Human Resource Management as a Tool to Reduce Corruption: Evidence from Mexico

Abstract: Most literature relies on the dominant principal-agent framework to emphasize how incentives, monitoring and sanctions are prime deterrents of corruption but stop short when evaluating how these general principles turn into concrete Human Resource Management (HRM) policies. Following a call made at *Public Administration* to develop innovative research about how day-to-day management operations change incentives to be corrupt, we use a fine-grained data of 5.22 million USD audited to 544 Mexican local governments over a period of 3 years, to test the correlation between the misappropriation of public resources at subnational level and HRM functions. Our results suggest that HRM is a critical, underseen factor to understand corruption. We find that having merit-based recruitment, performance evaluations, and less unequal structure of remunerations can help local governments to effectively prevent the misappropriation of public resources.

Key words: Human Resource Management, Corruption, Misappropriation, Local Government, Mexico

Introduction

Control of corruption is a metric for the adequacy of governments around the world, and a topic that lies at the center of public administration as a professional field (Perry, 2015). Yet, when studying it, scholarly literature focuses more on principal-agent models, incentives and sanctions, and much less on testing how the concrete implementation of these principles might influence corruption. Critical issues like the way in which human resource management (HRM) practices influence the prevalence of corruption have not been sufficiently studied (Sondang Silitonga et al., 2019; Meyer-Sahling & Mikkelsen, 2018).

We argue that HRM could be an important tool to control corruption and use microdata of registries and census to understand this relationship. For example, when HRM practices include moral reminders to reduce corruption, unethical behavior could drop (Shu et al., 2012). It has also been shown that public employees' compliance with regulation could be affected by managerial cues, such as exposure to dishonest behavior (Hoeben et al., 2016), the degree of focus on monetary rewards (Gino & Mogilner, 2014), intra-organizational competition (Rigdon & D'Esterre, 2015), and the feeling of entitlement (Sah, 2017). Studies have shown that challenging performance goals and time pressure may also influence compliance (Belle & Cantarelli, 2017). Other studies have pointed to the importance of monitoring (Rixom & Mishra, 2014; Welsh & Ordóñez, 2014), whistle-blowing protection (Near & Miceli, 1985), higher wages and less discretion (Kwon, 2012) as tools to diminish corruption (Belle & Cantarelli, 2017).

Building upon recent calls to find new ways to study corruption as a public management issue (Sondang Silitonga et al., 2019; Meyer-Sahling & Mikkelsen, 2018; Oliveros & Schuster, 2018; Perry, 2015), this study provides evidence of how public HRM may curb corruption, contributing to the literature in three ways.

Fist, we side with an emerging literature that observes that the best way to understand state capacity is to rely on administrative measures, not surveys (Holt & Manning, 2014). Most studies of corruption still rely on surveys about perceptions and experiences of corruption as their explanatory variable (Meyer-Sahling & Mikkelsen, 2016). Yet, these measures are influenced by elite concerns and biased in favor of grand corruption. Our study explores corruption using administrative data sources. This allows us to capture objective elements of the organizational governance structure. Although some efforts have been done (Bersch et al., 2017; Sundström, 2016; Rose & Peiffer, 2015; Cullen, 2012), this form of research remains limited due to the lack of reliable information about internal registries of corruption.

Second, we focus on studying the role that concrete HRM practices could play on controlling corruption as way to translate principal-agent models into concrete public administration studies at the micro level. Underpinning the principal-agent framework, there is an idea that incentives, monitoring and sanctions are the prime determinants for higher compliance levels. Yet, scholars have usually stopped short when looking into studying the concrete implementation of these principles (Sondang Silitonga et al., 2019). We use HRM as a translation of principal-agent's general constructs, and therefore as an angle from which to analyze the problem of corruption. Specifically, we explore how HRM operations and practices in local governments of Mexico are related to the prevalence of budget misappropriation, as a way to shed light over why there is large variance in levels of corruption even within governments that share similar economic and institutional factors (Cantu, 2014; Langbein & Sanabria, 2013).

Third, our study focuses on differences in public management at the sub-national level, rather than cross-national comparisons. Regarding corruption-control, national public

administrations have improved greatly over the last decades (Meyer-Sahling & Mikkelsen, 2016; Santiso, 2015). Yet, much less has been said about local and municipal governments (Charron et al., 2016; Nicholls-Nixon et al., 2011). Our study provides an opportunity to examine how institutional and managerial differences combine to influence corruption outcomes at the local level (cf. Belle and Cantarelli, 2017).

Following the recommendations of other scholars (Ackerman & Palifka, 2016; Lasthuizen et al., 2011; Johnston 2005), we focus on analyzing a single type of measurable corruption: the misappropriation of public funds by local authorities. We define misappropriation as *the misplacement and potential embezzlement of public funds placed in trust or allocated to municipal governments*. We focus on misappropriation because it allows us to study unethical behavior by tracing public records that do not depend on subjective evaluations, but on factual, public, and independent quantifiable records. Furthermore, studying misappropriation allows us to examine organizational practices related to the prevalence of a culture of corruption in which local authorities might regularly misuse public funds.

Our study was made possible due to the existence of two fine-grained datasets that are rarely find together. First, we collected data of misappropriations from municipal governments' audits in Mexico from 2014 to 2016. These audits trace the use of 5.22 million USD (99,163,380 MXN in 2019) of public funds and identify that as much as 426,873 USD were misappropriated. This is one of the largest auditing-based studies to date. Before, Olken (2007), Ferraz & Finan (2011) and Bobonis et al. (2016) had used auditing processes to study corruption in Indonesia, Brazil and some other countries. Second, we paired this data with the results of a multi-year census of local management variables conducted biannually since 2011. To the best of our knowledge, this the first time that these two datasets are put together to understand corruption at the subnational level.

Our multilevel analysis with a matched sample shows that less corruption is related to merit-based recruitment, and controls and evaluations. We found no significant effect of employment protection and probability of dismissal. However, we do find some evidence that a more unequal wage structure could lead to more corruption. Thus, our results show that attention to specific managerial policies can aid local governments interested in preventing corruption.

Our study speaks to the broader public administration literature that, since the seminal work of Wilson (1887), has asked to weight the role that public administrations and public managers have on governance and corruption control. We stress the importance of focusing on HRM as a potentially effective way to prevent corruption in developing countries.

The rest of the paper is structured in the following sections: (i) theoretical considerations and hypotheses, (ii) data and methods, (iii) statistical results, and (iv) conclusion.

Corruption control as an HRM issue

Professional public service may help reduce corruption and promote prosperity. Evans & Rauch (1999) show a correlation between the existence of "Weberian" administrative structures and economic performance. Professional bureaucracies based on meritocratic recruitment and long-term careers increase organizational conformity and create disincentives to corrupt behavior, which in turn promote trust and economic growth.

Professional bureaucracies may also reduce corruption because of indirect effects. Bureaucracies that are professional enough as to have the capacity to use technology to provide digital government services tend to be less corrupt (Elbahnasawy, 2014; Andersen, 2009). For example,

the use of biometric cards reduces embezzlement (Muralidharan et al., 2016), and e-government makes markets more competitive and diversified (Lewis-Faupel et al., 2016).

Evidence also points to the importance of adequate salaries. Corruption emerges when salaries are below a basic living wage or when austerity measures reduce wages (Borcan et al., 2014; Reeves, 2013; Anders, 2010). Yet, some studies find mixed effects (Gans-Morse et al., 2018; Alt & Lassen, 2014). In any case, wages seem seldom enough to control corruption and not a perfect variable to study. As pointed out by Kwon (2012) "high wages are costly and firing bureaucrats can be difficult partly because corruption is often hard to verify and partly because those who monitor corruption may be corrupt as well" (p. 766).

Overall, there is still much to know about how specific HRM practices and policies could impact corruption (Meyer-Sahling & Mikkelsen, 2018). The effect of functions of recruitment, promotion, performance evaluations, employment protection and dismissal, and the intra-organizational structure of remunerations has not been studied mostly out of the difficulties to find available datasets with information at granular level.

This is an area that deserves more attention as some evidence suggests that management and organizational practices could indeed influence the decision to be corrupt (Belle & Cantarelli, 2017; Bing et al., 2012). For instance, Moore & Gino (2013) showed that socio-psychological processes that facilitate moral neglect, moral justification, and immoral action can be exacerbated by organizational factors. Also, Ashford & Anand (2003) have explained how organizational structures and processes can promote rationalization and the normalization of corruption. Actually, even minor changes in organizational processes could have an important effect. Studies have shown that when individuals are required to sign their documents before reporting their activities, the probability of honest reporting increases (Shu et al., 2012; see also, Cohn et al., 2014).

Organizational policies could also help modulate social influences that are correlated with corruption. When individuals are exposed to dishonesty, illegal conducts may become more acceptable (Hoeben et al., 2016). Yet, if internal policies focus attention away from monetary rewards, individuals may tend to behave more ethically by cheating less (Gino & Mogilner, 2013; Rigdon & D'Esterre, 2015). Finally, in professional areas that create a sense of entitlement and invulnerability, crossing ethical boundaries has been proven to be more common (Sah, 2017). Studies have shown that corruption tends to be more common among individuals that are subject to challenging performance goals and time pressure, particularly if they have low risk aversion (Belle & Cantarelli, 2017).

To fully flesh out the role that HRM policies and practices may have on corruption, we build on Meyer-Sahling & Mikkelsen (2018) and Berman (2015) and their four critical civil service management functions: (a) recruitment, (b) control and evaluation, (c) employee protection and dismissal, and (d) remuneration. We derive hypotheses from all of them and gather evidence of which practices may influence the capacity of a public bureaucracy to limit corruption most effectively.

a) Recruitment

Scholars have shown that adopting recruitment through examinations has lowered corruption in different cases, from Latin American (Oliveros and Schuster, 2018) to post-communist countries (Charron et al., 2016; Meyer-Sahling & Mikkelsen, 2016). This relation seems to happen because of different reasons.

First, merit-based recruitment reduces adverse selection as it signals that capacity. Performance measures are the main variables to determine success. As adverse selection theory

predicts, public servants that are corrupt or do not have the capacity to perform may be deterred from even applying to the position. As a result, the pool of public servants become a subset of the total population, one that is less prone to be corruption.

Second, merit-based recruitment promotes disincentives to misbehave by changing the logic of access to public employment. As a result, accepting bribes could become more difficult (Bersch et al., 2017; Heywood & Meyer-Sahling, 2013). This happens because bureaucrats' positions in meritocratic systems do not depend on loyalty to politicians but on credentials and measurable performance. In this environment, bureaucrats could have a lot to lose by engaging in corruption.

Third, merit-based recruitment could help develop a public administration that adheres to professional standards of integrity (Neshkova & Kostadinova, 2012; Schester, 2017). Merit-based recruitment increases bureaucratic expertise (Haveric et al., 2018), and encourages government employees to more candidly voice their opinions (Cooper, 2018). When the career of professional bureaucrats is determined according to merit, collusion for taking bribes is less likely because it becomes a collective action problem (Dahlström et al., 2012). Merit-based recruitment helps create stronger ties and a "esprit de corps" among bureaucrats that reinforce the adherence to codified rules of behavior. As a result, some research has shown that the behavior of different bureaucrats tends to become similar, creating a virtuous cycle in which peers monitor the behavior of others, thus reducing the chances of misbehavior (Dahlström et al., 2012).

In light of the previous, our first hypothesis suggests:

Hypothesis 1 — Merit-based recruitment of personnel correlates with lower misappropriation

b) Control and evaluation

As with any illicit behavior, it is expected that corruption decreases when the probability of detection is higher (Becker, 1968). When day-to-day management operations include internal controls in the form of monitoring and personnel and organizational evaluations, a reduction in corruption may be observed due to increased risk of punishment and highlighted awareness of weaknesses.

Top-down monitoring tools like audits and performance and departmental evaluations have been proven among the most effective anti-corruption tools (Gans-Morse et al., 2018). Observational studies from Buenos Aires (Di Tella & Franceschelli, 2011) to Pakistan (Davis, 2004) have showed that when management can oversee the actions of public servants, ethical behavior is induced. In Indonesia, for example, village road projects have been proven to be less corrupt when they are audited (Olken, 2006). In Georgia, the success of anti-corruption reforms has been attributed to the capacity of the state to monitor its bureaucracy (Schueth, 2012). Overall, corruption is considerably lower in municipalities where spending is monitored before elections (Bobonis et al., 2016).

Experimental evidence has also confirmed the importance of monitoring and evaluation in reducing corruption (Rosenbaum et al., 2014). A randomized policy experiment implemented in Brazil concluded that temporarily increasing annual monitoring risk by about 20 percentage points reduces the proportion of procurement processes with evidence of corruption by 15 percent (Zamboni & Litsching, 2018). A meta-analysis of 19 independent experiments showed a negative effect of monitoring on individuals' unethical behavior (Belle & Cantarelli, 2017; Dai et al., 2017).

An interesting interpretation of the mechanism through which monitoring may have effects in bureaucrats is through its psychological impact. Monitoring encourages self-awareness thus making it impossible for a public servant to engage in corruption without having to update her self-concept (Welsh & Ordoñez, 2016; Mazar et al., 2008). Sometimes unethical behavior results from people's limited attention to ethical considerations (Pittarello et al., 2015). Thus, our second hypothesis suggests:

Hypothesis 2 — Existence of internal control and evaluations correlates with lower misappropriation

c) Employment protection and stability

Employment protection and job stability could reduce incentives to corrupt behavior because public servants are less motivated to take risky short-term corrupt gains (Meyer-Sahling & Mikkelsen, 2016; Becker & Stigler, 1974). The expected punishment for being corrupt is larger when the job has higher probability of leading to a long-term stable income than when it is temporal.

Furthermore, tenure facilitates long-term socialization into a public service ethos that, in turn, may reduce corruption (Dahlström et al., 2012). Higher employment protections and lower probability of dismissal makes public servants more prone to follow the rules of ethical behavior posed by their institution (Evans & Rauch, 1999). Tenure may also liberate public servants from the pressure of greedy elected officials that may want to force them to be corrupt (Neshkova and Kostadinova, 2012). Clientelism is particularly prone to emerge when politicians are capable of personalizing public administration (Oliveros, 2016).

Yet, it is important to mention that evidence with respect to job protection and corruption is quite mixed (Oliveros and Schuster, 2018). Particularly, because the opposite behavior could also be true. That is, that a tenured public servant wants to be corrupt even against the will of an honorable elected official, precisely because tenure could "shield" corrupt officials from dismissal.

The previous can be summarized in the following hypothesis:

Hypothesis 3 — Employment protection and a lower probability of arbitrary dismissal correlate with lower misappropriation

d) Remuneration

Very low wages for civil servants and sudden declines in salaries tend to be related to larger corruption (Gans-Morse et al., 2018; Dal Bó, 2013). There is also evidence that

Intra-organizational inequality may also pave the way towards corruption because it diminishes (intra-organizational) trust between public servants. As Rothstein & Uslander (2005) have shown, lack of trust increases the propensity of individuals to rely on illegal solutions, like corruption, to solve their problems. Bureaucracies are less effective combating corruption when levels of trust are low (Bjørnskov, 2011). As a result, higher levels of income inequality enable a higher degree of unethical behavior (Ariely & Uslander, 2017; Podobnik et al., 2015).

Inequality could also lead to self-justification, as social cognitive theory argues that individuals may find ways to minimize their responsibility for unethical behavior (Mazar et al., 2008). If individuals think that the difference in bureaucratic wages is not justifiable or fair, their probability to become corrupt may increase (Jost et al., 2004). The effect may be enhanced because individuals that belong to superior echelons are likely to be less aware of corruption because of

their feeling of entitlement to greater power and their desire to maintain dominance even if that requires some forms of misbehavior (Rosenblatt, 2012; Gingerich, 2013). In other words, intra-organizational inequality may create a justification to extract rents through corrupt behavior.

In sum, our fourth hypothesis suggests:

Hypothesis 4 — A more unequal structure of remunerations correlates with higher misappropriation

Data and empirical specification

Context: Mexican municipal governments

Mexico has 2,457 municipal governments that share three important features (Merino, 2007). First, municipalities are governed by councils (ayuntamientos) presided by a mayor. Second, although formally autonomous, municipalities must abide to state and federal legislation. This is particularly important in the case of municipal finances and public administration, since municipal governments must comply to federal and state regulations in order to receive funding. Finally, independently of their size or population, municipal administrations share a common responsibility to provide basic public services and infrastructure such as lighting, sewer and water services, market and slaughterhouse administration, paving and policing.

Municipal governments typically have a three-year term, and until 2018, no reelection was permitted. Local councils and mayors are elected by direct vote. Public administration is organized according to state legislation and municipal regulation issued by the local council. Much variation can be observed in the day-to-day functioning of municipal public administrations.

According to census data (2015), on average, Mexican municipal governments have 286 public employees (ranging from 2 to 15,000+). The most common departments/functions of municipal administrations are public safety and police (16%), urban services (15%) and public works (8%).

Misappropriation

Corruption is an umbrella concept that refers to a series of activities that are not necessarily correlated (Johnston, 2005). Thus, we constrain our study to a single type of event: the misappropriation of public funds. We define misappropriation as the (willing or unwilling) misplacement of public funds placed in trust or allocated to municipal governments.

We focus on it for three reasons. First, misappropriation reduces the capacity of a local government to deliver services. When public money that was supposed to help provide education or social services is misappropriated, the performance of government agencies is likely to diminish. If public funds were supposed to be used to enhance public infrastructure, effects may be more visible, having as a result poor quality roads, sewage, or public spaces. We focus on misappropriation because of its direct, substitution effects with public spending. Second, misappropriation could signal institutional or organizational weaknesses within local governments that enable other forms of corruption, such as embezzlement or the illegal funneling of public funds into political campaigns. Finally, studying misappropriation allow us to depart from papers using perception measures. To date, most studies rely on subjective measures such as surveys asking individuals whether they perceive a government to be corrupt (UNODC, 2018). This is

problematic because perception-based measures tend to be influenced by press coverage, information availability, institutional trust, among other factors.

To avoid these problems, we rely on a measure of misappropriation extracted from public audits by an independent comptroller agency. According to Gans-Morse et al. (2018), the single most important tool capable of identifying corruption acts is upper monitoring in the form of Federal Auditing Institutions (FAIs).

Indeed, some literature relies on information created by FAIs. Di Tella and Schargrodsky (2003) showed that an increase in "audit intensity" reduced prices paid by local hospitals for basic, homogeneous inputs by 10–15 percent. Olken (2007) showed that a 100 percent probability of an audit reduced missing expenditures in an Indonesian road construction project. Most recently, Ferraz and Finan (2016) showed that being audited in the past reduces future corruption. Also, Bobonis et al. (2016) showed that pre-election release of the audit reports led to significant short-term reductions in municipal corruption levels and an increase in incumbent mayors' electoral accountability (also see De la O and García 2018; and Litsching and Zamboni 2013).

Our response variable (*misappropriation*) is based on data from the Mexican FAI: Auditoría Superior de la Federación (ASF), which publicly reports the results of audits of municipal spending. ASF in an autonomous national institution that every year selects a sample of municipalities to be audited. On average, 258 municipalities get audited every year. Selection is done based on the size of budgets, recent changes in budget size, non-recent audits, results from previous audits, media interest, and specific request by Congress or civil society. Given that some of these factors may not be orthogonal to present levels of misappropriation, the results of this exercise should be considered as an estimation of how HRM may control corruption within governments that may already have a tendency towards higher levels of corruption. Studying corrupt-prone environments is increasingly interesting for academics and policymakers as studies have shown that many countries "have remained stuck in a high-corruption equilibrium" (Klašnja et al., 2018; Corbacho et al., 2016).

We use a set of 1,312 audits to municipal governments across Mexico that took place between 2014 and 2016 (34.1% from 2014, 33.2% from 2015, and 32.7% from 2016). Although audits include information on a number of domains, for this study we focus on the amount of money found to be misappropriated (as proportion of the total audited), the (mismanaged) fund, and year of audit.

In total, audits correspond to 544 different municipalities (about 22% of the total number). The Fund for Municipal Social Infrastructure (FAIS), the Fund of Contributions for Strengthening of Municipalities and the Territorial Demarcations of the Federal District (FORTAMUNDF), and the Fund of Subsidies for Municipalities that Perform Public Safety Functions (FASP-FORTASEG) represent more than 87% of audits. These are the most sizeable federal funds entrusted to municipal authorities in Mexico (Merino, 2007; Porras Sánchez, 2016). Other audited funds are the Fund for Sports Infrastructure, Fund for Paving, Sport Spaces, Public Lighting and Rehabilitation of Educational Infrastructure, and the Cultural Fund.

Mean misappropriation in all funds was 321 USD (for 2019), within a range from 0 to 26,300 USD. In about 40% of audits, ASF reported misappropriation. However, only in 1% misappropriation amounted to 5,300 USD or more. It should be noted that a given municipal government could have been found to misappropriate funds in only one audit, several or none. In our statistical analysis we used a normalized score of misappropriation as proportion of the total audited. As seen in Fig. 1, there is large variation in this variable across municipalities (panel a), and the 31 Mexican states (panel b). According to Bliese (2000) interpretation of intraclass

correlation coefficients (ICC), about 57% of the observed variance in misappropriation can be attributed to municipal differences, whereas ~9% can be explained by state differences. In both cases, ICC scores (0.77 and 0.81, respectively) indicate that municipalities and states can be reliably differentiated in terms of our standardized measurement of misappropriation.

[Figure 1 about here]

Municipal HRM policies

Data on HRM policies of municipal governments, as well as control variables from the local context were gathered from databases of the National Statistics Institute of Mexico (INEGI). Data on HRM were obtained from two waves of the National Municipal and Local Government Census (2013 and 2015). Although phrasing of some of the modules in each wave of the Census has changed over time, the measurements used in this study remained largely unaltered for the studied period. Control variables regarding local contextual characteristics for the period 2014-2016 come from the National Census, as well as public databases of INEGI, CONEVAL (National Council for Social Policy Evaluation), and local electoral authorities.

We used eight variables to capture HRM differences across municipal governments. First, to measure merit-based recruitment, we identified whether a municipal government had a civil service based on meritocratic recruitment of public employees. Specifically, we measured whether recruitment and hiring are done via formal (and public) examinations (*meritocratic recruitment*). Only about 27% of municipalities had meritocratic, examination-based hiring in the studied period.

Second, internal control and evaluations were measured with three dummies. The first one (*performance evaluation*) indicates whether a government implemented regular performance evaluations of its personnel. The second one (*organizational evaluation*) indicates whether a municipal government had a program of bureaucratic or departmental evaluation and modernization. Finally, the variable *Internal comptroller* indicates whether a municipality had an internal comptroller office, independent from state and federal auditing institutions. Although the majority of municipal governments have some form of internal comptroller (81%), the use of performance and organizational evaluations is far more limited (only 33% and 35% of municipalities, respectively).

Third, employment protection and probability of arbitrary dismissal were measured with two variables. The first one is unionized personal, a type of worker that has stronger protections against dismissal and discretionary severance. The second variable indicates the proportion of political appointments in the payroll. Although political appointments tend to locate at the upper (managerial) echelons, they can also be dismissed easier. In fact, Mexican municipalities typically exhibit high rates of turnover, especially at the top of the administrative hierarchy (Porras Sanchez, 2016).

Finally, to capture the structure of remunerations, we computed two variables. *Payroll dispersion* measures the distance between the highest and the lowest earning official as number of payroll levels between one and the other. There are 7 levels possible, ranging from level 1 (0-1000 MXN monthly salary) to level 7 (50,000+ MXN monthly salary). Higher values in this variable indicate a wider differentiation of salary ranks among public employees. *Salary inequality* is the Gini coefficient of the municipal payroll. It is a measurement of the distribution and concentration of income among employees of a given municipality.

Control variables

In addition, we included several variables to control for probability of corruption at the municipal level: municipal population (in log scale), municipal socioeconomic marginalization index score, economic growth (seasonally adjusted), as well as raw percentages of the population that are migrant, catholic or indigenous. We also incorporated two dummies to indicate whether an audit happened during electoral year or the year before elections.

Matching

As stated above, there are some concerns about endogeneity between misappropriation and HRM factors. Given that bureaucratic and institutional features that serve as explanatory and control variables are not randomly assigned, it could be the case that municipal governments with better administrative capacities or in more favorable economic/institutional conditions had lower levels of corruption (misappropriation) to begin with. To partially address these concerns, we used a matching procedure with propensity scores (Caliendo & Kopeinig, 2018).

We matched cases (with and without misappropriation) based on municipal bureaucratic characteristics and controls using Nearest Neighbor Matching (NNM). To approximate the assumption of ignorable treatment assignment (Stuart, 2010), we included all covariates under study in the matching procedure. This resulted in the exclusion of 44 audits and 8 municipalities from the original dataset (see Annex). Although matching does not eliminate all endogeneity concerns —given that unobserved factors might still affect both misappropriation and the effectiveness of HRM policies—, it does produce a more balanced dataset and reduces bias. The rest of the analysis was conducted with the matched data. A summary of all variables under study is shown in Table 1.

[Table 1 about here]

Bivariate correlations and method

As shown in Table 2, we find that HRM policies are correlated in the sample. First, there is a strong correlation between meritocratic recruitment and the use of personnel performance evaluations, suggesting that Mexican municipalities tend to implement these policies in tandem. Second, as expected, our two remuneration measurements are correlated. In particular, higher payroll dispersion positively correlates with higher salary inequality. This implies that these variables should be treated independently. Third, there are some moderate correlations among employment protection variables (% unionized and % political appointments) and other HRM variables. This suggest that having a higher proportion of unionized public employees (with stronger dismissal protections) relates to less political appointees, wider payroll dispersion, the use of performance evaluations, and the existence of an internal comptroller.

Bivariate correlations suggest that HRM policies appear, in the case of Mexican municipalities, in "typical bundles" (e.g., meritocratic recruitment and performance evaluation, or a wider and unequal payroll). However, given the structure of correlations, it also appears that municipal governments retain large variation in the actual use of different HRM policies.

[Table 2 about here]

To investigate our hypotheses, we performed multilevel regression analyses from N=1,268 audits in the 536 municipalities in the dataset. We use this type of analysis because data have a hierarchic structure: audits (level 1, N=1,268) are nested in municipalities (level 2, N=536), which in turn are nested in states (level 3, N=31). In multilevel analysis, residual variance is partitioned into different components (or levels). This is useful because higher-level residuals (municipal and state effects) represent (un)observed characteristics that could affect misappropriation. In other words, accounting for both municipal and state effects could be informative because, as pointed out before, Mexican municipal governments must comply with state regulations, which in some cases include rules for organizing municipal administrations. Thus, we studied data with and without random effects on level 3 as described below.

Results

Our multilevel analysis shows that, as expected, HRM correlates with misappropriation of public funds. The random intercept-only model (model 1) demonstrates that using multilevel analysis is adequate for these data. Specifically, the difference between the –2 log likelihood value for Model 1 with random intercept and a simpler linear model with no mixed effects (357.86) is significant.

[Table 3 about here]

When we allowed the intercept to randomly vary across municipalities, and audit characteristics are included (model 2), municipal HRM predictors, as well as control variables, the specification accounts for ~66% of observed variance in the response variable (cf. Nakagawa & Schielzeth, 2013). In this two-level model, we found that merit-based recruitment does not have statistically significant effect on misappropriation, although it has the hypothesized negative effect. With regard to internal control and evaluation, we found that having regular personnel performance evaluations has a negative and significant effect on misappropriation. This is evidence that supports Hypothesis 2, in that performance evaluations correlate with lower misappropriation in our data. Having an internal comptroller or a program of organizational evaluation does not yield statistically significant effects in this model.

No significant effects were found for the proportion of unionized personnel or the proportion of political appointments in the two-level model.

In line with Hypothesis 4, we found that larger income inequality (measured as the Gini coefficient of the municipal payroll) has a positive and significant effect on misappropriation. However, the CI for the corresponding beta in the regression model crosses zero. A wider payroll dispersion between the lowest and the highest earning official has a negative effect on the response variable.

Regarding audit characteristics, we found a positive effect of "Other" types of fund. This means that in our matched sample, it is more likely to find misappropriated money in smaller and more discretionary funds, than in larger but also more regulated federal funds such as FAIS or FORTAMUNDF.

Finally, municipal controls show few significant effects. However, two are particularly noteworthy: the dummies for electoral year and year before a local election correlate positively and significantly with misappropriation. We believe these indicate that we are not merely observing administrative inefficiency. Given that clientelism and patronage remain pervasive in

elections in Mexico (Morris, 2009), it is more likely that public funds go missing during electoral years and thus this seems a strong indication that the dependent is in fact capturing corruption.

We then proceed to incorporate random variance at level 3 (states). This improved model fit, as compared to the model with only two levels (–2 log likelihood value difference = 91.46, p < 0.001), and increased explained variance in the outcome variable to about 72%. However, given that we do not have specific hypotheses at level 3, we did not include fixed effects at the state level and only focus on the effects of municipal predictors.

Hypothesis 1 established that merit-based recruitment correlates with lower corruption. We found supporting evidence in model 3: There is a negative and significant effect on misappropriation of having a professional civil service with meritocratic (exam-based) recruitment.

We also found evidence in support of Hypothesis 2. Specifically, there are negative effects of performance evaluation of personnel and having organizational evaluations. However, in this last case, the corresponding 95% confidence interval crosses zero. As in Model 2, having an internal comptroller office does not have a statistically significant effect.

As before, no significant effects are detected for the proportion of unionized personnel or of political appointments in the three-level model. Again, we found evidence of a positive effect on misappropriation of salary inequality and a negative effect of payroll dispersion. Finally, most the effects of audit characteristics, as well as the effects of municipal control variables remain as before.

Given the structure of correlations among HRM variables (see above), we also report alternative specifications of the three-level model (Table 4). We found, as expected, that the effect of meritocratic recruitment and performance evaluations will hold even when either one is omitted (models 4 and 5). Further, the effect of payroll dispersion disappears when salary inequality is not included (model 7).

[Table 4 about here]

Overall, results show that while merit-based recruitment does correlate negatively with corruption (as discussed also, e.g., by Dahlström et al., 2012), other HRM policies are also significantly related to less misappropriation. Performance evaluations, as well as organizational and departmental evaluations aimed at improving bureaucratic performance and processes of the municipal administration could be deterrents of corruption.

Furthermore, having a greater proportion of unionized personnel (and therefore with greater job security and stability) does not correlate significantly with less corruption in our data. Nor having a greater proportion of political-appointees (who can be dismissed at any time in the Mexican system). These two results suggest that job stability and the probability of dismissal, by themselves, do not necessarily limit this form of corruption, or at least they have a limited effect when controlling by other HRM variables such as meritocratic recruitment and the structure of remuneration.

Regarding this last aspect, our analysis offers evidence that greater inequality in the payroll of the local government (i.e., a concentration of higher salaries in fewer public employees) does correlate with a more misappropriation. Thus, results suggest that concrete features of remuneration management and specifically the unequal concentration of intra-organizational benefits could have consequences on the probability of corruption.

Conclusion

Recent analyses of corruption have implied that the principal-agent approach is outdated and that collective action is needed to better understand how corruption happens (Bo and Rothstein, 2011; Prasad et al 2018). However, our findings seem to show that the principal-agent approach may still have some value because public servants are at the frontline of decision making when it comes to determining whether to behave ethically or not.

This implies that we need a deeper understanding of corruption at the micro-level and its relation to administrative practices and structures. Indeed, evidence shows that, even in developed countries, corruption control has been far from accomplished (Cheol & Mikesell, 2014; Svara, 2014; Perry et al., 2014; Teachout, 2014), and that developing nations have been capable of reducing corruption in some local governments but not in others (Langbein & Sanabria, 2013). Studying public HRM in countries like Mexico could result in more practical knowledge that allow us to better understand when public employees hold a more ethical behavior.

Based on previous contributions by Meyer-Sahling & Mikkelsen (2016) and Berman (2015), the present study posed that HRM policies can be an important antecedent of corruption control at the local level. We studied four core HRM functions (recruitment, control and evaluation, employee protection and dismissal, and remuneration) and looked into which ones influenced the capacity of a municipal bureaucracy to limit corruption most effectively. We conclude that meritocratic recruitment, performance and organizational evaluations, as well as less unequal wage structures seem related to a lower probability of public funds misappropriation. Thus, local governments could prevent or reduce misappropriation by adopting HRM policies like exam-based hiring tied with regular personnel and departmental evaluations. These HRM policies might be more effective than establishing (often expensive) internal comptrollers.

Three potential limitations of our study need to be addressed. First, our study was conducted in Mexico which begs the question of generalizability. Experience-based measures of corruption tend to classify Mexico as a country with more corruption than average. While in Latin America 21% of individuals have given a bribe to public officials, in Mexico 34% had done so (GCB, 2019). This is also higher than the worldwide average (27%) (GCB, 2017). Mexico also has important variation in corruption levels at the subnational level, with the most corrupt state (Ciudad de Mexico; 20,093 cases of corruption per 100,000 contacts with the authority) being 1.2 times more prone to bribery than the least one (Guanajuato; 9,577 per 100,000) (ENCIG 2017). In our own dataset, differences between municipalities are also strong. While some municipalities misappropriated 100% of the audited budget, others spent all the money following the rules.

Though Mexican municipal governments share features of some Continental and Latin American cases, they differ from highly decentralized Anglo-Saxon models. Further comparative investigation is needed to truly disentangle regional variations and the effects of different legal and administrative traditions. Future studies could also build on a multilevel design to study variation across local governments of different countries. However, in this case, research will likely face the challenge of comparable and reliable microdata on misappropriation and on HRM policies.

Second, this study focuses on misappropriation. Yet, other forms of corruption could be related to different HRM policies and practices. For instance, influence peddling or conflict of interest could be related to a higher number of political appointees in the municipal administration.

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Identifying and studying the connections between HRM policies and different forms of corruption constitutes an interesting and promising research avenue.

Third, since we wanted to study the combined and comparative effect of HRM variables, we used rather coarse-grained measurements in some cases (e.g., the existence of meritocratic recruitment). This was also the consequence of data availability. Admittedly, much variation could exist among concrete policies in a specific domain. For instance, merit-based recruitment could resource to different types of examinations or performance evaluations could be implemented in varied ways. Implementation variations and their effect on corruption could be further studied in the future.

Notwithstanding these limitations, this study does offer new evidence based on registry and census data that HRM correlates with the likelihood of corruption in local governments. It also yields evidence that concrete policies could be more effective in preventing corruption, such as merit-based recruitment, performance and organizational evaluations, as well as payroll management. These results constitute important lessons that, in some cases, confirm previous findings in the literature, and in others further our understating of the organizational and managerial antecedents of corruption among subnational public administrations.

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Tables

Table 1 — Description of variables

Variable	Mean	SD	Minimum	Maximum
Misappropriation (dep.)	0.00	1.00	–0.45	4.39
Fund[†]	1.79	1.09	1	4
Year[‡]	1.99	0.82	1	3
Merit-based recruitment	0.27	—	0	1
Performance evaluation	0.33	—	0	1
Organizational evaluation	0.35	—	0	1
Internal comptroller	0.81	—	0	1
% Unionized	0.27	0.23	0	1
% Political appointments	0.53	0.32	0	1
Payroll dispersion	3.51	1.81	0	6
Salary inequality (centered)	0.00	0.08	–0.12	0.31
Electoral year	0.28	—	0	1
Year before election	0.37	—	0	1
Pop (log)	11.59	1.35	7.03	14.39
Marginalization	–0.42	1.21	–2.21	5.14
Growth	0.03	0.03	–0.07	0.13
% Migrants	12.68	12.57	0	67.69
% Catholics	71.40	13.02	16	100.00
% Indigenous	14.40	24.07	0	93.49

NOTES:
† FAIS = 1 (60.06%), FORTAMUNDF = 2 (14.71%), FASP-FORTASEG = 3 (12.65%), Other = 4 (12.58%)
‡ 2014 = 1 (34.15%), 2015 = 2 (33.15%), 2016 = 3 (32.70%)

Table 2 — Bivariate correlations (municipal HRM practices and policies)

Variable	9.	8.	7.	6.	5.	4.	3.	2.
1. Misappropriation (dep.)	–0.01	0.10*	0.04	–0.09*	–0.11*	–0.11*	–0.16*	–0.17*
2. Merit-based recruitment	0.10*	0.21*	–0.18*	0.22*	0.15*	0.15*	0.76*	—
3. Performance evaluation	0.13*	0.26*	–0.21*	0.23*	0.19*	0.16*	—	
4. Organizational evaluation	0.11*	0.12*	–0.03	0.09*	0.20*	—		
5. Internal comptroller	0.22*	0.29*	–0.10*	0.22*	—			
6. % Unionized	0.12*	0.29*	–0.61*	—				
7. % Political appointments	–0.05	–0.16*	—					
8. Payroll dispersion	0.74*	—						
9. Salary inequality	—							

NOTES:

Sig. code: * $p < 0.05$

Table 3 — Multilevel regression analysis on misappropriation

	Model 1		Model 2		Model 3	
	β	SE	β	SE	β	SE
Municipal HR practices and policies						
Merit-based recruitment			−0.11	0.10	−0.18*	0.10
Internal control and evaluations						
Performance evaluation			−0.23**	0.10	−0.26**	0.10
Organizational evaluation			−0.07	0.06	−0.10*	0.06
Internal comptroller			−0.04	0.08	−0.06	0.08
Employment protection and probability of dismissal						
% Unionized			−0.06	0.19	0.12	0.19
% Political appointments			−0.13	0.12	−0.02	0.12
Unequal structure of remunerations						
Payroll dispersion			−0.07**	0.03	−0.08***	0.03
Salary inequality (centered)			0.96*	0.59	2.15***	0.59
Controls						
Electoral year			0.56***	0.07	0.46***	0.07
Year before election			0.19***	0.06	0.15**	0.06
Pop (log)			0.01	0.03	−0.05	0.04
Marginalization			0.14**	0.05	0.07	0.06
Growth			−1.30	1.08	−0.95	1.11
% Migrants			0.003	0.003	0.005	0.004
% Catholics			−0.0004	0.003	0.006	0.004
% Indigenous			−0.003	0.002	−0.005*	0.002
Constant	0.02	0.07	0.25	0.45	0.40	0.56
Audit characteristics						
Fund†						
FORTAMUNDF			−0.08	0.06	−0.07	0.06
FASP-FORTASEG			−0.02	0.06	−0.01	0.06
Other			0.16**	0.07	0.13*	0.06
Year‡						
2015			0.003	0.06	0.04	0.05
2016			0.19***	0.06	0.19***	0.06
Variance		SD		SD		SD
State	0.10	0.32	—	—	0.12	0.35
Municipality	0.64	0.81	0.64	0.80	0.61	0.78
Audit	0.39	0.63	0.39	0.62	0.34	0.58
R^2 (fixed and random)			0.66		0.72	
Log likelihood	−1,636.48		−1,618.32		−1,572.58	

Notes:
† Reference: FAIS
‡ Reference: 2014
Sig. codes: * p < 0.1, ** p < 0.05, *** p < 0.01

Table 4 — Multilevel regression analysis on misappropriation (three-level model specifications)

	Model 4		Model 5		Model 6		Model 7	
	β	SE	β	SE	β	SE	β	SE
Municipal HR practices and policies								
Merit-based recruitment	–0.34***	0.07	—	—	–0.35***	0.08	–0.36***	0.08
Internal control and evaluations								
Performance evaluation	—	—	–0.37***	0.07	—	—	—	—
Organizational evaluation	–0.10*	0.06	–0.11*	0.06	–0.09	0.06	–0.09	0.06
Internal comptroller	–0.08	0.08	–0.05	0.08	–0.08	0.08	–0.07	0.08
Employment protection and probability of dismissal								
% Unionized	0.18	0.19	0.08	0.19	0.15	0.19	0.12	0.19
% Political appointments	–0.01	0.12	–0.02	0.12	–0.02	0.12	–0.02	0.12
Unequal structure of remunerations								
Payroll dispersion	–0.08***	0.03	–0.08**	0.03	—	—	–0.003	0.02
Salary inequality (centered)	2.07***	0.59	2.25***	0.59	0.99**	0.41	—	—
Controls								
Electoral year	0.47***	0.07	0.46***	0.07	0.49***	0.07	0.51***	0.07
Year before election	0.16**	0.06	0.15**	0.06	0.17**	0.06	0.19***	0.06
Pop (log)	–0.06	0.04	–0.06	0.04	–0.09**	0.04	–0.07	0.04
Marginalization	0.07	0.06	0.07	0.06	0.08	0.06	0.08	0.05
Growth	–0.91	1.11	–0.96	1.12	–0.92	1.12	–1.03	1.12
% Migrants	0.005	0.004	0.005	0.004	0.005	0.004	0.005	0.004
% Catholics	0.005	0.004	0.006	0.004	0.006	0.004	0.006	0.004
% Indigenous	–0.005*	0.002	–0.005*	0.002	–0.004*	0.002	–0.005*	0.002
Constant	0.54	0.55	0.44	0.56	0.54	0.56	0.33	0.56
Audit characteristics								
Fund†								
FORTAMUNDF	–0.07	0.06	–0.08	0.06	–0.08	0.06	–0.08	0.06
FASP-FORTASEG	–0.01	0.06	–0.02	0.06	–0.02	0.06	–0.02	0.06
Other	0.13*	0.06	0.12*	0.07	0.13**	0.06	0.14**	0.06
Year‡								
2015	0.04	0.05	0.07	0.06	0.03	0.05	0.03	0.05
2016	0.19***	0.06	0.18***	0.06	0.17***	0.05	0.18***	0.05
Variance		SD		SD		SD		SD
State	0.11	0.34	0.12	0.35	0.12	0.34	0.11	0.33
Municipality	0.60	0.77	0.61	0.78	0.60	0.78	0.60	0.77
Audit	0.34	0.58	0.34	0.59	0.34	0.59	0.35	0.59
R^2 (fixed and random)	0.71		0.72		0.71		0.70	
Log likelihood	–1,574.40		–1,572.78		–1,575.12		–1,580.83	

Notes:
† Reference: FAIS
‡ Reference: 2014
Sig. codes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure legend

Fig. 1 — *Group average scores and 95% CI of misappropriation (normalized) across municipalities (a) and states (b)*

Annex

Comparison before and after matching, by outcome (misappropriation)

	Before matching			After matching		
	No misappro-priation	*With misappro-priation*	*p*	*No misappro-priation*	*With misappro-priation*	*p*
Merit-based recruitment	0.28 (0.45)	0.26 (0.44)	0.44	0.28 (0.45)	0.27 (0.44)	0.49
Performance evaluation	0.34 (0.47)	0.32 (0.47)	0.42	0.34 (0.47)	0.32 (0.47)	0.40
Organizational evaluation	0.36 (0.48)	0.34 (0.47)	0.48	0.36 (0.48)	0.34 (0.47)	0.48
Internal comptroller	0.79 (0.41)	0.82 (0.38)	0.08	0.79 (0.41)	0.83 (0.38)	0.06
% Unionized	0.25 (0.23)	0.29 (0.23)	0.01	0.25 (0.23)	0.29 (0.23)	0.01
% Political appointments	0.55 (0.32)	0.51 (0.32)	0.03	0.55 (0.32)	0.51 (0.32)	0.01
Payroll dispersion	3.38 (1.79)	3.62 (1.74)	0.01	3.38 (1.79)	3.66 (1.73)	0.01
Salary inequality	−0.00 (0.08)	0.00 (0.08)	0.24	−0.00 (0.08)	0.00 (0.08)	0.17
Electoral year	0.16 (0.37)	0.39 (0.49)	<0.001	0.16 (0.37)	0.40 (0.49)	<0.001
Year before election	0.39 (0.49)	0.35 (0.48)	0.08	0.39 (0.49)	0.36 (0.48)	0.18
Pop (log)	11.45 (1.35)	11.69 (1.35)	<0.001	11.45 (1.35)	11.53 (1.34)	<0.001
Marginalization	−0.47 (1.18)	−0.39 (1.25)	0.24	−0.47 (1.18)	−0.37 (1.26)	0.17
Growth	0.03 (0.02)	0.03 (0.03)	0.17	0.03 (0.02)	0.03 (0.03)	0.17
% Migrants	12.13 (12.10)	13.07 (12.69)	0.17	12.13 (12.10)	13.23 (12.82)	0.12
% Catholics	71.96 (12.50)	70.99 (13.49)	0.18	71.96 (12.50)	70.84 (13.63)	0.13
% Indigenous	13.04 (23.01)	15.30 (25.24)	0.09	13.04 (23.01)	15.76 (25.50)	0.05
N	634*	654		634	634	

NOTES:
For each variable, mean and (SD) are reported, as well as p-value of the test of differences in means.
*24 additional audits were excluded due to information incompleteness.