.103	-1.51	0.132	-0.358	0.047	
age	0.003	0.004	0.97	0.334	-0.004	0.011	
organizational involvement	1.444	0.390	3.70	0.000	0.678	2.210	***
country's economic situation	0.235	0.084	2.79	0.005	0.070	0.400	***
left ideology	-0.467	0.109	-4.29	0.000	-0.681	-0.254	***
black	-0.082	0.139	-0.59	0.555	-0.354	0.190	
non-public employee	-0.494	0.222	-2.23	0.026	-0.930	-0.059	**
constant	5.110	0.460	11.12	0.000	4.209	6.012	***

Mean dependent var	3.275	SD dependent var	1.938
R-squared	0.121	Number of obs	1299.000
F-test	17.772	Prob > F	0.000
Akaike crit. (AIC)	5259.402	Bayesian crit. (BIC)	5316.265

**** p<0.01, ** p<0.05, * p<0.1*

Linear regression - with the excluded instruments

trust in local government	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
corruption perception	-0.184	0.062	-2.96	0.003	-0.306	-0.062	***
interpersonal trust	0.005	0.002	3.29	0.001	0.002	0.008	***
years of education	0.013	0.015	0.87	0.385	-0.016	0.041	
female	-0.165	0.093	-1.78	0.074	-0.347	0.016	*
age	0.007	0.003	2.06	0.039	0.000	0.013	**
organizational involvement	0.671	0.363	1.85	0.065	-0.041	1.383	*
country's economic situation	0.093	0.075	1.24	0.216	-0.055	0.242	
left ideology	-0.313	0.099	-3.17	0.002	-0.506	-0.119	***
black	-0.054	0.122	-0.44	0.657	-0.293	0.185	
non-public employee	-0.469	0.200	-2.35	0.019	-0.861	-0.078	**
city size	-0.190	0.060	-3.19	0.001	-0.307	-0.073	***
trust in political parties	0.423	0.035	12.09	0.000	0.355	0.492	***
satisfaction with public services	0.205	0.027	7.72	0.000	0.153	0.257	***
constant	2.047	0.479	4.27	0.000	1.107	2.987	***

Mean dependent var	3.275	SD dependent var	1.938
R-squared	0.296	Number of obs	1299.000
F-test	52.349	Prob > F	0.000
Akaike crit. (AIC)	4976.193	Bayesian crit. (BIC)	5048.564

**** p<0.01, ** p<0.05, * p<0.1*

Table 14 - Hausman-based tests of endogeneity in the trust in local government equation

Tests of endogeneity
Ho: variables are exogenous

Durbin (score) chi2(1) = .129633 (p = 0.7188)
Wu-Hausman F(1,1281) = .128343 (p = 0.7202)

Table 15 - Hausman-based tests of endogeneity in the corruption experience equation

Tests of endogeneity
Ho: variables are exogenous

Durbin (score) chi2(1) = .692666 (p = 0.4053)
Wu-Hausman F(1,1286) = .6861 (p = 0.4076)

Table 16 – Unrestricted model for Petty corruption by groups

	Coef.	OIM Std. Err.	z	P>z	95% Conf.	Interval]	Standardized Coef.
Structural							
corruption experience							
trust in local government							
Br12	-0.0123	0.0212	-0.58	0.560	-0.0538	0.0292	-0.0341
Br16	-0.0251	0.0181	-1.38	0.167	-0.0606	0.0105	-0.0850
Mex12	-0.0884	0.0289	-3.06	0.002	-0.1450	-0.0318	-0.1485
Mex16	-0.1962	0.0380	-5.16	0.000	-0.2707	-0.1217	-0.3695
not involved 2012	-0.0127	0.0136	-0.94	0.347	-0.0393	0.0138	-0.0231
not involved 2016	-0.0209	0.0123	-1.71	0.088	-0.0449	0.0031	-0.0661
corruption perception							
Br12	0.0137	0.0146	0.94	0.349	-0.0150	0.0424	0.0253
Br16	0.0087	0.0190	0.46	0.647	-0.0286	0.0460	0.0127
Mex12	0.0324	0.0262	1.24	0.216	-0.0189	0.0837	0.0307
Mex16	0.0230	0.0307	0.75	0.453	-0.0371	0.0831	0.0211
not involved 2012	0.0162	0.0078	2.09	0.037	0.0010	0.0315	0.0204
not involved 2016	0.0609	0.0101	6.03	0.000	0.0411	0.0807	0.1126
interpersonal trust							
Br12	-0.0014	0.0007	-2.16	0.031	-0.0027	-0.0001	-0.0618
Br16	-0.0003	0.0005	-0.62	0.535	-0.0013	0.0007	-0.0169
Mex12	-0.0027	0.0009	-2.84	0.004	-0.0045	-0.0008	-0.0712
Mex16	0.0001	0.0009	0.06	0.955	-0.0018	0.0019	0.0016
not involved 2012	-0.0018	0.0003	-5.41	0.000	-0.0024	-0.0011	-0.0544
not involved 2016	-0.0005	0.0003	-1.77	0.077	-0.0010	0.0001	-0.0258
years of education							
Br12	0.0146	0.0051	2.88	0.004	0.0047	0.0246	0.0815
Br16	0.0076	0.0045	1.69	0.090	-0.0012	0.0164	0.0465
Mex12	0.0014	0.0071	0.20	0.844	-0.0126	0.0154	0.0054
Mex16	0.0082	0.0075	1.09	0.278	-0.0066	0.0229	0.0325
not involved 2012	0.0208	0.0029	7.25	0.000	0.0152	0.0264	0.0756
not involved 2016	0.0095	0.0028	3.40	0.001	0.0040	0.0150	0.0508
female							
Br12	-0.0377	0.0335	-1.13	0.260	-0.1034	0.0279	-0.0287
Br16	-0.1538	0.0294	-5.23	0.000	-0.2114	-0.0962	-0.1339
Mex12	-0.2736	0.0508	-5.39	0.000	-0.3731	-0.1740	-0.1331
Mex16	-0.4140	0.0513	-8.06	0.000	-0.5146	-0.3133	-0.2082
not involved 2012	-0.0358	0.0178	-2.01	0.045	-0.0708	-0.0009	-0.0185
not involved 2016	-0.1099	0.0176	-6.23	0.000	-0.1445	-0.0753	-0.0863
age							

Br12	0.0001	0.0013	0.08	0.935	-0.0025	0.0027	0.0023
Br16	-0.0005	0.0010	-0.51	0.612	-0.0025	0.0015	-0.0140
Mex12	-0.0050	0.0018	-2.80	0.005	-0.0085	-0.0015	-0.0759
Mex16	-0.0066	0.0018	-3.73	0.000	-0.0100	-0.0031	-0.1064
not involved 2012	0.0028	0.0006	4.48	0.000	0.0016	0.0040	0.0444
not involved 2016	0.0004	0.0006	0.63	0.530	-0.0008	0.0016	0.0093
organizational involvement							
Br12	0.6255	0.1713	3.65	0.000	0.2898	0.9613	0.0955
Br16	0.4303	0.1109	3.88	0.000	0.2130	0.6476	0.1017
Mex12	1.5550	0.2297	6.77	0.000	1.1048	2.0053	0.1679
Mex16	1.2426	0.1862	6.67	0.000	0.8777	1.6075	0.1710
not involved 2012	1.9975	0.0660	30.26	0.000	1.8681	2.1268	0.2919
not involved 2016	0.4748	0.0587	8.08	0.000	0.3597	0.5899	0.1131
country's economic situation							
Br12	-0.0199	0.0260	-0.77	0.444	-0.0708	0.0310	-0.0198
Br16	-0.0637	0.0234	-2.72	0.007	-0.1096	-0.0178	-0.0716
Mex12	0.0238	0.0414	0.57	0.566	-0.0574	0.1049	0.0144
Mex16	0.0028	0.0615	0.04	0.964	-0.1178	0.1233	0.0012
not involved 2012	0.0172	0.0135	1.28	0.202	-0.0092	0.0436	0.0125
not involved 2016	0.0346	0.0122	2.84	0.005	0.0107	0.0586	0.0452
leftist ideology							
Br12	0.0344	0.0396	0.87	0.386	-0.0433	0.1121	0.0255
Br16	-0.0413	0.0326	-1.27	0.205	-0.1053	0.0226	-0.0349
Mex12	0.0922	0.0554	1.66	0.096	-0.0164	0.2008	0.0449
Mex16	0.0247	0.0578	0.43	0.670	-0.0887	0.1381	0.0118
not involved 2012	0.1233	0.0214	5.76	0.000	0.0813	0.1652	0.0634
not involved 2016	-0.0195	0.0215	-0.91	0.364	-0.0617	0.0226	-0.0154
black							
Br12	-0.0574	0.0486	-1.18	0.237	-0.1525	0.0378	-0.0307
Br16	0.0274	0.0389	0.70	0.481	-0.0489	0.1038	0.0178
Mex12	-0.3501	0.3449	-1.02	0.310	-1.0262	0.3259	-0.0254
Mex16	-0.1322	0.1750	-0.76	0.450	-0.4753	0.2108	-0.0206
not involved 2012	0.2162	0.0222	9.72	0.000	0.1726	0.2598	0.1115
not involved 2016	-0.2036	0.0199	-10.26	0.000	-0.2425	-0.1647	-0.1589
non-public servant							
Br12	0.0554	0.0560	0.99	0.322	-0.0543	0.1651	0.0258
Br16	0.0106	0.0681	0.16	0.876	-0.1228	0.1441	0.0040
Mex12	-0.0419	0.1162	-0.36	0.718	-0.2696	0.1858	-0.0089
Mex16	-0.0134	0.1055	-0.13	0.899	-0.2202	0.1934	-0.0033
not involved 2012	0.1018	0.0313	3.25	0.001	0.0404	0.1632	0.0307
not involved 2016	-0.0383	0.0336	-1.14	0.255	-0.1041	0.0276	-0.0157
willing to emigrate							
Br12	0.1482	0.0659	2.25	0.024	0.0191	0.2773	0.0624
Br16	0.1031	0.0353	2.92	0.003	0.0340	0.1722	0.0767
Mex12	0.2678	0.0830	3.23	0.001	0.1051	0.4305	0.0763
Mex16	0.1129	0.0567	1.99	0.047	0.0017	0.2240	0.0447
not involved 2012	0.0774	0.0224	3.45	0.001	0.0334	0.1213	0.0368
not involved 2016	0.1088	0.0184	5.93	0.000	0.0728	0.1448	0.0851
corruption tolerance							
Br12	0.2285	0.0598	3.82	0.000	0.1113	0.3456	0.0996
Br16	0.3111	0.0461	6.74	0.000	0.2207	0.4015	0.1702
Mex12	0.3509	0.0613	5.72	0.000	0.2308	0.4711	0.1412
Mex16	0.3244	0.0614	5.28	0.000	0.2040	0.4448	0.1400
not involved 2012	0.3391	0.0225	15.08	0.000	0.2950	0.3832	0.1522
not involved 2016	0.1017	0.0228	4.47	0.000	0.0571	0.1463	0.0748
constant							
Br12	0.0489	0.1529	0.32	0.749	-0.2509	0.3486	0.0743
Br16	0.2320	0.1594	1.46	0.145	-0.0804	0.5444	0.4038

Mex12	0.9794	0.2535	3.86	0.000	0.4825	1.4763	0.9533
Mex16	1.2811	0.2909	4.40	0.000	0.7109	1.8513	1.2890
not involved 2012	-0.4698	0.0894	-5.25	0.000	-0.6450	-0.2945	-0.4858
not involved 2016	-0.0054	0.0944	-0.06	0.954	-0.1904	0.1796	-0.0085
trust in local government							
corruption experience							
Br12	-0.1386	0.5662	-0.24	0.807	-1.2482	0.9711	-0.0501
Br16	-0.3896	0.3997	-0.97	0.330	-1.1730	0.3938	-0.1150
Mex12	-0.3268	0.2287	-1.43	0.153	-0.7751	0.1214	-0.1945
Mex16	-0.5168	0.2837	-1.82	0.069	-1.0729	0.0393	-0.2744
not involved 2012	-0.2703	0.1165	-2.32	0.020	-0.4985	-0.0421	-0.1490
not involved 2016	-1.0044	0.4159	-2.42	0.016	-1.8195	-0.1894	-0.3181
corruption perception							
Br12	-0.1350	0.0363	-3.72	0.000	-0.2062	-0.0638	-0.0899
Br16	-0.1869	0.0544	-3.44	0.001	-0.2934	-0.0804	-0.0804
Mex12	0.0441	0.0418	1.06	0.291	-0.0378	0.1260	0.0249
Mex16	-0.0874	0.0523	-1.67	0.095	-0.1899	0.0152	-0.0425
not involved 2012	-0.0510	0.0146	-3.49	0.000	-0.0797	-0.0224	-0.0353
not involved 2016	-0.1279	0.0383	-3.34	0.001	-0.2031	-0.0528	-0.0748
interpersonal trust							
Br12	0.0052	0.0018	2.95	0.003	0.0017	0.0086	0.0802
Br16	0.0057	0.0015	3.91	0.000	0.0029	0.0086	0.0918
Mex12	0.0018	0.0015	1.14	0.252	-0.0013	0.0048	0.0282
Mex16	0.0078	0.0016	4.88	0.000	0.0047	0.0109	0.1264
not involved 2012	0.0040	0.0006	6.38	0.000	0.0028	0.0053	0.0682
not involved 2016	0.0019	0.0009	2.04	0.041	0.0001	0.0036	0.0304
years of education							
Br12	0.0070	0.0146	0.48	0.632	-0.0217	0.0357	0.0141
Br16	0.0109	0.0139	0.78	0.434	-0.0164	0.0382	0.0197
Mex12	-0.0061	0.0111	-0.55	0.582	-0.0278	0.0156	-0.0140
Mex16	-0.0171	0.0133	-1.28	0.199	-0.0433	0.0090	-0.0363
not involved 2012	-0.0046	0.0061	-0.76	0.446	-0.0165	0.0073	-0.0092
not involved 2016	-0.0008	0.0101	-0.08	0.934	-0.0207	0.0190	-0.0014
female							
Br12	-0.0319	0.0852	-0.38	0.708	-0.1989	0.1350	-0.0088
Br16	-0.1979	0.1092	-1.81	0.070	-0.4118	0.0161	-0.0508
Mex12	-0.0875	0.1054	-0.83	0.407	-0.2942	0.1192	-0.0253
Mex16	-0.2624	0.1573	-1.67	0.095	-0.5707	0.0459	-0.0701
not involved 2012	0.0122	0.0334	0.37	0.713	-0.0531	0.0776	0.0035
not involved 2016	-0.1570	0.0757	-2.07	0.038	-0.3053	-0.0086	-0.0390
age							
Br12	0.0012	0.0031	0.38	0.704	-0.0050	0.0073	0.0093
Br16	0.0066	0.0031	2.13	0.033	0.0005	0.0126	0.0521
Mex12	0.0000	0.0031	0.00	0.998	-0.0062	0.0061	-0.0001
Mex16	-0.0089	0.0035	-2.55	0.011	-0.0158	-0.0021	-0.0768
not involved 2012	0.0005	0.0011	0.40	0.689	-0.0018	0.0027	0.0040
not involved 2016	-0.0003	0.0020	-0.13	0.899	-0.0042	0.0037	-0.0020
organizational involvement							
Br12	1.4394	0.5572	2.58	0.010	0.3472	2.5315	0.0794
Br16	0.8214	0.3795	2.16	0.030	0.0776	1.5653	0.0573
Mex12	0.9537	0.5009	1.90	0.057	-0.0280	1.9354	0.0613
Mex16	0.8296	0.4734	1.75	0.080	-0.0981	1.7574	0.0606
not involved 2012	0.4519	0.2679	1.69	0.092	-0.0731	0.9769	0.0364
not involved 2016	0.9708	0.2811	3.45	0.001	0.4199	1.5217	0.0732
country's economic situation							
Br12	0.0763	0.0636	1.20	0.230	-0.0484	0.2010	0.0275
Br16	0.0920	0.0733	1.25	0.210	-0.0517	0.2357	0.0305
Mex12	0.0278	0.0629	0.44	0.659	-0.0955	0.1511	0.0100

Mex16	0.3241	0.1032	3.14	0.002	0.1218	0.5263	0.0777
not involved 2012	0.1404	0.0243	5.79	0.000	0.0929	0.1880	0.0562
not involved 2016	0.2289	0.0402	5.70	0.000	0.1502	0.3076	0.0946
leftist ideology							
Br12	-0.4317	0.0944	-4.57	0.000	-0.6168	-0.2466	-0.1156
Br16	-0.3443	0.0968	-3.56	0.000	-0.5340	-0.1545	-0.0858
Mex12	-0.0531	0.0856	-0.62	0.535	-0.2208	0.1146	-0.0154
Mex16	-0.1702	0.1017	-1.67	0.094	-0.3695	0.0291	-0.0434
not involved 2012	-0.1482	0.0433	-3.42	0.001	-0.2331	-0.0633	-0.0420
not involved 2016	-0.2944	0.0603	-4.88	0.000	-0.4127	-0.1761	-0.0734
black							
Br12	-0.3122	0.1176	-2.66	0.008	-0.5426	-0.0817	-0.0604
Br16	-0.0342	0.1179	-0.29	0.772	-0.2653	0.1970	-0.0065
Mex12	0.5875	0.5345	1.10	0.272	-0.4601	1.6351	0.0254
Mex16	0.2182	0.3099	0.70	0.481	-0.3893	0.8256	0.0181
not involved 2012	-0.3267	0.0564	-5.79	0.000	-0.4373	-0.2161	-0.0929
not involved 2016	-0.4724	0.0974	-4.85	0.000	-0.6632	-0.2815	-0.1167
non-public servant							
Br12	0.1072	0.1384	0.77	0.439	-0.1641	0.3785	0.0181
Br16	-0.3775	0.2037	-1.85	0.064	-0.7768	0.0218	-0.0420
Mex12	-0.1860	0.1751	-1.06	0.288	-0.5293	0.1572	-0.0236
Mex16	0.2831	0.1838	1.54	0.124	-0.0772	0.6435	0.0369
not involved 2012	-0.0579	0.0595	-0.97	0.330	-0.1745	0.0587	-0.0096
not involved 2016	-0.0577	0.1171	-0.49	0.622	-0.2872	0.1719	-0.0075
city size							
Br12	0.0125	0.0503	0.25	0.803	-0.0860	0.1110	0.0056
Br16	-0.1486	0.0548	-2.71	0.007	-0.2559	-0.0412	-0.0613
Mex12	-0.1564	0.0426	-3.67	0.000	-0.2399	-0.0728	-0.0792
Mex16	-0.2804	0.0565	-4.96	0.000	-0.3911	-0.1697	-0.1051
not involved 2012	0.0258	0.0258	1.00	0.318	-0.0248	0.0764	0.0118
not involved 2016	0.1833	0.0380	4.82	0.000	0.1087	0.2578	0.0705
trust in political parties							
Br12	0.4398	0.0256	17.20	0.000	0.3897	0.4899	0.4021
Br16	0.4104	0.0309	13.29	0.000	0.3499	0.4709	0.3229
Mex12	0.4364	0.0241	18.13	0.000	0.3892	0.4836	0.4436
Mex16	0.3332	0.0370	9.01	0.000	0.2608	0.4057	0.2870
not involved 2012	0.3421	0.0095	36.08	0.000	0.3235	0.3607	0.3526
not involved 2016	0.3738	0.0162	23.07	0.000	0.3421	0.4056	0.3580
satisfaction with public services							
Br12	0.1245	0.0221	5.64	0.000	0.0813	0.1677	0.1311
Br16	0.2045	0.0240	8.51	0.000	0.1574	0.2516	0.2026
Mex12	0.1486	0.0209	7.12	0.000	0.1077	0.1896	0.1551
Mex16	0.1289	0.0229	5.64	0.000	0.0841	0.1737	0.1264
not involved 2012	0.1158	0.0089	13.04	0.000	0.0984	0.1331	0.1284
not involved 2016	0.1565	0.0150	10.46	0.000	0.1272	0.1859	0.1616
constant							
Br12	1.5157	0.3621	4.19	0.000	0.8060	2.2254	0.8321
Br16	2.0062	0.4561	4.40	0.000	1.1124	2.9001	1.0304
Mex12	2.1382	0.4247	5.03	0.000	1.3058	2.9705	1.2386
Mex16	3.0208	0.5468	5.52	0.000	1.9491	4.0925	1.6140
not involved 2012	1.7984	0.1568	11.47	0.000	1.4911	2.1057	1.0249
not involved 2016	1.5987	0.2821	5.67	0.000	1.0457	2.1516	0.7966

LR test of model vs. saturated: chi2(18) = 85.95, Prob > chi2 = 0.0000

Report 1 – Instrumental Variables Tests for different groups

IV Tests for Brazil 2012

The **equation-level goodness of fit** provides R^2 values for each of the observed variables. So, the model explains 4.4.% of the variance of corruption experience, and 29.12% of variable trust in local government. When assessing **overall model fit**, the chi-square is significant at the 0.01 level (9.994 with 3 degrees of freedom) and does not indicate a good model fit. The RMSEA is 0.039, the lower bound for this is 0.014 and the upper bound is 0.068, suggesting a close fit. The CFI suggests good model fit. The TLI is 0.869, which indicates an acceptable fit.

From the **univariate tests of normality**, most of the variables do not appear to be normally distributed: p-values for skewness, kurtosis, and joint univariate test are lower than 0.01. For the four multivariate normality tests, all of them rejects the null hypothesis of multivariate normality, p-value < 0.001. For non-normality, the Satorra-Bentler adjusted chi-squared is nonsignificant at the 0.01 level and does indicate a good model fit.

Testing for the **validity of the overidentifying restrictions**, the R^2 from the first-stage equations for the overidentified models with instruments for each equation are 0.04 for the trust in local government equation and 0.30 for the equation with corruption experience as an outcome.

In this overidentified model, the instruments for the trust in local government equation (willing to emigrate and corruption tolerance) appear reasonable based on the tests introduced above. The chi-square value of 0. 02443 with 1 degree of freedom (p = 0. 8758) for the Sargan test suggests that we are unable to reject the null hypothesis that these instruments are indeed valid. The Basmann test yields almost an identical result. For the corruption experience equation, the chi-square of 6.58287 with 2 degrees of freedom (p = .0372) also suggests that we should not reject the null hypothesis that the instruments are valid. The Basmann test returns the same result.

To address **heteroscedasticity and/or autocorrelation**, in the overidentified model, Hansen's J statistic is almost identical to Sargan/Basmann at .025 (p = . 8737) for the trust in local government equation and 5.461 (p = . 0652) for the corruption experience equation.

Assessing the **strength of the IVs** in the equation for trust in local government, the incremental R^2, which is the difference in the r-squares of the two models, is .0147. Performing an F test of the difference in these two models, the difference in the chi-squared is .21, the difference in the degrees of freedom is 12-10=2 and a p > .05, suggesting that we have a weak instruments problem. In the corruption experience equation with three identifying instruments, the incremental R^2 is .1971.

The difference in the chi-squared is 26.08. The difference in the degrees of freedom is 13-10= 3 and a $p < .05$. This suggests no weak instruments problem.

Performing the Hausman-based **tests of endogeneity**, in the overidentified trust in local government equation, both the Durbin chi-square test (.333231, p = 0. 5638) and the Wu-Hausman F test (.329375, p = 0. 5661) fail to reject the null hypothesis that the variables are exogenous, suggesting that variables may be treated as exogenous. In the same vein, the corruption experience equation presents both tests as nonsignificant (Durbin: . 285826, p = 0.59); Wu-Hausman: . 282572, p = 0.59), also suggesting that variables may be treated as exogenous.

IV Tests for Mexico 2012

The model explains 9.9 % of the variance of corruption experience, and 27.18 % of variable trust in local government. When assessing **overall model fit**, the chi-square is non-significant at the 0.01 level (0.938 with 3 degrees of freedom) and does indicate a good model fit. The RMSEA is 0.0001, the lower bound for this is 0.0001 and the upper bound is 0.026, suggesting a close fit. The CFI suggests good model fit. The TLI is 1.030, which indicates an acceptable fit.

From the **univariate tests of normality**, all of the variables do not appear to be normally distributed: p-values for skewness, kurtosis, and joint univariate test are lower than 0.01. For the four multivariate normality tests, all of them rejects the null hypothesis of multivariate normality, p-value < 0.001. For non-normality, the Satorra-Bentler adjusted chi-squared is nonsignificant at the 0.01 level and does indicate a good model fit.

Testing for the **validity of the overidentifying restrictions**, the R^2 from the first-stage equations for the overidentified models with instruments for each equation are 0.11 for the trust in local government equation and 0.06 for the equation with corruption experience as an outcome. The Sargan and Basmann tests suggest that we are unable to reject the null hypothesis that the instruments for both equations are indeed valid. The Hansen's J statistic, which assess **heteroscedasticity and/or autocorrelation**, for both equations are nonsignificant and suggest the same result.

Assessing the **strength of the IVs** in the equation for trust in local government, the incremental R^2, which is the difference in the r-squares of the two models, is .03. Performing an F test of the difference in these two models, the difference in the chi-squared is .88, the difference in the degrees of freedom is 12-10=2 and a $p > .05$, suggesting that we have a weak instruments problem. In the corruption experience equation with three identifying instruments, the incremental R^2 is .2492.

The difference in the chi-squared is 36.42. The difference in the degrees of freedom is 13-10= 3 and a $p < .05$. This suggests no weak instruments problem.

Performing the Hausman-based **tests of endogeneity**, in the overidentified trust in local government equation, both the Durbin chi-square test and the Wu-Hausman F test fail to reject the null hypothesis that the variables are exogenous, suggesting that variables may be treated as exogenous. In the opposite same vein, the corruption experience equation presents both tests as significant (Durbin: 8.49791, p = 0. 0036); Wu-Hausman: 8.46455, p = 0. 0037), suggesting that variables may not be treated as exogenous.

Tests for Mexico 2016

The **equation-level goodness of fit** provides R^2 values for each of the observed variables. So, the model explains 10.23% of the variance of corruption experience, and 23.45% of variable trust in local government. When assessing **overall model fit**, the chi-square is significant at the 0.01 level (16.004 with 3 degrees of freedom) and does not indicate a good model fit. The RMSEA is 0.055, the lower bound for this is 0.031 and the upper bound is 0.083, suggesting a close fit. The CFI suggests good model fit. The TLI is 0.799, which does not indicate an acceptable fit.

From the **univariate tests of normality**, all of the variables do not appear to be normally distributed: p-values for skewness, kurtosis, and joint univariate test are lower than 0.01. For the four multivariate normality tests, all of them rejects the null hypothesis of multivariate normality, p-value < 0.001. For non-normality, the Satorra-Bentler adjusted chi-squared is significant at the 0.01 level and does not indicate a good model fit.

Testing for the **validity of the overidentifying restrictions**, the R^2 from the first-stage equations for the overidentified models with instruments for each equation are 0.13 for the trust in local government equation and 0.28 for the equation with corruption experience as an outcome.

In this overidentified model, the instruments for the trust in local government equation (willing to emigrate and corruption tolerance) appear reasonable based on the tests introduced above. The chi-square value of 1.62366 with 1 degree of freedom (p = 0.2026) for the Sargan test suggests that we are unable to reject the null hypothesis that these instruments are indeed valid. The Basmann test yields almost an identical result. For the corruption experience equation, the chi-square of 10.2802 with 2 degrees of freedom (p = .0059) suggests that the instruments are not valid. The Basmann test returns the same result.

To address **heteroscedasticity and/or autocorrelation**, in the overidentified model, Hansen's J statistic is almost identical to Sargan/Basmann at 1.688 (p = . 1938) for the trust in local government equation and 13.214 (p = . 0014) for the corruption experience equation.

Assessing the **strength of the IVs** in the equation for trust in local government, the incremental R^2, which is the difference in the r-squares of the two models, is .02. Performing an F test of the difference in these two models, the difference in the chi-squared is -0.48, the difference in the degrees of freedom is 12-10=2 and a p > .05, suggesting that we have a weak instruments problem. In the corruption experience equation with three identifying instruments, the incremental R^2 is .14. The difference in the chi-squared is 16.64. The difference in the degrees of freedom is 13-10= 3 and a p < .05. This suggests no weak instruments problem.

Performing the Hausman-based **tests of endogeneity**, in the overidentified trust in local government equation, both the Durbin chi-square test and the Wu-Hausman F test fail to reject the null hypothesis that the variables are exogenous, suggesting that variables may be treated as exogenous. In the opposite same vein, the corruption experience equation presents both tests as significant (Durbin: 6.14386, p = 0. 0132); Wu-Hausman: 6.10542, p = 0 .0136), suggesting that variables may not be treated as exogenous.

Tests for Countries not included in Lava Jato scandal 2012

The **equation-level goodness of fit** provides R^2 values for each of the observed variables. So, the model explains 20.78 % of the variance of corruption experience, and 22.68% of variable trust in local government. When assessing **overall model fit**, the chi-square is significant at the 0.01 level (33.974 with 3 degrees of freedom) and does not indicate a good model fit. The RMSEA is 0.033, the lower bound for this is 0.023 and the upper bound is 0.043, suggesting a close fit. The CFI suggests good model fit. The TLI is 0.93, which indicates an acceptable fit.

From the **univariate tests of normality**, except for the variable satisfaction with public services, all of the variables do not appear to be normally distributed: p-values for skewness, kurtosis, and joint univariate test are lower than 0.01. For the four multivariate normality tests, all of them rejects the null hypothesis of multivariate normality, p-value < 0.001. For non-normality, the Satorra-Bentler adjusted chi-squared is significant at the 0.01 level and does not indicate a good model fit.

Testing for the **validity of the overidentifying restrictions**, the R^2 from the first-stage equations for the overidentified models with instruments for each equation are 0.25 for the trust in local government equation and 0.24 for the equation with corruption experience as an outcome.

In this overidentified model, the instruments for the trust in local government equation (willing to emigrate and corruption tolerance) do not appear reasonable based on the tests introduced above. The chi-square value of 27.4121 with 1 degree of freedom (p = 0.00001) for the Sargan test suggests that we can reject the null hypothesis that these instruments are indeed valid. The Basmann test yields almost an identical result. For the corruption experience equation, the Sargan chi-square of 17.4988 with 2 degrees of freedom (p = .0002) suggests that the instruments are not valid. The Basmann test returns the same result.

To address **heteroscedasticity and/or autocorrelation**, in the overidentified model, Hansen's J statistic is almost identical to Sargan/Basmann at 28.395 (p = . 00001) for the trust in local government equation and 19.121 (p = . 0001) for the corruption experience equation.

Assessing the **strength of the IVs** in the equation for trust in local government, the incremental R^2, which is the difference in the r-squares of the two models, is .02. Performing an F test of the difference in these two models, the difference in the chi-squared is -8.22, the difference in the degrees of freedom is 12-10=2 and a $p > .05$, suggesting that we have a weak instruments problem. In the corruption experience equation with three identifying instruments, the incremental R^2 is .14. The difference in the chi-squared is 57.31. The difference in the degrees of freedom is 13-10= 3 and a $p < .05$. This suggests no weak instruments problem.

Performing the Hausman-based **tests of endogeneity**, in the overidentified trust in local government equation, both the Durbin chi-square test and the Wu-Hausman F test reject the null hypothesis that the variables are exogenous, suggesting that variables may not be treated as exogenous. In the opposite same vein, the corruption experience equation presents both tests as nonsignificant (Durbin: 1.24973, p = 0.2636); Wu-Hausman: 1.24619, p = 0.2643), suggesting that variables may be treated as exogenous.

Tests for Countries not included in Lava Jato scandal 2016

The **equation-level goodness of fit** provides R^2 values for each of the observed variables. So, the model explains 7.66 % of the variance of corruption experience, and 27.47 % of variable trust in local government. When assessing **overall model fit**, the chi-square is significant at the 0.01 level (22.846 with 3 degrees of freedom) and does not indicate a good model fit. The RMSEA is 0.036, the lower bound for this is 0.023 and the upper bound is 0.051, suggesting a close fit. The CFI suggests good model fit. The TLI is 0.89, which indicates an acceptable fit.

From the **univariate tests of normality**, all of the variables do not appear to be normally

distributed: p-values for skewness, kurtosis, and joint univariate test are lower than 0.01. For the four multivariate normality tests, all of them rejects the null hypothesis of multivariate normality, p-value < 0.001. For non-normality, the Satorra-Bentler adjusted chi-squared is significant at the 0.01 level and does not indicate a good model fit.

Testing for the **validity of the overidentifying restrictions**, the R^2 from the first-stage equations for the overidentified models with instruments for each equation are 0.08 for the trust in local government equation and 0.34 for the equation with corruption experience as an outcome.

In this overidentified model, the instruments for the trust in local government equation (willing to emigrate and corruption tolerance) appear reasonable based on the tests introduced above. The chi-square value of 5.66121 with 1 degree of freedom (p = 0. 0173) for the Sargan test suggests that we can reject the null hypothesis that these instruments are indeed valid. The Basmann test yields almost an identical result. For the corruption experience equation, the Sargan chi-square of 13.3316 with 2 degrees of freedom (p = .0013) suggests that the instruments are not valid. The Basmann test returns the same result.

To address **heteroscedasticity and/or autocorrelation**, in the overidentified model, Hansen's J statistic is almost identical to Sargan/Basmann at 5.371 (p = . 0205) for the trust in local government equation and 12.717 (p = . 0017) for the corruption experience equation.

Assessing the **strength of the IVs** in the equation for trust in local government, the incremental R^2, which is the difference in the r-squares of the two models, is .01. Performing an F test of the difference in these two models, the difference in the chi-squared is -.29, the difference in the degrees of freedom is 12-10=2 and a p > .05, suggesting that we have a weak instruments problem. In the corruption experience equation with three identifying instruments, the incremental R^2 is .14. The difference in the chi-squared is 68.88. The difference in the degrees of freedom is 13-10= 3 and a p < .05. This suggests no weak instruments problem.

Performing the Hausman-based **tests of endogeneity**, in the overidentified trust in local government equation, both the Durbin chi-square test and the Wu-Hausman F test reject the null hypothesis that the variables are exogenous, suggesting that variables may not be treated as exogenous. In the opposite same vein, the corruption experience equation presents both tests as nonsignificant (Durbin: .511895, p = 0. 4743); Wu-Hausman: .509897, p = 0. 4752), suggesting that variables may be treated as exogenous.