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Working Paper 002 -2025

Bringing Rigour and Evidence to Economic Policy Making in Africa

AFRICAN ECONOMIC RESEARCH CONSORTIUM

CONSORTIUM POUR LA RECHERCHE ÉCONOMIQUE EN AFRIQUE

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AERC Working Paper 002-2025
African Economic Research Consortium, Nairobi
May 2025

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are, however, those of the author and do not necessarily reflect the views of the Consortium, its individual members, or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 – City Square
Nairobi 00200, Kenya

Acknowledgement

We are grateful to African Economic Research Consortium (AERC) for its support for this paper under the grant number RT21512. We wish to thank Victor Murinde, Issouf Soumare, Amadou Sy, Sydney Chauwa, Joseph Ajefu, and all the participants of the 56^{th} (2021), 57^{th} (2022), and 58^{th} (2023) AERC Bi-annual workshops for their useful comments.

Abstract

This paper provides an in-depth analysis of the impact of payroll system reform on the likelihood that a civil servant (state agent) will experience intra-civil service corruption in the Democratic Republic of Congo (DRC). As part of a broader Public Administration Reform and Rejuvenation Project (PARRP) launched in 2011, a direct payroll system was introduced, replacing the previous practice of civil servants receiving their salaries in cash, by hand, from superiors or accountants, a process prone to various forms of abuse. Using a comprehensive and representative dataset obtained through the PARRP project, we first document a significant prevalence of corruption within the civil service in the pre-reform/pre-compliance period, with approximately 36% of civil servants reporting incidents of pay-related misconduct. Using access to financial services across provinces as a source of exogenous variation, we find that the reform reduced the probability of experiencing any form of pay-related misconduct by more than a third. Moreover, this deterrent effect is stronger in sectors characterized by an initially high prevalence of wage misconduct, where compliance with the reform led to a reduction in the probability of being a victim of wage misconduct of around 51%. These findings underscore the critical importance of considering corruption within the civil service when designing anti-corruption policies. This dimension has been largely neglected in existing policies, which have focused primarily on tackling corruption between state actors and public service users.

Keywords: Corruption; Civil servant; Payroll reform; DRC; Effectiveness.

JEL codes: D73, J28.

1. Introduction

In recent decades, the issue of public sector corruption has become a critical concern, particularly within the context of developing countries given its higher prevalence. An extensive body of literature has documented the social and economic costs of corruption. This is particularly true in the case of public sector corruption, where public agents responsible for providing public services impose conditions on access or speed of service delivery through bribery or other illicit forms of compensation (Ahmad et al., 2010; Alam, 1990; Ugur and Dasgupta, 2011). In other words, public agents act as perpetrators, whereas public service users bear the burden. The existing literature identifies the key drivers of such a phenomenon including the nature of bureaucracy(Tanzi and Davoodi, 1998), government size(Goel and Nelson, 2010), and low wages(Tanzi and Davoodi, 1998), among others. To handle this threat, policymakers must design anti-corruption policies. A recent body of literature, exploiting quasi-natural experiments, examines the effectiveness of such anti-corruption policies in some developing countries, such as Kagzasthan (Oka, 2013), Pakistan (Banuri and Eckel, 2015), and India(Banerjee and Duflo, 2006). These anti-corruption policies include rewards and penalties[1], monitoring[2], restructuring bureaucracy[3], as well as screening and recruiting[4]. While shedding light on the potential effectiveness of anti-corruption policies, this literature predominantly focuses on corruption dynamics between public service providers and users. However, this literature disregards an important aspect of the

[1] Reward integrity and penalize illicit behaviors. This targets extrinsic and intrinsic incentives for corrupt acts and wants to alter them(Lindkvist, 2013; Kwon, 2014; Van Veldhuizen, 2013; Becker and Stigler, 1974; Abbink et al., 2002).

[2] This includes top-down monitoring, and bottom-up civil society monitoring (Serra, 2012; Banuri and Eckel, 2015; Armantier and Boly, 2011; Di Tella and Franceschelli, 2011; Bobonis et al., 2016; Olken, 2007; Véron et al., 2006; MUÑOZ, 2014; Moyo, 2014).

[3] The bureaucratic structure in which civil servants work affects their incentive to engage in corrupt acts. So decentralization, bureaucratic competition, and staff rotation should have a deterring effect (Gans-Morse et al., 2018; Shleifer and Vishny, 1993; Treisman, 2000, 2007; Olken and Barron, 2009; Ryvkin and Serra, 2019)

[4] Meritocratic based recruitment policies will bring skilled civil servants with moral values Gans-Morse et al. (2018) list comparative case studies that have emphasized the role played by meritocratic recruitment in reducing corruption (Freedman, 1988; Hamilton, 2002; E. and Evans, 2000; Dahlström et al., 2012; Barfort et al., 2015).

phenomenon that we refer to as “intra-civil corruption”. We are no longer talking about public agents bribing public service users, but about public agents being bribed by other public agents. The existence of this form of corruption is likely, as far as disregarded, to jeopardize the potential gains from the traditional anti-corruption policies listed above. It could be the case that intra-civil servant corruption acts as a driving force behind the traditional, well-documented form of corruption. This form of corruption involves some civil servants acting as perpetrators and others as victims, with varying degrees of consent. The intuition is that public servants who are themselves bribed by their superiors, are more inclined to bribe public service users, aiming to offset the burden they endure within their services.

The contribution of our paper is two twofold: (*i*) First, we elucidate and bring to the forefront the existence and extent of corruption among civil servants (intra-civil servant corruption). (*ii*) Second, we discuss the connection between intra-civil servant corruption, corruption between civil servants and public service users, and the efficacy of anti-corruption policies. We argue that the effectiveness of anti-corruption policies, traditionally designed to curb corrupt practices between public officials and users of public services, is contingent upon addressing intra-civil servant corruption. This aspect potentially plays a pivotal role in the sense that abused civil servants, those who are victims of corruption within the public sector, are less likely to respond favorably to anti-corruption measures and policies in contrast to their non-abused counterparts. Corruption in the DRC has deep historical roots, dating back to the mid-1960s when the country’s national heritage was often appropriated for personal gain (Tedika, 2013; Kodi, 2008). The pervasiveness of corruption in the DRC has resulted in the development of an entire vocabulary around it, leading to its acceptance and normalization (Kodi, 2008; Blundo et al., 2008). From an international perspective, the DRC ranks among the most corrupt countries in the world. According to Transparency International, in 2021, the DRC was ranked 169^{th} out of 180 countries as per corruption intensity (Transparency International, 2023). This corruption takes two forms. First, there is "great corruption," which is institutionalized and practiced at the highest levels of the state, where senior officials embezzle state funds, among others for political purposes (Jacquemot, 2010). Second, the "small corruption", which is experienced daily by the population. Small corruption is well captured by the Congolese expression "Article 15", symbolizing resourcefulness and clientelism. Acting as one form of small corruption, "intra-civil servant

corruption" in the DRC has persisted and even intensified due to the country's tumultuous history, marked by successive conflicts. These conflicts have engendered significant infrastructural shortcomings, including limited access to banking and financial services across regions. As a result, the responsibility of distributing salaries to most state employees was entrusted to public accountants appointed by the Ministry of Budget. These accountants were placed under the authority of superiors in different ministerial departments (Kabungu et al., 2018). This arrangement has given rise to an original form of corruption and exploitation. This includes (*i*) superiors automatically deducting portions of their subordinates' salaries; (*ii*) civil servants being compelled to pay bribes; (*iii*) and instances of misappropriation. Employees who opposed these practices often faced forced transfers and various forms of harassment, as documented in the surveys conducted by the World Bank and PRRAP in 2016 and 2018. However, this form of corruption has received limited attention in existing literature.

To counter this issue, the DRC initiated a reform in 2011 designed to transition civil servants from manual payments to a bank-based system. This reform aimed to streamline salary payments, eliminate intermediaries, and ensure the timely disbursement of salaries. The question that emerges is whether this reform succeeds in curbing or, at the least, significantly deterring intra-civil servant corruption in the DRC. However, the capacity of such a reform to deter intra-civil servant corruption is not straightforward. Firstly, while it may reduce corruption on certain fronts, there is a possibility that corruption practices move to other areas (Yang, 2008). Moreover, the reform itself may not be sufficient to effectively deter this type of corruption. Despite receiving their salaries directly into their bank accounts, some civil servants may still choose to allocate a portion to their supervisors in exchange for favors or to avoid retaliation, considering the endemic and almost normalized nature of corruption in the DRC. Secondly, implementing the reform poses a range of complex technical challenges, such as ensuring internet/network connectivity or physical access to bank branches, depending on whether civil servants rely on mobile or traditional banking methods. This raises concerns that the effectiveness of the reform may be compromised unless all components are well-implemented (Kremer, 1993). Lastly, both of the aforementioned scenarios may coexist, resulting in an unclear effect of the reform. The underlying assumption is that civil servants' access to bank accounts will significantly reduce the exposure to abuses in place in the

pre-reform payroll system, as the reform ensures that superiors or public accountants no longer have direct control over their subordinates' salaries. Conversely, some civil servants might receive their salaries directly into their bank accounts but still choose to give a portion to their supervisors in exchange for favors or to avoid retaliation. These two conflicting mechanisms lead to an unclear effect of the reform such that its final impact depends on which of these channels is dominant.

Relying on a comprehensive and representative dataset collected from civil servants across 15 provinces of the DRC, we compare the exposure to diverse forms of abuse in the post-reform period to the exposure in the pre-reform period. As the speed of compliance with the reform is likely endogenous to access to financial services, the estimated effect using linear probability is potentially endogenous. To address endogeneity in the decision and speed at which civil servants open a bank account, we employ an instrumental variable approach. Specifically, we leverage the variation in nighttime light intensity before the compliance year as an exogenous predictor of the speed of compliance. The intuition is that the decision to comply with the reform and the speed at which this decision is taken is governed by access to financial services. The identifying assumption here is that exposure to corruption and province-level access to financial services are uncorrelated.

A descriptive analysis shows significant insights into corruption among civil servants. Among the state agents surveyed, those who did not comply with the treatment had a 28.5% higher proportion of intra-civil servant corruption compared to their counterparts who complied. Additionally, striking patterns emerge concerning the disparity in corruption exposure between compliers and non-compliers, particularly conditional on proximity to financial institutions in the provinces where civil servants are based. In Kinshasa, the treated group experiences 34.0% lower corruption exposure compared to the control group, while this difference decreases to 21.0% in non-Kinshasa provinces. Furthermore, in provinces with higher access to financial services, the treated group exhibits a 21.2% lower corruption exposure than non-compliers, whereas in provinces with lower access to financial services, this percentage is only 19.9%. These descriptive findings are confirmed by the econometric estimation of the treatment effect of this reform. Our main finding indicates that compliance with the reform significantly reduces the likelihood of intra-civil servant corruption by roughly 32%. More importantly, the effect is stronger in administrations exhibiting the highest pre-reform corruption (42%). These findings are robust across

econometric specifications. We then show that always-treated public agents did not experience any significant change in their exposure to corruption. This suggests that their exposure to corruption was already low, and the reform had minimal impact on their circumstances. In addition, civil servants who opened bank accounts after the implementation of the reform experienced a noteworthy 39% decline in the prevalence of corruption.

The remainder of the paper is organized as follows: Section 2 provides a concise overview of the payroll reform, detailing the transition from manual payment to a bank-based system for civil servants. Section 3 outlines the empirical methodology employed in our study, while Section 4 provides a comprehensive description of the data used and highlights some stylized facts. The results of our empirical investigations are presented, and further robustness checks are presented and discussed in Section 5. Finally, Section 6 concludes the paper, summarizing the key findings and implications.

From manual to bank-based payroll of the DRC civil servants: a brief background of the banking reform

The reform: milestones of its implementation

The payroll reform in the DRC's civil service originated from two Economic Programs of the DRC's Government (PEG I in 2003 and PEG II in 2010, with PEG standing for Programme Economique of the Government, in French). One of the primary objectives of these programs was to address the issue of salary arrears accumulation, which necessitated the prior harmonization of the civil service and state agents' payroll circuit. Before the implementation of banking remuneration for civil servants, the payroll system was plagued by several issues: the accumulation of salary arrears over several months, widespread wage evasion, multiplication of intermediaries in the payroll circuit, deductions from salaries at each step in the payment chain, missing bundles and poor quality of banknotes, lack of control over the number of individuals to be paid, and insufficient control over the payroll. The introduction of banking-based payments aimed to address these challenges and bring about a more efficient and transparent payroll system for civil servants in the DRC (Kilozo, 2019).

The reform was launched in 2011 by the DRC government with the creation of the Payroll Supervision Committee (CSP for Comité de Suivi de la Paie in French) through an inter-ministerial decree[5]. This committee was

[5] Source: *n°004 of February 09, 2011*

established to ensure the regular and timely payment of remuneration to the state personnel and is responsible for implementing the banking reform project. In November of the same year, the decree was revised[6] to strengthen the committee's missions based on the experience gained during the initial months of the banking system[7]. The implementation of the reform occurred gradually and can be described in stages based on information from Kilozo (2019), Kabungu et al. (2018), and Babs (2014). The banking system became effective in August 2011 to eventually cover nearly 900,000 individuals employed in public administration whose salaries would be paid through banks. Initially, the banking system began with six banks.

Step 1 –August 2011: the reform was initially launched in the province of Kinshasa where bank payment was provided for members of ministerial cabinets and general secretaries of the public administration. It covered at this stage about 2,444 civil servants.

Step 2 – September 2011 to March 2012: the implementation of the new payroll system includes the addition of approximately 26,000 executives from the public administration, specifically directors, heads of division, and heads of office, to the system.

Step 3 – July 2012 to September 2012: teachers, who constitute the most significant component of the public administration, have now been included in the new payroll system, previously handled by SECOPE[8]. In addition to teachers, civil and military magistrates have also been included. This represents approximately 141,000 new officials included in the banked payroll system.

Step 4 – October 2012 to December 2012: Progressive inclusion of elements from the armed forces and the national police. As of December 31, 93% of services paid by the public administration were banked. During the implementation phase, the number of compliers experienced a significant surge, increasing from approximately 2,500 in August 2011 to over 278,000 by the end of December 2012. This remarkable growth represents a more than a hundredfold increase in just 17 months.

Step 5 – October 2012: it was made possible to receive the salary via

[6] Source: *Nº. 299 bis CAB/MIN/FINANCES/2011, Nº. 051/CAB/MIN/BUDGT/2011 and Nº. 071/CAB/MIN/PUBLIC SERVICE/2011*

[7] Source : Kabungu et al. (2018)

[8] Service of Control and Payment of Teachers

Mobile Banking. This was first tested on a sample of 1,200 military personnel and then scaled up to all services and provinces.

By June 2013, the government announced the end of payroll reform. By that date, nearly 975,000 civil servants had already complied[9]. It is worth noting that compliance with the reform was progressive once the implementation started. Indeed, given that it wasn't binding for civil servants to open an account, the decision to comply with the treatment was most often delayed from the announcement date.

Unveiling the civil servant payroll system: How does it function?

In practice, the payment is made directly to the account of civil servants from the central administration. The procedure involves three stakeholders: first, the central administration through the Ministry of Finance. Second, the commercial banks and mobile money providers. Third, the civil servants. Fourth, a regulator named the Congolese Association of Banks. The Ministry of Finance provides money every month which serves two purposes. Firstly, the civil servants' salary per-se; and second, the account management fees for each civil servant that the central government has self-committed to pay each month[10]. The commercial banks receive the money that is then split into the individual accounts of civil servants and then in-form account holders via SMS. The civil servant expects the salary in the account in due time and due amount. This information dimension of commercial bank branches is critical because of the limited number of bank branches due to infrastructure shortages (Kongolo (2017)). Consequently, some civil servant are far away from bank services, making it not convenient to commute between their place of residence and the nearest bank branch without the certainty of money availability. As per mobile account, companies involved in the payment of civil servants are Vodacom with m-pesa mafalanga, Airtel with Airtel money, Tigo with Tigo-cash. Finally, the Congolese Association of Banks whose goal is to make sure that the central government's commitment to pay account management fees is respected.

In the first stage of the procedure mentioned above, the DRC government ensures commitment, liquidation, and authorization of

[9] newspaper Business and Finance Babs (2014)

[10] These fees represent $3.6 per month per account.

payment carried out by three ministries[11]. The Ministry of Civil Service is the initiator of the commitment of remuneration expenditures of civil servants. It prepares the lists of civil servants to be paid and transmits them to the Ministry of Budget who is the liquidator of the payroll. This ministry has drawn up a commitment voucher and transmitted it for authorization to the Ministry of Finance. This third ministry prepares and validates the monthly payment vouchers and the relevant salary amounts and transfers them electronically to the Central Bank of Congo via the public Treasury (Zirimwababagab, 2014). It is worth saying that all the transactions are made under the permanent control of the payroll supervision committee (CSP) which acts as a supervisor outside the operational circuit. The Payroll Supervision Committee (CSP) was created by inter-ministerial decree in 2011 when the reform was launched. Its main role is to monitor operations related to the remuneration of State personnel, reminding banks of their obligation to carry out payroll without delay and to transfer the remaining payroll to an account dedicated to this purpose.

The approach is such that civil servants are not obliged by the State to open a bank account to receive their salary. The approach consists of encouraging civil servants to have their salaries deposited in a bank. According to (Monitadila (2017)) The DRC government adopted a massive communication strategy and worked hard to disseminate information to the public about the objectives of the operation, its contours, and other important aspects. Thanks to the appropriate channels of information for mass communication, the population was increasing and better informed. To this communication strategy, the State associated a financial incentive mechanism that it set up in 2011. Indeed, the State had committed to paying each account maintenance fee at a rate of US$ 3.6 per civil servant. Considering the growing number of banked employees and the related burden in terms of remuneration, the government decided in 2012 to only pay the maintenance account for the category of employees receiving less than 92,000 Congolese francs i.e., approximately US $50. Soldiers and police officers were completely exempt from these charges. In 2016, thanks to the payroll supervision committee, this fee was reduced from US $3.6 to US $2.6.

[11] Circular No. 001/CAB/V.P.M/MIN/BUDGET/2013 of 25 February 2013 containing the instruments relating to the implementation of Finance Act No. 13/009 of 1 January 2013, p.16.

Before and after the reform: observed changes for the stakeholders: the case of the education sector

The transition to a bank-based system has streamlined the payroll circuit by reducing the number of intermediaries involved (Fig. 1). As described by Kabungu et al. (2018), prior to the reform, a multitude of participants complicated the process and created opportunities for the misappropriation of funds by those responsible for payment. This shift is exemplified in the education sector, where the number of intermediaries in the payroll circuit decreased from 6 before the reform to 2 afterward (1). In the pre-reform period, funds flowed from the ministry to the Central Bank of Congo, which then distributed them either to provincial delegates of the Ministry of Finance (for accessible areas) or to CARITAS Congo[12](for remote regions). In the former case, provincial delegates transferred funds to public accountants, who then facilitated payments to local school managers. These managers were tasked with disbursing funds to school principals, who in turn distributed them to teachers. In the latter scenario, CARITAS Congo routed funds through various Diocesan representatives to Caritas Parishes, ultimately reaching school principals responsible for teacher payments. In the post-reform period, the circuit is described in the second panel of Figure 1. In short, it shows how striking the reduction in the number of intermediaries has been due to the reform. Beyond the reduction of the number of intermediaries, the payroll reform could potentially impact the State, the civil servants, and the Congolese banking sector.

For the DRC's government: in addition to modernizing people/worker management, the banking reform makes it possible to reduce the wage bill by eliminating fictitious and ghost employees on the payroll as well as duplicates. Before the banking reform, the sums disbursed to pay non-existent employees were systematically misappropriated by intermediaries in charge of payroll (accountants, hierarchical superiors, etc.). After the reform, these non-diverted sums are transferred at the end of payroll operations to the general treasury in a sub-account named

[12] CARITAS is an organization responsible for disbursing payments to religious workers, primarily those within the Catholic community. Before the reform was implemented, the Congolese government collaborated with CARITAS Congo to facilitate the payment of public-school teachers residing in remote areas of the country. It's important to note that CARITAS's role was specifically focused on public school teachers and not extended to civil servants in other sectors or ministries.

"solde des salaires" (salary balance), according to the memorandum of understanding signed on December 1, 2012, between the Congolese Association of Banks and the government of the Republic of Congo. A visible impact of the reform is that the balance of this sub-account has remained positive and growing since the implementation of the reform. In billions of Congolese francs and for January of each year, this sub-account showed 3.37 in 2012; 10.03 in 2013; 16.03 in 2014; 35.42 in 2015, 73.81 in 2016; 98.34 in 2017 (Kabungu et al. (2018)), and 125.4 billion Congolese francs (CDF) as of February 5, 2019[13].

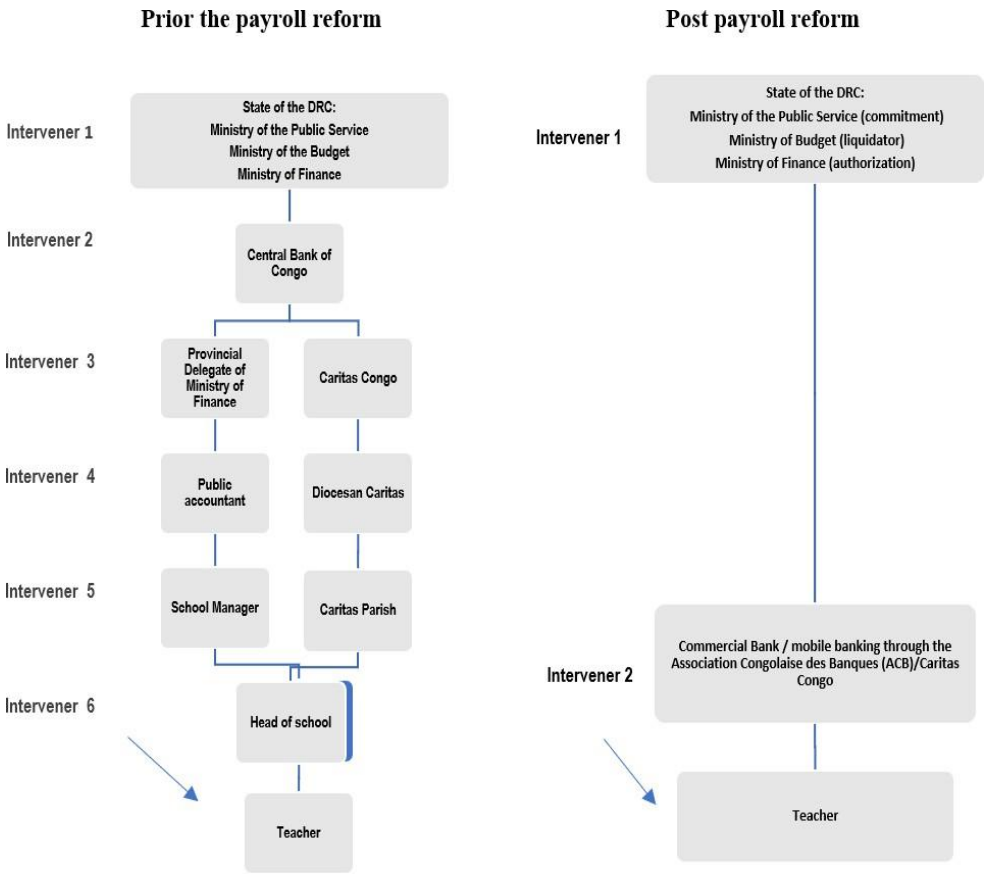
For civil servants: the advantage of banking is the security of their salary in the sense they receive their salary regularly and in full[14]. Another advantage is that civil servants have access to the various services and advantages of banking reform like interest-bearing savings thanks to bank intermediation and access to credit without the need for guarantees; the direct debit of their salary being largely sufficient for guarantees.

For banks: Banks and telecom operators are earning more related revenues with the support of the government, which has decided to remunerate their service with USD 3.6 per account. They have also benefited from tax breaks. The government is considering a new tariff to encourage them to expand into hard-to-reach areas. Bank penetration has led to an increase in deposits in commercial banks and, consequently, more credit to households and businesses.

[13] ZOOM Eco. Net.

[14] Bancarisation : le miracle congolais.

Figure 1: Number of intermediate before and after the reform for the education sector



2. Methodology

Linear probability model

Does receiving a salary through a personal bank account impact intra-civil servant corruption in the DRC? To find this out, our starting point is to estimate a simple linear probability model comparing the probability of experiencing any form of salary abuse in the post-compliance period and that same probability in the pre-compliance period. It is worth noting that we chose to capture the treatment based on the compliance year instead of the reform year because the compliance with the treatment was progressive in the sense that all state agents did not open a bank/ mobile account in 2011, the year of the reform. This suggests that the cut-off is individual-specific. Put differently, from 2011 onwards, the number of compliers increased year after year. Let T_{it} denotes the probability that

the civil servant *i* complies with the treatment in year *t*, and Y_{it} denotes the probability that the civil servant *i* is a victim of any form of salary abuse in year *t*.

$$Y_{it} = \alpha + \beta T_{it} + \delta_t + \eta_i + \epsilon_{it} \quad (1)$$

Where δ_t is the time-fixed effect common to all civil servants, η_i the individual fixed effects, and ϵ_{it} is the error term. The coefficient β is the effect of receiving salary through an individual bank/mobile account on the probability of experiencing any form of salary abuse. The implicit assumption made here is that compliers and non-compliers are perfect substitutes. However, if they differ either on non-observable characteristics or on individual specific and time-varying observable characteristics or both, then β will not be consistently estimated by Ordinary Least Squares (OLS). Nevertheless, given the structure of our specification, the only threat to identification will arise from individual specific time-varying factors (*it*) as any endogeneity that could arise from individual specific factors (*i*) and time-specific factors (*t*) are controlled for using the structure of our fixed effects.

Selection bias

To check if the civil servants who opened a bank account earlier (early compliers) are *ex-ante* identical to those who opened their bank/mobile account (late compliers), we estimate regressions of the form:

$$T_i = \alpha + X_i\lambda + \epsilon_i \quad (2)$$

Where X_i is a vector of civil servants' characteristics i , T_i is a dummy variable which is one if the civil servant is in a treatment group and zero if not. Civil servants' characteristics include demographic characteristics (age, gender, and language which is a proxy of ethnicity and religion) as well as the socio-professional status of the civil servant (channel to access to work in public administration, matriculation, rank, province, and ministry of affiliation clustered according to the intensity of corruption that prevails). Errors ϵ_i are assumed to be correlated within each group. The estimated coefficient λ represents pre-treatment differences between treatment and control groups. If this difference is statistically significant, this suggests that there is a systematic difference between compliers and noncompliers, then the estimated effect with the OLS described in the previous section will be biased.

Dealing with selection: insights from the instrumental variable approach

As mentioned in Section 3.1, endogeneity bias may arise from the

systematic difference between compliers and non-compliers making the comparison between the two groups non-consistent. Indeed, for the comparison to be consistent, the treatment group should be ex-ante identical to the control group. Although one argument in favor of this similarity between the two groups is that many compliers are former non-compliers given the time profile of entering the treatment, there are still the always treated in the sample. These are civil servants who already had a bank account before the reform took place. If we split the sample of treated in two groups, the always treated and the post-reform treated, then our estimated effect can be structured as follows: (1) the effect estimated on post-compliance treated is made of the comparison between each individual probability of experiencing salary abuse in the post-compliance period and that corresponding probability in the pre-compliance period. If the time is controlled for, then each individual after being treated is compared to himself before being treated. (2) The effect estimated on always treated is made of (1) to which an additional component endogenous to the decision to open a bank/mobile account way before the reform arises is added. In a nutshell, if always treated dominates the distribution, then OLS estimates might be biased if the selection is large. If post-reform compilers dominate the distribution, then, the selection effect would be marginal, and the OLS estimate would be consistent.

To completely rule out this concern, we rely on an instrumental variable approach to identify the causal effect of our treatment. To create exogenous variations, we exploit the difference in the time of entry into the treatment as explained by the difference in the accessibility to financial services. It is intuitive to think that more developed regions have higher access to financial services, as compared to less developed regions, making compliance with the reform bigger and quicker for those civil servants working and/or residing in more developed regions. Put differently, in richer regions, more civil servants quickly comply with the reform. By this process, the more developed the region is, the larger the number of early compliers will be. Our identifying assumption here is that being in a more developed region (province) is positively correlated with access to financial services, which in turn eases entry into the treatment. We argue that access to financial services is orthogonal to the intensity of intra-civil servant corruption. This is likely to be the case because abuse tends to be nationwide and/or sector wide. We proxy the level of development at the first administrative region level (province) by the night-time light intensity a year prior to compliance.

Thus, for our first stage analysis, we estimate the following equation:

$$T_{i,t} = \Gamma + \gamma nlight_{p,t-1} + \psi_t + \psi_p + \mu_{i,t} \quad (3)$$

Where T_{it} is the dummy variable indicating whether the civil servant i considered is treated at time t. $nlight_{p,t-1}$ is the night-time light intensity in province p (first administrative region) in the year prior the compliance $t-1$. ψ_t and ψ_p denote time and province fixed effects. The second stage can then be estimated as.

$$Y_{it} = \alpha + \beta \hat{T}_{it} + \delta_t + \eta_i + \epsilon_{it} \quad (4)$$

where $\hat{T}_{it}$ is the probability to be treated estimated using Eq. (3).

Robustness checks

One central concern when looking at our identification strategy is related to the fact that the civil servants who opened bank accounts before the reform took place (i.e., before 2011) and those who opened bank accounts in the post-reform era are pulled together in the same analysis. A potential issue would be that those with accounts before the reform took place systematically differ from those treated in the post-reform era. To check that our results are not led by the always treated, we split the sample into two categories representing each of the two groups.

$$Y_i^{pre} = \alpha + \beta_1 T_{it} + \delta_t + \eta_i + \epsilon_{it} \quad (5)$$

$$Y_i^{post} = \alpha + \beta_2 T_{it} + \delta_t + \eta_i + \epsilon_{it} \quad (6)$$

Where Y_i^{pre} is the outcome variable for civil servants whose bank accounts were opened before the reform took place. Y_i^{post} is the outcome variable for civil servants whose bank accounts were opened after the reform took place. β_1 and β_2 are the estimated effects of the reform for the two groups.

Heterogeneity checks

We also investigate whether the treatment effect is heterogeneous across treated units, we explicitly interact with the treatment indicator with some individual characteristics. These include demographic characteristics (age, educational attainment, gender, ethnicity, and religion); socio-professional status of the civil servant (channel through which- the civil servant got in the public administration, matriculation, rank, province, and ministry of affiliation clustered according to the intensity of corruption that prevails).

$$Y_{it} = \alpha + \beta T_{it} + \Phi T_{it} \times X_i + \delta_t + \eta_i + \varphi_{it} \quad (7)$$

Where X_i is the set of demographic and socio-professional characteristics.

Furthermore, as suggested by the descriptive statistics, Kinshasa is over-represented in the sample even though this over-representation features its size in the DRC's public employment. One may worry that Kinshasa might be driving the results. To account for this, we design a specification that consists of differentiating the effect of the reform in Kinshasa and the rest of the country. This is done through the following specifications:

$$Y_{it} = \alpha + \beta T_{it} + \Phi T_{it} \times Kinshasa_i + \delta_t + \eta_i + \varphi_{it} \quad (8)$$

Where $Kinshasa_i$ is a dummy variable that equals 1 if the individual is in Kinshasa and 0 otherwise.

3. Data and stylized facts

Data collection

The data was collected through interviews with civil servants in 15 DRC provinces. The dataset we use is made of 2,233 respondents. The data collection process experienced several interruptions mainly related to managerial constraints with the PRRAP's project. Thus, the survey started in 2016 in the provinces of Kinshasa and Kongo Central, and after a first interruption, the data collection was finalized in these two provinces in 2018. Then, another interruption occurred, and interviews resumed in 2020 in Sud Kivu, Nord Kivu, Kwilu, Équateur, and Lualaba provinces. In 2021, the survey took place in eight other provinces: Haut-Katanga, Haut-Lomami, Kasai, Kasai-Oriental, Kasaï-Central, Lomami, Sankuru, and Tanganyika.[15]

The civil servants interviewed were selected by a multi-stage random sampling technique. The sample of public servants was weighted to be representative at the national level. To achieve this, a 3-stage sampling strategy was implemented with stratification within each stage. The degrees and strata considered for the sampling are the following: Degree I was the duty station of the civil servant split into two strata: officials serving in Kinshasa *Vs.* officials serving in the other 25 provinces of the country. This was made to account for the fact that Kinshasa serves as the capital of the country and hosts the largest concentration of civil servants in

[15] To get rid of selection bias, we remove from our sample all the civil servants that joined the public service after the payroll reform took place such as to remain only with civil servants who experience both periods (before and after).

the country. Degree II was the rank of the official according to 3 strata. Stratum 1 includes command officers like Directors, Head of division, and heads of the office. Stratum 2 consists of collaborating officers, as well as clerical officers, and Stratum 3 includes executing officers, for example, administrative auxiliaries. Degree III was about the status of the respondent regarding whether he/she had a personal number in public administration (matricula) or not. At this level, civil servants are distinguished according to whether they are registered or not. It should be noted that in the DRC some officials in service and recognized as such, do not have a matricula and are referred to as “New Units". By making this distinction, the survey has made it possible to identify the specific characteristics of these different categories of officials.

Personal interviews were carried out with each civil servant on the side to guarantee confidentiality and true answers without fear of colleagues and superiors. A standardized questionnaire was used which covered a wide range of topics, such as (i) the profile of the civil servant interviewed including, matriculate status, grade, education, career, wage, and bonuses, (ii) the performance of the state agents and performance of the office where he is working for instance: incentive and punishment of agents, record keeping process in the office, patronage, corruption, (iii) civil service reforms including banking reform, administrative decentralization, (iv) the demographic, social, and economic characteristics of the respondent and the household to which he belongs, and (v) a part subject to taxation question, which was added to consider the special features in a decentralized administration.

Table 1: Sample characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Obs.	**Province (%)**	**Tertiary educ. (%)**	**Secondary educ. (%)**	**Mean Age**	**Commanders (%)**	**Collaborators (%)**	**Network (%)**	**Share men (%)**
Country	2,233	100.0	63.2	30.7	52.1	29.7	53.9	29.0	76.0
Equateur	70	3.1	41.4	37.1	56.7	18.6	50.0	40.0	77.1
Haut-Katanga	36	1.6	83.3	16.7	51.4	36.1	55.6	27.8	63.9
Haut-Lomami	38	1.7	47.4	50.0	53.2	36.8	39.5	18.4	89.5
Kasai	18	0.8	88.9	5.6	54.9	66.7	27.8	16.7	88.9

Kasai-Central	56	2.5	39.3	58.9	59.6	28.6	39.3	26.8	85.7
Kasai-Oriental	55	2.5	47.3	36.4	58.4	36.4	49.1	36.4	80.0
Kinshasa	1,372	61.4	70.1	25.5	50.7	29.2	58.3	27.3	72.7
Kongo-Central	250	11.2	40.0	47.6	53.6	22.8	49.2	27.2	80.4
Kwilu	40	1.8	65.0	32.5	52.3	40.0	40.0	25.0	90.0
Lomami	35	1.6	62.9	37.1	56.8	51.4	37.1	37.1	97.1
Lualaba	36	1.6	58.3	33.3	54.8	27.8	47.2	25.0	86.1
Nord-Kivu	79	3.5	70.9	22.8	50.9	36.7	48.1	41.8	84.8
Sankuru	28	1.3	60.7	39.3	50.8	28.6	67.9	28.6	78.6
Sud-Kivu	87	3.9	52.9	39.1	53.6	28.7	49.4	50.6	74.7
Tanganyika	33	1.5	60.6	33.3	52.0	39.4	30.3	15.2	75.8

Col (2) reports the relative size of each province covered in the sample. Cols (3) and (4) report the proportion of tertiary and secondary educated public agents i.e. the residual category is made of the proportion of civil servants with primary education or less. Cols. (6) and (7) also admit a residual category made of executors. Col. (8) reports the proportion of civil servants whose access to the public sector relied upon connections they have instead of a competitive entrance approach.

Table 1 gives a summary view of how the sample is composed. It is straightforward to note the large predominance of Kinshasa as this region accounts for 61.4% of the civil servants interviewed followed by Congo-Central. Although one may worry about the over-representation of Kinshasa, this structure matches the geography of state agents in the DRC. Nevertheless, it is worth noting that Kinshasa accounts for nearly 17% of the DRC population against 61.4% of the civil servant's population according to the World Bank statistics. About 63% of Congolese civil servants are tertiary educated but remain on average very old (52.1 years old on average). Furthermore, public administration is dominated by males representing more than three-quarters of the civil servant population. In addition to being old and dominated by males, nearly one-third of Congolese civil servants access the job through their network suggesting a significant level of indebtedness likely later to drive several forms of abuse.

Intra-civil servants' corruption

Our dependent variable denoted the *prevalence of corruption* or the

probability of experiencing at least one form of salary abuse is proxied by the combination of two questions from the survey. (1) In your opinion, compared to the period when the payroll system was hand-to-hand, are the workers in your team working better, worse, or the same? There were 4 possible answers: (*i*) *better*, (*ii*) *likewise*, (*iii*) *worse*, and *(iv) did not experience the cash payment period*. (2) Which of the following abuses did you experience or are you experiencing when receiving/received salary in the hand-to-hand payment setting? There are seven possible answers with possibly nested answers: (*i*) *salary deduction*, (*ii*) *forced transfer*, (*iii*) *bribery*, (*iv*) *salary embezzlement*, (*v*) *Harassment*, (*vi*) *no abuse*, (*vii*) *was not receiving a salary yet*. (3) Which of the above-listed abuses still exist since the implementation of the banking reform? We exploit the fourth modality of the question (1) to discard civil servants who did not experience the pre-reform area as they were not a public agent yet. Then, relying on question (2), we ignore cases (*ii*), and (*v*) that we do not consider as instances of corruption[16]. Conditional on having experienced the pre-reform area, the second and third questions help with the construction of the probability of experiencing corruption in the following way:

We first built an indicator variable that equals 1 if the surveyed civil servant was experiencing any type of abuse before the reform arose and 0 otherwise (based on the second question).

We then built a measure of instances of corruption in the post-reform setting by exploiting the third question asking which of the above listed abused persist (if any) after he/she complies with the reform i.e., he/she agrees and opens a bank/mobile account to receive the salary.

After implementing these two steps, we end up with two dummy variables: experience of instances of corruption before compliance with the reform (before) and instances of corruption after the compliance (after). These two dummy variables are combined to create our measure of exposure to instances of corruption before and after the compliance date for each civil servant. This conditioning arises because the treatment per se was not binding at its introduction. Public agents were asked and incentivized to create a bank/mobile account and were not forced to do so. Consequently, the compliance with the reform was gradual over time making the treatment period individual specific. In our robustness checks

[16] Even if we do consider those cases as instances of corruption, results remain qualitatively unchanged.

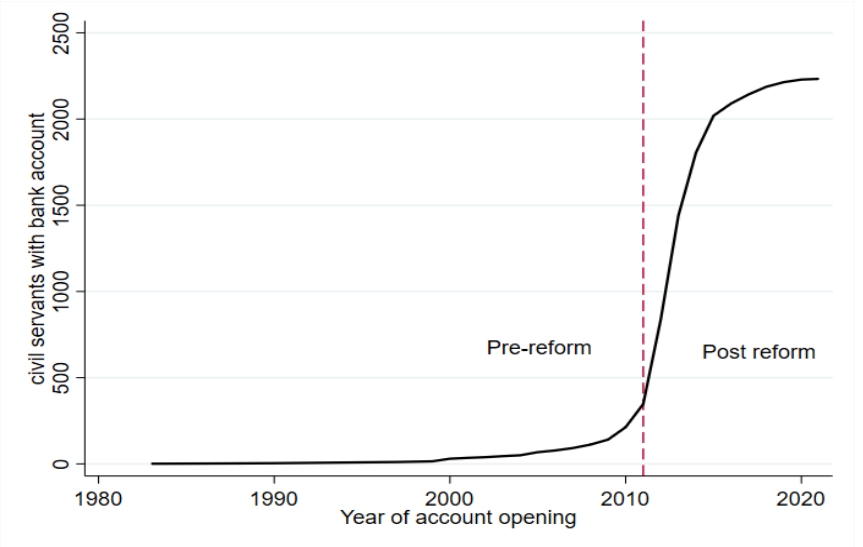
section, we further split this exposure to instances of corruption by type of abuse to investigate whether our treatment effect is abuse-type specific.

Treatment variable: compliance with the reform

In 2011, public agents were asked to open a personal bank/mobile account such that their salary could be directly transferred. Before 2011, nearly all Congolese public agents received their salary either in cash by hand either through their superior, or the accountant. With the introduction of this payroll system reform, salaries were no longer paid hand to hand, but directly to the public agent's bank account conditional on having created the account itself. Ideally, this treatment variable would be a 0/1 dummy (1 if the public agent created the bank account in 2011 or 0 if he/she did not). However, this requires the treatment itself to be binding at its introduction in 2011. However, the creation of a personal bank account was a recommendation and thus, not compulsory. Consequently, the speed of compliance has been individual-specific and thus gradual over time. Put differently, not all civil servants complied at the introduction of the reform. Although the treatment remains 0/1, it now exhibits a time dimension as each surveyed civil servant was asked when he/she starts receiving his/her salary by bank deposit.

The indicated date is considered here as the compliance date for the indicated individual. It is also worth noting that the treatment is made on a subset of civil servants who were already in the public administration when the reform was introduced. Whenever a civil servant becomes treated, he/she remains treated over the remaining years covered in our dataset. Finally, our treatment variable is a pseudo panel dummy variable to fully capture the time at which people become treated.

Figure 2: Time pattern of the compliers to the reform



Relevant information is to see how compliance has evolved over time. As depicted in Figure 2, the pattern of the compliers to the reform is staggering. The reform led to a sharp increase in the number of civil servants with bank accounts until 2018, after which the number of bank accounts opened stagnated. More interestingly, Figure 3 is more than explicit and shows that the average probability of experiencing any form of corruption is 30 percentage points lower for compliers as compared to non-compliers. These gaps remain, albeit different in size whatever type of corruption considered.

Descriptive analysis

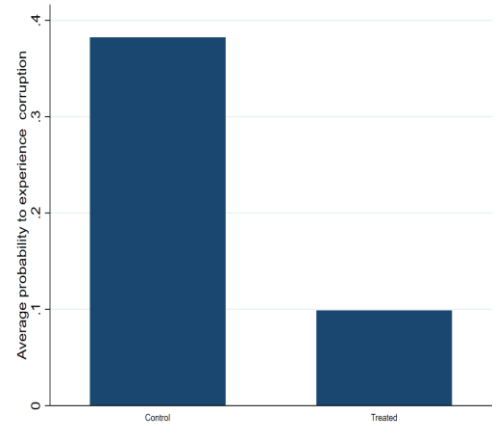
This section starts by examining the simple difference in exposition to corruption between civil servants who complied with reform (i.e., created a bank account for their payroll) and civil servants who did not. This is done before turning to the actual systematic effect of the intervention. Finally, the section will provide some evidence of the causal impact of the reform and how heterogeneous this effect is across ministries and provinces.

Panel 1 of Table 2 gives a first overview of the difference in exposition to corruption between treated civil servants and untreated ones. While in the treatment group, the proportion of civil servants facing salary abuse is 10.43%, this proportion reaches 38.96% in the control group. Framed differently, the proportion of state agents facing intra-civil servant corruption is 28.52% higher for those who did not comply with the treatment as compared to their counterparts who complied with. This

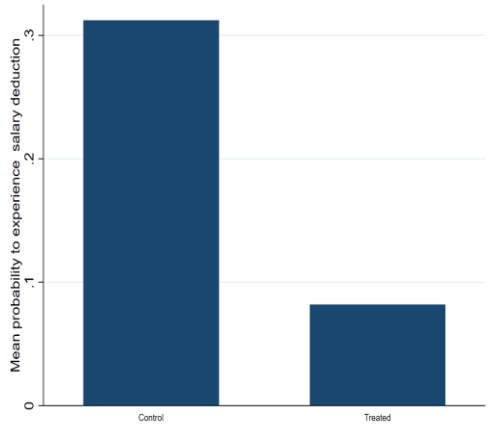
result was expected and goes in the same direction as our intuition that compliance with this reform by reducing the number of bureaucratic interveners in the payroll process reduces the likelihood of losing part of the salary.

Figure 3: Compliance with the reform and exposure to corruption

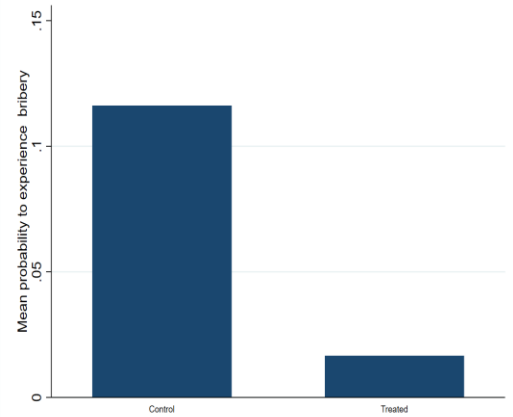
(a) At least one form of abuse



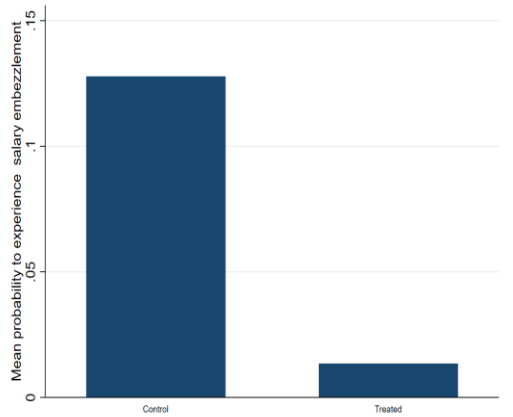
(b) Salary deduction



(c) Bribery



(d) **Salary embezzlement**



Note: Panel (a) gives the mean probability of experiencing any type of corruption (at least one) in both treated and control groups. Panel (b) compares the mean exposure when it comes to salary deduction. Panel (c) does the same for bribery while panel (d) does it for salary embezzlement. The gap between the two average probabilities stands for the unconditional average effect of compliance with the treatment.

The question that remains is whether this difference observed in the whole

population of civil servants is uniform across categories of civil servants surveyed. Indeed, there is a systematic difference among civil servants which could reveal interesting features in terms of difference in exposition to corruption between those who complied with the reform and those who did not. For instance, concerning bank endowment, Kinshasa (the DRC' Capital) has better access to financial services, making the opening of bank accounts easier compared to other regions of the DRC. This reality is likely to create a discrepancy in the capacity of a civil servant to comply with the reform. Consequently, it is expected that the effect of the treatment differs between Kinshasa and non-Kinshasha provinces. As shown in Panel 2 of Table 2, it appears that while the treated is 34.0% less exposed to corruption compared to the control group in Kinshasa, this difference stands at 21.0% when it comes to the non-Kinshasa provinces as shown in Panel 3. The intended effect of the reform is likely to be 13.0 percentage points stronger in Kinshasha. Although this heterogeneity is already sizeable, it is likely that another important heterogeneity does exist among non-Kinshasa provinces as the access to financial services among non-Kinshasa provinces also differs. In fact, after the administrative decentralization of the DRC in 2011, some provinces kept the old provincial capitals[17] while the newly created provinces had new capitals with less substantial financial services endowment compared to the provinces that kept the old provincial capitals. To account for that heterogeneity, we split non-Kinshasha provinces into two groups: the first group is made of those with access to financial services above the average and those below the average (the second group). As depicted in panel 4 of Table 2, in provinces with financial services above the average, the treated group displays a percentage in exposition to corruption of 21.2% lower than that of non-compliers while in provinces with financial services below the average (Panel 5), this percentage is only 19.9% i.e., about 2 percentage points lower than what was observed in Panel 4.

Moreover, the lack of uniformity in the way the treatment affects civil servants is also driven by structures to which civil servants belong. More precisely, as shown in panel 6 of table 2, depending on whether civil servant belongs to clusters 1, 2, 3, or 4, the effects of the treatment

[17] In addition to Kinshasa, the provinces that have kept the old provincial capitals are: Équateur, Haut-Katanga, Kasaï-Central, Kasai-Oriental

look specific.[18] Indeed, in cluster 1, compliers experience in the post-treatment a 42.8% lower probability to be exposed to corruption as compared to their noncompliers counterpart; and 33.1%; 6.9% and 22.9% lower probabilities for clusters 2, 3 and 4 respectively. Although cluster 3 is mainly made by outliers, thus making their interpretation not necessarily meaningful, the remaining clusters seem to highlight the fact that structures included in clusters 1 and 2 are the ministries most plagued by corruption with the pre-eminence of the first cluster over the second. Indeed, cluster 1 is made of ministries of land affairs, infrastructures, and public work as well as the Ministry of Planning. Cluster 2 is made by the Ministry of Budget, Public Administration, Interior, and Law.

It is worth noticing that what has been done so far is a purely descriptive analysis that completely disregards both the con-founder effects as well as the simultaneous interrelation between characteristics that shape the effect of the treatment. To account for this, we then move to an econometric analysis in the next section.

Table 2: Descriptive analysis of exposure to instances of corruption

	(1) Control (B)	(2) Treatment (A)	(3) Difference (A)-(B)
Panel 1: Full sample			
Proportion experiencing instances of corruption	0.390	0.104	-0.285***
	(0.488)	(0.306)	(0.006)
Observations	11,119	8,978	20,097
Panel 2: Kinshasa			
Proportion experiencing instances of corruption	0.442	0.102	-0.340***
	(0.497)	(0.303)	(0.007)
Observations	6,422	5,926	12,348
Panel 3: Other provinces			

[18] Cluster 1 includes the following ministries: Land Affairs, Infrastructure and Public Works, Planning. Cluster 2 is made up of ministries of Budget, Primary, Secondary and Technical Education, Civil Service, Interior, and Justice. Cluster 3 includes DGDA, SNEL, REGIDESO while cluster 4 contains DGI, DGRAD, Decentralization and Customary Affairs, Finance, Portfolio, Health.

Proportion experiencing instances of corruption	0.318	0.109	-0.210***
	(0.466)	(0.311)	(0.010)
Observations	4,697	3,052	7,749
Panel 4: Other provinces above the average			
Proportion experiencing instances of corruption	0.311	0.099	-0.212***
	(0.463)	(0.298)	(0.011)
Observations	3,414	2,283	5,697
Panel 5: Other provinces below the average			
Proportion experiencing instances of corruption	0.338	0.139	-0.199***
	(0.473)	(0.346)	(0.020)
Observations	1,283	769	2,052
Panel 6: Ministry			
Proportion experiencing instances of corruption	**Cluster 1**		-0.428***
	0.523	0.095	
	(0.500)	(0.293)	(0.015)
Observations	1,720	1,493	3,213
Proportion experiencing instances of corruption	**Cluster 2**		-0.331***
	0.434	0.103	
	(0.496)	(0.304)	(0.010)
Observations	4,152	3,192	
Proportion experiencing instances of corruption	**Cluster 3**		-0.069***
	0.126	0.057	
	(0.332)	(0.232)	(0.014)
Observations	930	843	1,773
	Cluster 4		
Proportion experiencing instances of corruption	0.350	0.121	-0.229***
	(0.477)	(0.326)	(0.010)
Observations	4,317	3,450	7,767

Notes: The table reports balance across covariates from survey. Robust standard errors are in parentheses. In addition to Kinshasa, the provinces that have kept the old provincial capitals are Équateur, Haut-Katanga, Kasaï-Central, Kasai-Oriental. Cluster 1 includes the following ministries: Land Affairs, Infrastructure and Public Works, Planning. Cluster 2 is made up of ministries of Budget, Primary, Secondary and Technical Education, Civil Service, Interior, and Justice. Cluster 3 includes DGDA, SNEL, REGIDESO while cluster 4 contains DGI, DGRAD, Decentralization and Customary Affairs, Finance, Portfolio, Health. *, **, *** Significant at the 10%, 5% and 1% level.

4. Findings

Benchmark results

The results are presented across four panels labeled A, B, C, and D in Table (3). In Panel A, we provide the naive linear probability estimate. Panel B examines the relevance of our instrument, while Panel C presents the results of the reduced form estimation. Finally, Panel D showcases the Two Stage Least Square estimation. Within each panel, we display a set of columns representing different analyses. In Column (1), we present the benchmark specification (Equation 1). Columns (2) to (5) delve into the results of the heterogeneity analysis. Specifically, in Column (2), we explore the interaction between the treatment and demographic characteristics such as age, educational attainment, gender, ethnicity, and religion. Moving to Column (3), we investigate the interaction between the treatment and socio-professional characteristics, including the rank of the civil servant, matriculation, and the means of access in public administration. In Column (4), we delve into the treatment's interaction with the ministry of affiliation, clustered by corruption intensity. Finally, column (5) synthesizes all these interactions for a comprehensive view of the results.

Table 3: Benchmark result

	(1)	(2)	(3)	(4)	(5)
Panel A: Exposure to corruption (Least Squares)					
Treatment	-0.297***	-0.366***	-0.211***	-0.437***	-0.386***
	(0.006)	(0.021)	(0.027)	(0.012)	(0.036)
R-squared	0.762	0.764	0.763	0.773	0.775
Panel B: Probability to comply with the reform (First stage)					
Night-time light intensity	0.147***	0.100**	0.075*	0.187***	0.089***
	(0.019)	(0.032)	(0.040)	(0.023)	(0.051)
R-squared	0.720	0.720	0.720	0.723	0.720
K. Paap F-Stat	62.89	65.40	70.24	63.33	74.16
Panel C: Probability of experiencing instances of corruption (Reduced form)					
Night-time light intensity	-0.053***	-0.104**	0.047	-0.214***	-0.137***
	(0.016)	(0.027)	(0.035)	(0.020)	(0.044)
R-sq	0.730	0.731	0.731	0.735	0.736
Panel D: Probability to experience instances of corruption (IV)					

Treatment	-0.362***	-0.429***	-0.280**	-0.513***	-0.435***
	(0.102)	(0.110)	(0.117)	(0.097)	(0.117)
R-squared	0.114	0.121	0.115	0.151	0.160
individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	20,097	20,088	20,097	20,097	20,097

Notes: The table reports benchmark results. The vector of control variables includes age interval, education, religion, access mode to the public job, civil servant id, administrative rank, and the administration cluster to which the surveyed civil servant belongs. In column (1), we have the basic regression without interaction between the treatment and control variables. In column (2), we add to the basic regression and the interaction between the treatment and socio-demographic variables in addition. In column (3), the interaction is with socio-professional variables. In column (4), the interaction is with the variable that accounts for clusters of structures based on whether they have a higher propensity to experience corruption or not. The last column pools together all the interactions simultaneously. The first stage regression includes province fixed effects instead of individual fixed effects as night-time light intensity is province-time. *, **, *** Significant at the 10%, 5% and 1% level.

Starting with the baseline estimate reported in Column (1), we observe a statistically significant negative coefficient for the treatment effect. It suggests that complying with the reform (i.e., opening a bank/mobile account to directly receive the salary) reduces the probability of experiencing instances of corruption of any form by 29.8% in the linear probability estimation and 36.2% in the instrument variable estimation. When comparing this estimate with the coefficient obtained through Two-Stage Least Squares (2SLS) in Panel A, Column (1), it becomes apparent that the 2SLS coefficient is likely larger. This suggests that the Ordinary Least Squares (OLS) coefficient likely suffers from bias stemming from selection and/or reverse causality issues. Indeed, on the one hand, as intra-civil servant corruption potentially rises, there might be higher incentives to open a bank account (i.e., to comply with the reform), while on the other hand, broader adoption of banking services could subsequently impact the overall exposure to corruption.

The Fixed Effects OLS estimation, examining the impact of the civil servant payroll reform on corruption prevalence, implicitly assumes comparability between the two groups, such that any differences can be attributed entirely to the reform. As Panel A in Table 3 establishes, the reform has significantly reduced instances of intra-civil servant corruption. However, this effect displays heterogeneity, especially across provinces and sector clusters. While this result would be valid in the context of an experimental study with successful randomization, our

current study lacks ex ante randomization to assign civil servants to treatment or control groups. Consequently, individuals who complied with the banking reform may have inherently differed from non-compliers, potentially rendering the conclusion that banking reform reduces intra-civil servant corruption less accurately. To rigorously assess the accuracy of this initial finding, we employ an instrumental variable approach in which compliance with the reform is explained by the development level of each Congolese province highlighting the accessibility to financial services, approximated by night-time light intensity. Our instrument meets the relevance condition, as demonstrated in Panel B of Table 3, exhibiting a positive and significant correlation between compliance probability and provincial development levels. Additionally, the Kleibergen-Paap F-statistic, registering at 62.89, surpasses the critical value, affirming the instrument's validity despite potential weak identification concerns.

Our analysis reveals a noteworthy convergence between the outcomes obtained through both Ordinary Least Squares (OLS) and Instrumental Variable (IV) approaches. This convergence provides compelling evidence that compliance to the reform has effectively diminished the probability that a civil servant experiences intra-civil instances of corruption. To contextualize this finding, the likelihood of experiencing intra-civil servant corruption during the post-compliance era has seen a significant decrease of approximately 36% compared to the pre-compliance period. The robustness of our findings relies heavily on the strength of our initial-stage results, which establish the instrument's relevance through a marked positive correlation between nighttime light intensity and the likelihood of compliance with the treatment, as depicted in Column (1) of Panel B. Furthermore, the reduced form results in Column (1) of Panel C bolsters this observed impact.

Furthermore, as depicted in Columns (2) and (3), the estimated effect remains remarkably stable and robust even when incorporating interaction terms. These interactions account for socio-demographic and professional characteristics, as well as the ministry of affiliation (operating sectors). As shown in Column 2 of Table 3, when controlling for socio-demographic characteristics, the obtained impact appears more pronounced within the reference group. Put differently, as detailed in Table A.4 in the appendix, Christian low-skilled civil servants aged between 20- and 40-years old experience a substantial 42.9% reduction in the probability of experiencing instances of corruption after complying with the reform. This effect becomes increasingly pronounced as civil servants

age, with a 4.3 and 9.0 percentage points increase respectively for those aged 40 to 65 and those above 65. However, the estimated impact diminishes as civil servants have higher levels of education. Specifically, the impact of the reform decreases by nearly 10 percentage points for medium and high-skilled civil servants. This seemingly counter-intuitive result can be rationalized by the fact that more educated civil servants generally face a lower probability of experiencing instances of corruption in the pre-reform era. Therefore, the initial exposure plays a pivotal role in determining the strength of the reform's impact. In Column 3, the analysis reveals that civil servants who entered the public administration through non-competitive means and do not possess a matricula experience a substantial 28% reduction in instances of corruption in the post-reform period. This effect is even more pronounced for those who entered competitively, with a 3.8 percentage point increase, and for those with a matricula, with a 9.7 percentage point increase. However, it is slightly weaker (2.6 percentage points) for civil servants at the bottom of the administrative hierarchy (executors). This suggests that the reform has primarily benefited civil servants who obtained their positions through regular means as well as those with slightly higher capacity to prevent alternative corruption channels. Additionally, civil servants without a matricula, as well as those who relied solely on their networks to secure their positions, may only partially benefit from the reform, as there could still be indirect ways of exposure to instances of corruption, even if their salaries are directly deposited into their bank or mobile accounts.

More notably, when the ministries are clustered and interacted with the treatment in Column 4, public agents from the most corrupt operating sectors experience a substantial drop of up to 51.3% in the probability of experiencing any instance of corruption. More interestingly, as the initial probability of experiencing instances of corruption in the operating sector decreases, the reform's impact weakens. Specifically, the estimated effects declined by 9.6, 36.7, and 20.1 percentage points for agents in Cluster 2, 3, and 4, respectively. In a nutshell, the benchmark estimate of the payroll system reform in the DRC strongly suggests that compliance with the reform reduces the probability of experiencing any instance of corruption by more than one-third. Moreover, the strength of this effect increases with age and access mode while decreasing with education level and the initial level of corruption in the agent's operating sector. Overall, Table 3 strongly supports the idea of a negative and robust causal impact of compliance with the payroll reform in the DRC on the probability of encountering instances of corruption.

Heterogeneity and robustness checks

Impact of the reform along the type of corruption

Table 4: Results across types of corruption

	(1)	(2)	(3)	(4)
	All types of corruption	**Salary deduction**	**Mandatory bribes**	**Salary embezzlement**
Panel A: Exposure to corruption (OLS)				
Treatment	-0.354***	-0.276***	-0.135***	-0.155***
	(0.031)	(0.029)	(0.014)	(0.011)
R-squared	0.129	0.097	0.053	0.062
Panel B: Exposure to corruption (2SLS)				
Treatment	-0.435***	-0.411***	0.257***	-0.062
	(0.117)	(0.117)	(0.097)	(0.086)
R-sq	0.160	0.124	-0.384	0.028
K. Paap F-Stat	44.77	46.23	49.00	44.65
individual FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	20,097	20,097	20,097	20,097

Notes: The table reports benchmark results for the case of at least one corruption and for each type of corruption. In column (1), we examine exposure to at least one type of corruption. Column (2) presents the results for salary deductions, while in column (3), we analyze mandatory bribes. In column (4), the type of corruption is salary embezzlement. For each model from column (1) to column (4), all control variables were added with interactions with the treatment. *, **, *** Significant at the 10%, 5% and 1% level.

So far, our analysis has not differentiated between the various types of corruption experiences faced by Congolese civil servants. As illustrated in Figure 3, corruption encountered by these civil servants can manifest in different forms, such as salary deductions, bribery, or salary embezzlement. In our benchmark model, corruption is defined as the likelihood of experiencing at least one of these forms of corruption. While it is obvious that the direct payment system implemented by the reform has effectively eliminated the possibility of automatic salary deductions or salary embezzlement by superiors involved in the traditional hand-to-hand pay process, the potential for bribery remains. Public agents may

still find themselves compelled to pay bribes to their superiors in exchange for various advantages or to avoid different types of professional harassment. Consequently, the impact of the reform is likely to be not only contingent on the type of corruption but also may have divergent effects. The underlying concept here is that the implementation of the reform, by eliminating the option of deducting collaborators' salaries, could potentially result in an increased demand for bribes. This intuition is substantiated by the results presented in Panel B of Table 4. Compliance with the reform reduces the likelihood of experiencing salary deductions and salary embezzlement but appears to elevate the probability of superiors soliciting bribes from their subordinates. Nonetheless, the overall effect of the reform suggests a substantial reduction in instances of corruption in the post-compliance era.

Kinshasa versus the rest of the country

Table 1 provides compelling evidence of the prominent role played by Kinshasa, which represents a substantial 61.4% of our sample, while the other 14 provinces collectively account for only 38.6% of the sample. While this overrepresentation of Kinshasa aligns with the distribution of civil servants across the DRC's regions, a pertinent question arises: Could the estimated impact of the reform be primarily driven by Kinshasa? Panel B of Table 5 addresses this question, revealing that this is not the case. The effect of the reform in Kinshasa is 9.5 percentage points lower compared to non-Kinshasa provinces. This finding aligns perfectly with the narrative that has emerged from our results thus far. Kinshasa, as the most developed province in the country, already had a lower pre-reform exposure to corruption. Additionally, the DRC's most educated civil servants' agglomerate in Kinshasa, further explains the slightly reduced impact of the reform in this province. This Kinshasa effect persists across various types of corruption, except for salary embezzlement, where the effect in Kinshasa is 2.5 percentage points stronger.

Always treated versus post-reform treated

Our benchmark results unequivocally demonstrate that compliance with the payroll re-form leads to a significant reduction in the probability of experiencing intra-civil servant corruption. However, a central concern arises when examining our identification strategy. Specifically, it pertains to the inclusion of civil servants who opened bank/mobile accounts before the reform (i.e., before 2011) referred to as always treated, and those who did so in the post-reform era referred to as post-reform treated. There is a potential issue that those with pre-reform accounts might

systematically differ from those treated in the post-reform era. To address this concern and ensure that our results are not driven solely by the "always treated" group, we have divided the sample into two distinct categories, each representing one of these groups. Table 6 is divided into three panels for clarity: the top panel displays the results obtained on the entire sample, which we have already discussed in our benchmark findings. The middle panel focuses on the sub-sample of civil servants who possessed a bank/mobile account before the implementation of the reform (the "always treated" group). The bottom panel focuses on the subsample of civil servants who opened the bank/mobile account after the reform was already implemented. Our findings show that this group did not experience any significant change in their probability of experiencing instances of corruption. This lack of change can be intuitively explained by the fact that this group was already receiving their pay through their bank accounts. Consequently, they were not susceptible to experiencing salary deductions or embezzlement from their superiors, rendering them largely unaffected by the reform. In contrast, the bottom panel examines civil servants who opened bank accounts after the reform's implementation (the "post-reform treated" group). Within this group, our results indicate a substantial and consistent 44% decrease in the probability of experiencing instances of corruption. This effect holds across various specifications, providing strong evidence of the reform's positive impact on reducing corruption for civil servants who adopted the new payment system after its implementation.

Table 5: Kinshasa effect across different measures of corruption

	(1)	(2)	(3)	(4)
	All types of corruption	**Salary deduction**	**Mandatory bribes**	**Salary embezzlement**
	Panel A: Exposure to corruption (Least Squares)			
Treatment	-0.190***	-0.170***	-0.077***	-0.094***
	(0.010)	(0.010)	(0.007)	(0.007)
kinshasa ×treatment	-0.139***	-0.082***	-0.034***	-0.030***
	(0.011)	(0.011)	(0.007)	(0.007)
R-squared	0.127	0.095	0.053	0.060
	Panel B: Exposure to corruption (2SLS)			

treatment	-0.366***	-0.309***	-0.091***	-0.097***
	(0.014)	(0.014)	(0.009)	(0.009)
kinshasa ×treatment	0.095***	0.090***	-0.012	-0.025**
	(0.012)	(0.012)	(0.008)	(0.008)
R-squared	0.099	0.076	0.037	0.047
K. Paap F-Stat	467.6	355.1	150.0	196.8
individual FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	20,097	20,097	20,097	20,097

Notes: The table reports benchmark results which examine the effect of Kinshasa (the capital of DRC) for the case of at least one corruption and for each type of corruption. In column (1), we examine exposure to at least one type of corruption. Column (2) presents the results for salary deductions, while in column (3), we analyze mandatory bribes. In column (4), the type of corruption is salary embezzlement. For each model from column (1) to column (4), all control variables were added with interactions with the treatment. *, **, *** Significant at the 10%, 5% and 1% level.

Table 6: Always treated versus post-reform treated

	(1)	(2)	(3)	(4)	(5)
Panel A: Full sample (2SLS)					
Treatment	-0.362***	-0.429***	-0.280**	-0.513***	-0.435***
	(0.102)	(0.110)	(0.117)	(0.097)	(0.117)
R-squared	0.114	0.121	0.115	0.151	0.160
K. Paap F-Stat	62.89	65.40	70.24	63.33	74.16
Observations	20,097	20,088	20,097	20,097	20,088
Panel B: Always treated (2SLS)					
Treatment	0.257	0.634	0.395	-0.140	0.537
	(0.409)	(0.631)	(0.365)	(0.375)	(0.519)
K. Paap F-Stat	7.66	4.49	9.28	7.84	7.84
Observations	1,917	1,917	1,917	1,917	1,917
Panel C: Post-reform treated (2SLS)					
Treatment	-0.441***	-0.515***	-0.379**	-0.571***	-0.521***
	(0.132)	(0.143)	(0.149)	(0.125)	(0.147)

K. Paap F-Stat	44.77	46.23	49.00	44.65	51.15
Observations	18,180	18,171	18,180	18,180	18,171
individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Notes: The table reports exposure to corruption for the full sample (Panel A), the always treated civil servants (Panel B) and the pre-reform treated (Panel C). In column (1), we have the basic regression without interaction between the treatment and control variables. In column (2), we add to the basic regression and the interaction between the treatment and socio-demographic variables in addition. In column (3), the interaction is with socio-professional variables. In column (4), the interaction is with the variable that accounts for clusters of structures based on whether they have a higher propensity to experience corruption or not. Column (5) pull all the interactions together. *, **, *** Significant at the 10%, 5% and 1% level.

5. Conclusion

This study contributes to the literature by empirically investigating the impact of a pay-roll reform in the Democratic Republic of the Congo (DRC) on the probability of experiencing instances of intra-civil servant corruption. Our investigation provides two notable contributions. First, it sheds light on an under-explored dimension of corruption that we refer to as “intra-civil servant" corruption. The second contribution pertains to a policy-oriented perspective. It suggests that the effectiveness of anti-corruption policies, traditionally designed to curb corrupt practices between public officials and users of public services, is contingent upon addressing intra-civil servant corruption. This aspect potentially plays a pivotal role in the sense that abused civil servants, those who are victims of corruption within the public sector, are less likely to respond favorably to anti-corruption measures and policies in contrast to their non-abused counterparts. A third, ad-hoc, contribution is that we meticulously address endogeneity concerns surrounding the speed of compliance with the treatment i.e., civil servants’ decision to open bank/mobile accounts.

Leveraging a rich, representative, and unique dataset encompassing 15 provinces within the Democratic Republic of Congo (DRC), our study employs an instrumental variable (IV) approach to effectively deal with endogeneity issues associated with the speed at which civil servants choose to comply with the treatment *i.e.,* the moment they choose to open a bank or mobile account. The findings show that non-compliers exhibit a higher prevalence of any form of salary abuse as compared to their compliers’ counterparts. Furthermore, substantial heterogeneity is

documented and relates to ministries classified concerning their traditional exposure to corrupt acts as well as age groups and education levels. The main finding of this paper is that compliance with the payroll reform in the DRC significantly reduces the probability of experiencing intra-civil servant corruption. Indeed, complying with the reforms decreases by roughly one-third the probability of experiencing any form of salary abuse. This effect is particularly stronger for low-educated civil servants and keeps getting stronger the older they are. The robustness checks confirm the negative and statistically significant impact of the payroll system reform across different specifications. Additionally, civil servants who opened bank or mobile accounts after the reform took place experienced a notable 44% decline in the probability of facing instances of salary abuse, while civil servants who were always treated (i.e., already had a bank account before the reform) did not experience any significant change in the prevalence of corruption. More interestingly, this reform has reduced by roughly 51% the probability of facing instances of corruption in the operating sector, depicting the highest level of prevalence of intra-civil servant corruption (cluster 1).

Our findings have important policy implications. While the overall impact of the pay-roll system reform on intra-civil servant corruption is promising, variations in its effectiveness across provinces, operating sectors (ministries), and the type of abuse call for attention. Enhanced infrastructure, especially financial infrastructure, in provinces with limited access, is key. For instance, fiscal incentives targeted at commercial banks and mobile banking operators deciding to open branches in less connected areas could serve to propel financial inclusion and then foster the impact of such a policy through a higher speed of compliance. Furthermore, combining traditional anti-corruption policies with those targeting intra-civil servant corruption is key to guaranteeing their effectiveness, given the interlinkages between the two types of corruption. Such a multi-pronged approach holds potential to effectively combat corruption which is a threat to development and social progress. Our empirical investigation provides compelling evidence of the payroll reform's effectiveness in deterring the prevalence of intra-civil servant corruption. The pivotal role that the accessibility of banking facilities plays in curbing corruption is obvious, as they offer an avenue to prevent transactions made in cash. However, it is worth noting that banking facilities alone will not be enough to entirely eradicate intra-civil servant corruption. Complementary strategies, including traditional anti-corruption policies, training programs, and mechanisms of accountability,

are imperative for a comprehensive resolution. The fight against corruption requires systemic reforms, enforcement of anti-corruption laws, a culture of integrity, and a supportive environment that discourages corruption and encourages ethical leadership among civil servants.

Our analysis nevertheless has three meaningful limitations: first, it is important to highlight that our instrumental variable strategy exclusively captures the local average treatment effect, which means it captures the effect that is solely mediated through our instrument (accessibility of financial services). Consequently, any effects of the reform originating from sources other than the accessibility of financial services cannot be accounted for in our IV estimates. This limitation leads us to view our estimates as a lower bound of the true effect of the payroll reform in the Democratic Republic of the Congo (DRC). To capture the overall impact of the reform, a more experimental setting such as Randomized Control Trials (RCT) would be advantageous. Second, another concern in our analysis is related to the nature of the data. Salary-related misconduct is self-reported by civil servants, who essentially compare instances of abuses they experienced before and after compliance with the reform of the payroll system. This introduces the possibility of reporting errors by civil servants, potentially biasing the results by either overestimating or underestimating instances of corruption. However, it's plausible that such bias would tend to understate instances of corruption in the pre-reform period. If this is indeed the case, our estimated effect can be considered a lower bound. Thirdly, due to administrative constraints within the PRAAP project, interviews were conducted at varying times across different provinces. Some provinces underwent interviews between 2016 and 2018, while others were interviewed in 2020 and 2021. Since instances of corruption are self-reported by civil servants, delayed interviews are more likely to result in underestimations of reported corruption cases. This introduces a potential bias on the estimated effects of the reform. In the appendix, Table A.16 examines the impact of interview timing on estimated effects. It is likely that cohorts interviewed at later dates, particularly those related to salary withholding abuses, exhibit estimated effects that are 7 and 12 percentage points lower for interviews conducted in 2020 and 2021, compared to those conducted between 2016 and 2018. While all eligible civil servants were exposed to the reform around the same time, it is reasonable to assume that those interviewed later may have a less precise recollection of their circumstances just before and after complying with the reform. Consequently, they are likely to underreport instances of

salary misconduct they encountered, introducing a conservative bias into the estimated effect.

6. References

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7. Appendices

Benchmark estimation

Table A.1: Linear probability model

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
treated = 1	-0.297***	-0.366***	-0.211***	-0.437***	-0.386***
	(0.006)	(0.021)	(0.027)	(0.012)	(0.036)
treated=1 × 40-65		-0.039***			-0.022**
		(0.009)			(0.009)
treated=1 × 65+		-0.098***			-0.045**
		(0.019)			(0.019)
treated=1 × Yes		0.013			0.016
treated=1 × Medium skilled		(0.010)			(0.010)
treated=1 × High skilled		0.106***			0.110***
		(0.020)			(0.020)
		0.094***			0.085***
		(0.020)			(0.020)
treated=1 × Revival		-0.001			0.005
		(0.009)			(0.009)
treated=1 × Other		0.094***			0.073***
		(0.020)			(0.019)
treated=1 × access_relation=1			-0.034***		-0.029***
			(0.010)		(0.010)
treated=1 × matricule=1			-0.099***		-0.130***
			(0.025)		(0.026)
treated=1 × collaborator			0.030***		0.012
			(0.010)		(0.010)
treated=1 × executor			0.025*		0.003
			(0.014)		(0.014)
treated=1 × Cluster 2				0.093***	0.090***
				(0.013)	(0.013)
treated=1 × Cluster 3				0.363***	0.361***
treated=1 × Cluster 4				(0.014)	(0.014)
				0.194***	0.189***
				(0.013)	(0.013)
Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes

Observations	20,097	20,088	20,097	20,097	20,088
R-squared	0.762	0.764	0.763	0.773	0.775

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.2: Probability to comply with treatment (First stage)

	(1)	(2)	(3)	(4)	(5)
	Probability to comply with the reform				
Night-time light intensity (nl_r)	0.147***	0.100***	0.075*	0.184***	0.089*
	(0.019)	(0.032)	(0.040)	(0.023)	(0.051)
40-65 × nl_r		0.029**			0.020*
		(0.011)			(0.012)
65+ × nl_r		0.014			0.000
		(0.021)			(0.022)
Yes × nl_r		0.009			0.006
		(0.014)			(0.014)
Medium skilled × nl_r		-0.001			-0.010
		(0.026)			(0.026)
High skilled × nl_r		0.030			0.006
		(0.025)			(0.026)
Revival × nl_r		0.032**			0.028**
		(0.013)			(0.013)
Other × nl_r		-0.006			-0.003
		(0.028)			(0.028)
access_relation=1 × nl_r			-0.007		-0.004
			(0.013)		(0.013)
matricule=1 × nl_r			0.086**		0.081**
			(0.035)		(0.035)
collaborator × nl_r			-0.005		-0.003
executor × nl_r Cluster 2			(0.013)		(0.014)
× nl_r			-0.049***		-0.044**
			(0.018)		(0.019)
				-0.060***	-0.053***
Cluster 3 × nl_r				(0.017)	(0.018)
				-0.069***	-0.066***
				(0.024)	(0.024)
Cluster 4 × nl_r				-0.016	-0.015
				(0.017)	(0.017)

Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	20,097	20,088	20,097	20,097	20,088
R-sq	0.720	0.720	0.720	0.720	0.720
K. Paap F-Stat	62.89	65.40	70.24	63.33	74.19

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Probability of complying with treatment (Reduced form)

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
Night-time ligt intensity	-0.053***	-0.104***	0.047	-0.214***	-0.137***
	(0.016)	(0.027)	(0.035)	(0.020)	(0.044)
40-65 × nl_r		-0.040***			-0.024**
		(0.010)			(0.010)
65+ × nl_r		-0.083***			-0.042**
		(0.018)			(0.018)
Yes × nl_r		0.014			0.016
		(0.012)			(0.012)
Medium skilled × nl_r High skilled × nl_r		0.087***			0.093***
		(0.022)			(0.022)
		0.076***			0.072***
		(0.021)			(0.022)
Revival × nl_r		-0.015			-0.007
		(0.011)			(0.011)
Other × nl_r access_relation=1 × nl_r		0.099***			0.079***
		(0.024)			(0.024)
			-0.031***		-0.025**
matricule=1 × nl_r			(0.011)		(0.011)
			-0.111***		-0.137***
			(0.030)		(0.030)
collaborator × nl_r			0.024**		0.008
			(0.011)		(0.012)
executor × nl_r			0.034**		0.015
			(0.015)		(0.017)
Cluster 2 × nl_r				0.115***	0.109***
				(0.015)	(0.015)
Cluster 3 × nl_r Cluster 4 × nl_r				0.339***	0.334***
				(0.020)	(0.021)
				0.190***	0.184***

				(0.015)	(0.015)
Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	20,097	20,088	20,097	20,097	20,088
R-sq	0.730	0.731	0.731	0.735	0.736

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Exposure to corruption (Two Stages Least Squares (2SLS)

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
treat	-0.362***	-0.429***	-0.280**	-0.513***	-0.435***
	(0.102)	(0.110)	(0.117)	(0.097)	(0.117)
40-65 ×treated		-0.043***			-0.031**
		(0.013)			(0.013)
65+ ×treated		-0.090***			-0.046**
		(0.020)			(0.021)
Yes ×treated		0.019			0.020
Medium skilled ×treated High skilled × treated		(0.013)			(0.012)
		0.098***			0.102***
		(0.023)			(0.023)
		0.097***			0.083***
		(0.023)			(0.024)
Revival ×treated		-0.004			0.003
Other × treated access_relation=1 ×treated		(0.012)			(0.012)
		0.113***			0.091***
		(0.026)			(0.026)
			-0.038***		-0.032***
matricule=1 ×treated			(0.012)		(0.012)
			-0.097***		-0.133***
			(0.037)		(0.037)
collaborator × treated			0.026**		0.007
			(0.012)		(0.012)
executor ×treated			0.018		-0.005
			(0.017)		(0.018)
Cluster 2 ×treated				0.096***	0.094***

				(0.017)	(0.016)
Cluster 3 × treated Cluster 4 × treated				0.367***	0.362***
				(0.024)	(0.024)
				0.201***	0.197***
				(0.015)	(0.015)
Id FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	20,097	20,088	20,097	20,097	20,088
R-sq	0.114	0.121	0.115	0.151	0.160
F-Stat (First stage)	62.89	65.40	70.24	63.33	74.19

Standard errors in parentheses

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

Heterogeneity across corruption types

Table A.5: Linear probability model across corruption types

	(1)	(2)	(3)	(4)
	Any type of corruption	**Withholding from salary**	**Mandatory bribe**	**Salary diversion**
treated=1	-0.354***	-0.276***	-0.135***	-0.155***
	(0.031)	(0.029)	(0.014)	(0.011)
treated=1 × 40-65	0.029***	0.029***	-0.005	0.008**
	(0.008)	(0.007)	(0.004)	(0.003)
treated=1 × 65+	0.015	-0.003	0.019*	-0.002
	(0.015)	(0.013)	(0.010)	(0.006)
treated=1 × Yes	-0.002	-0.009	0.003	0.004
	(0.007)	(0.007)	(0.003)	(0.003)
treated=1 × Medium skilled	0.012	0.003	0.012	0.035***
	(0.014)	(0.012)	(0.006)	(0.004)
treated=1 × High skilled	0.023	0.013	0.017*	0.017***
	(0.014)	(0.013)	(0.006)	(0.004)
treated=1 × Revival	-0.013*	-0.006	-0.003	-0.018***
	(0.007)	(0.006)	(0.003)	(0.002)
treated=1 × Other	0.087***	0.078***	-0.005	0.012
	(0.018)	(0.017)	(0.005)	(0.008)
treated=1 × access_relation=1	0.004	-0.002	0.004	-0.000
	(0.007)	(0.006)	(0.003)	(0.003)

treated=1 × matricule=1	-0.041	-0.021	0.002	0.001
	(0.022)	(0.019)	(0.010)	(0.008)
treated=1 × collaborator	0.024**	0.022**	0.007*	0.000
	(0.008)	(0.007)	(0.003)	(0.003)
treated=1 × executor	0.016	0.013	0.014**	0.005
	(0.011)	(0.010)	(0.005)	(0.005)
treated=1 × Cluster 2	0.007	-0.007	0.010*	0.014***
	(0.009)	(0.009)	(0.004)	(0.003)
treated=1 × Cluster 3	-0.011	0.001	-0.008*	-0.007*
	(0.012)	(0.012)	(0.004)	(0.003)
treated=1 × Cluster 4	0.021*	0.011	0.004	0.006*
	(0.009)	(0.009)	(0.004)	(0.003)
Individual FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Observations	20,088	20,088	20,088	20,088
R-squared	0.129	0.097	0.053	0.062

Standard errors in parentheses. * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Robustness checks

Always treated: those who had a bank account before the reform

Table A.6: Always treated (any type of corruption) - OLS

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
treated=1	-0.250***	-0.260***	-0.059	-0.421***	-0.161
	(0.026)	(0.099)	(0.050)	(0.070)	(0.138)
treated=1 × 40-65		-0.034			0.049
		(0.048)			(0.048)
treated=1 × 65+		0.216***			0.318***
		(0.069)			(0.090)
treated=1 × Yes		0.039			0.021
		(0.053)			(0.055)
treated=1 × Medium skilled		0.005			0.121
		(0.099)			(0.098)

treated=1 × High skilled		-0.036			0.032
		(0.096)			(0.096)
treated=1 × Revival		0.109**			0.123***
		(0.045)			(0.044)
treated=1 × Other		0.202***			0.149**
		(0.058)			(0.063)
treated=1 × access_relation=1			-0.039		-0.022
			(0.051)		(0.049)
treated=1 × matricule=1			-0.236***		-0.408***
			(0.032)		(0.055)
treated=1 × collaborator			0.060		0.012
			(0.046)		(0.046)
treated=1 × executor			0.116**		0.054
			(0.054)		(0.056)
treated=1 × Cluster 2				0.070	0.060
				(0.078)	(0.075)
treated=1 × Cluster 3				0.348***	0.397***
				(0.075)	(0.074)
treated=1 × Cluster 4				0.225***	0.226***
				(0.076)	(0.072)
Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	1917	1917	1917	1917	1917
R-squared	0.794	0.800	0.798	0.808	0.819

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.7: Always treated (by type of corruption) - OLS

	(1)	(2)	(3)	(4)
	Any type of corruption	**Withholding from salary**	**Mandatory bribe**	**Salary diversion**
treated=1	-0.322***	-0.344***	-0.047	-0.031
	(0.091)	(0.086)	(0.041)	(0.039)
treated=1 × 40-65	0.117***	0.088***	0.023**	0.002
	(0.022)	(0.020)	(0.010)	(0.009)
treated=1 × 65+	-0.023	-0.020	0.005	-0.083***
	(0.043)	(0.039)	(0.012)	(0.020)

treated=1 × Yes	0.027	-0.016	0.053***	0.014
	(0.024)	(0.021)	(0.011)	(0.010)
treated=1 × Medium skilled	-0.115***	-0.035	-0.069**	0.037***
	(0.041)	(0.032)	(0.029)	(0.013)
treated=1 × High skilled	-0.060	0.025	-0.082***	-0.028**
	(0.040)	(0.033)	(0.026)	(0.011)
treated=1 × Revival	-0.041**	-0.057***	-0.007	-0.045***
	(0.018)	(0.018)	(0.008)	(0.009)
treated=1 × Other	0.092**	0.044	-0.021***	0.097***
	(0.037)	(0.037)	(0.007)	(0.024)
treated=1 × access_relation=1	0.033	0.056***	-0.003	0.002
	(0.020)	(0.019)	(0.008)	(0.009)
treated=1 × matricule=1	-0.119**	-0.107*	-0.007	-0.045***
treated=1 × collaborator	(0.058)	(0.056)	(0.009)	(0.010)
	0.082*** (0.020)	0.050*** (0.019)	0.026*** (0.006)	-0.015* (0.008)
treated=1 × executor	0.007	-0.012	0.023**	-0.037***
	(0.026)	(0.024)	(0.011)	(0.011)
treated=1 × Cluster 2	-0.020	-0.035	0.010	0.019*
	(0.026)	(0.026)	(0.007)	(0.011)
treated=1 × Cluster 3	0.031	0.049	-0.019**	0.024**
treated=1 × Cluster 4	(0.034)	(0.033) 0.056**	(0.008)	(0.010)
	0.077*** (0.027)	(0.027)	0.020*** (0.007)	0.025*** (0.009)
Individual FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Observations	1917	1917	1917	1917
R-squared	0.227	0.189	0.167	0.200

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.8: Always treated: First stage

	(1)	(2)	(3)	(4)	(5)
		Probability to comply with the reform			
Night-time ligt intensity (nl_r)	0.075***	0.154**	0.134*	0.073*	0.136
	(0.027)	(0.061)	(0.079)	(0.044)	(0.109)
40-65	0.007	0.041*	-0.000	0.009	0.043**
	(0.017)	(0.021)	(0.017)	(0.017)	(0.022)
65+	-0.023	0.042	-0.031	-0.024	0.022
40-65 ×nl_r	(0.042)	(0.075)	(0.042)	(0.042)	(0.075)
		-0.087***			-0.099***
		(0.030)			(0.031)
65+ ×nl_r		-0.099			-0.089
		(0.086)			(0.087)
Yes ×nl_r		-0.004			0.009
		(0.032)			(0.033)
Medium skilled ×nl_r		-0.057			-0.081
		(0.054)			(0.057)
High skilled ×nl_r		0.018			0.006
		(0.052)			(0.056)
Revival ×nl_r		-0.045*			-0.034
		(0.027)			(0.027)
Other × nl_r		-0.082*			-0.070
access_relation=1 × nl_r		(0.046)	-0.091***		(0.046)
					-0.101***
			(0.029)		(0.029)
matricule=1 × nl_r			-0.039		0.057
			(0.071)		(0.073)
collaborator × nl_r			0.006		0.018
			(0.026)		(0.028)
executor ×nl_r			-0.013		0.019
			(0.034)		(0.038)
Cluster 2 ×nl_r				0.026	0.036
				(0.041)	(0.042)

Cluster 3 ×nl_r				0.000	-0.046
				(0.044)	(0.046)
Cluster 4 ×nl_r				-0.013	-0.031
				(0.040)	(0.041)
Id FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	1,917	1,917	1,917	1,917	1,917
R-sq	0.819	0.822	0.820	0.819	0.823
K. Paap F-Stat	7.66	4.49	9.28	7.84	6.19

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.9: Always treated: Reduced form

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
Night-time ligt intensity (nl_r)	0.019	-0.002	0.140*	-0.171***	0.029
	(0.029)	(0.063)	(0.082)	(0.045)	(0.109)
40-65 ×nl_r		-0.022			0.038
		(0.031)			(0.031)
65+ ×nl_r		-0.016			0.097
Yes ×nl_r		(0.089)			(0.088)
		0.082**			0.067**
		(0.034)			(0.033)
Medium skilled ×nl_r		0.036			0.125**
		(0.056)			(0.057)
High skilled ×nl_r		-0.047			0.005
Revival ×nl_r Other ×nl_r		(0.054)			(0.056)
		0.071***			0.077***
		(0.027)			(0.027)
		0.246***			0.210***
		(0.048)			(0.047)
access_relation=1 × nl_r			-0.030		-0.010
matricule=1 × nl_r			(0.030)		(0.030)
			-0.187**		-0.358***
			(0.073)		(0.074)

collaborator × nl_r			0.099***		0.043
			(0.027)		(0.028)
executor×nl_r			0.113***		0.040
Cluster 2 ×nl_r			(0.035)	0.080*	(0.038)
					0.080*
Cluster 3 × nl_r				(0.042)	(0.042)
Cluster 4 ×nl_r				0.317***	0.366***
				(0.045)	(0.046)
				0.245***	0.240***
				(0.041)	(0.041)
Id FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	1,917	1,917	1,917	1,917	1,917
R-sq	0.782	0.788	0.785	0.792	0.802

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.10: Always treated: IV

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
treat	0.257	0.634	0.395	-0.140	0.537
	(0.409)	(0.631)	(0.365)	(0.375)	(0.519)
40-65 ×treated		0.018			0.046
		(0.042)			(0.038)
65+ ×treated		-0.027			0.026
		(0.080)			(0.069)
Yes ×treated		0.108**			0.072
		(0.053)			(0.047)
Medium skilled ×treated		0.091			0.179*
		(0.102)			(0.094)
High skilled ×treated		-0.092			-0.033

Revival × treated		(0.086)			(0.078)
Other × treated		0.122**			0.116**
		(0.058)			(0.046)
		0.392***			0.310***
		(0.109)			(0.090)
access_relation=1 × treated			-0.003		0.051
matricule=1 × treated			(0.060)		(0.076)
			-0.197**		-0.443***
			(0.092)		(0.103)
collaborator ×treated			0.110***		0.012
			(0.035)		(0.046)
executor ×treated			0.142***		0.008
			(0.045)		(0.060)
Cluster 2 ×treated				0.097*	0.049
Cluster 3 ×treated				(0.051)	(0.065)
Cluster 4 ×treated				0.384***	0.435***
				(0.055)	(0.067)
				0.294***	0.269***
				(0.049)	(0.058)
Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	1917	1917	1917	1917	1917
R-sq	-0.179	-0.747	-0.181	0.024	-0.278
F-Stat (first stage)	7.66	4.49	9.28	7.84	6.19

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Post reform treated: those who opened a bank account after the re-form

Table A.11: Post-reform treated: OLS

	(1)	(2)	(3)	(4)	(5)
	Probability to experience instances of corruption				
treated=1	-0.303***	-0.370***	-0.227***	-0.438***	-0.397***
	(0.006)	(0.022)	(0.028)	(0.012)	(0.038)
treated=1 × 40-65		-0.042***			-0.027***
		(0.010)			(0.010)
treated=1 × 65+		-0.101***			-0.050**
		(0.020)			(0.021)
treated=1 × Yes		0.013			0.016
		(0.010)			(0.010)
treated=1 × Medium skilled		0.111***			0.109***
		(0.021)			(0.021)
treated=1 × High skilled		0.100***			0.087***
		(0.020)			(0.021)
treated=1 × Revival		-0.007			-0.002
		(0.009)			(0.009)
treated=1 × Other		0.081***			0.062***
		(0.021)			(0.020)
treated=1 × access_relation=1			-0.032***		-0.029***
			(0.010)		(0.010)
treated=1 × matricule=1			-0.087***		-0.111***
			(0.027)		(0.027)
treated=1 × collaborator			0.029***		0.011
			(0.010)		(0.010)
treated=1 × executor			0.018		-0.001
			(0.014)		(0.015)
treated=1 × Cluster 2				0.094***	0.091***
				(0.014)	(0.014)
treated=1 × Cluster 3					
treated=1 ×					

Cluster 4				0.363***	0.358***
				(0.014)	(0.014)
				0.191***	0.186***
				(0.013)	(0.013)
Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	18,180	18,171	18,180	18,180	18,171
R-squared	0.759	0.761	0.760	0.769	0.771

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.12: Post-reform treated by corruption type: OLS

	(1)	(2)	(3)	(4)
	Any type of corruption	**Withholding from salary**	**Mandatory bribe**	**Salary diversion**
treated=1	-0.282***	-0.233***	-0.121***	-0.138***
	(0.033)	(0.030)	(0.016)	(0.013)
treated=1 × 40-65	0.008	0.015*	-0.013***	0.005**
	(0.009)	(0.008)	(0.004)	(0.003)
treated=1 × 65+	0.011	-0.011	0.024**	0.005
	(0.017)	(0.014)	(0.011)	(0.006)
treated=1 × Yes	-0.020***	-0.015**	-0.007***	-0.000
	(0.008)	(0.007)	(0.003)	(0.003)
treated=1 × Medium skilled	0.028**	0.003	0.023***	0.027***
	(0.014)	(0.013)	(0.004)	(0.004)
treated=1 × High skilled	0.024	0.002	0.029***	0.019***
	(0.014)	(0.014)	(0.005)	(0.004)
treated=1 × Revival	-0.015**	-0.003	-0.004	-0.015***
	(0.007)	(0.007)	(0.003)	(0.002)
treated=1 × Other	0.074***	0.078***	0.004	-0.017***
	(0.021)	(0.020)	(0.007)	(0.003)
treated=1 × access relation=1	0.005	-0.008	0.005	-0.002
	(0.008)	(0.007)	(0.004)	(0.003)
treated=1 × matricule=1	-0.040	-0.008	-0.005	-0.003

	(0.024)	(0.020)	(0.012)	(0.011)
treated=1 × collaborator	0.000	0.006	0.003	-0.004
	(0.008)	(0.008)	(0.004)	(0.004)
treated=1 × executor	0.012	0.008	0.014***	0.007
	(0.012)	(0.011)	(0.005)	(0.005)
treated=1 ×Cluster 2	0.018*	-0.001	0.011**	0.013***
	(0.010)	(0.009)	(0.004)	(0.003)
treated=1 ×Cluster 3	0.018	0.012	0.004	0.003
	(0.013)	(0.013)	(0.004)	(0.004)
treated=1 ×Cluster 4	0.019*	0.010	0.002	0.006**
	(0.010)	(0.009)	(0.004)	(0.003)
Individual FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Observations	18,171	18,171	18,171	18,171
R-squared	0.120	0.091	0.051	0.060

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.13: Post-reform treated: First stage

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
					Probability to comply with the reform
Night-time ligt intensity (nl_r)	0.130***	0.075**	0.057	0.172***	0.081
	(0.019)	(0.032)	(0.040)	(0.024)	(0.051)
40-65 ×nl_r		0.037***			0.027**
		(0.011)			(0.011)
65+ ×nl_r		0.013			-0.003
		(0.021)			(0.021)
Yes ×nl_r		0.007			0.005
		(0.014)			(0.014)
Medium skilled ×nl_r		0.001			-0.008
		(0.025)			(0.026)
High skilled ×nl_r		0.028			-0.002
Revival ×nl_r		(0.025)			(0.026)
		0.040***			0.036***
		(0.013)			(0.013)

Other × nl_r		-0.001			0.001
		(0.029)			(0.029)
access_relation=1 × nl_r			-0.001		0.001
matricule=1 × nl_r			(0.013)		(0.013)
			0.091***		0.080**
			(0.035)		(0.035)
collaborator × nl_r			-0.013		-0.014
executor × nl_r			(0.013)		(0.014)
Cluster 2 × nl_r			-0.060***		-0.059***
			(0.018)		(0.019)
				-0.071***	-0.063***
Cluster 3 ×nl_r				(0.017)	(0.017)
				-0.072***	-0.066***
				(0.025)	(0.025)
Cluster 4 ×nl_r				-0.019	-0.016
				(0.017)	(0.017)
Individual FE		Yes	Yes	Yes	Yes	Yes
Period FE					Yes 18,180	Yes
Obs.		18,180	18,171	18,180		18,171
R-sq		0.744	0.744	0.744	0.744	0.744
K. Paap F-Stat		44.77	46.23	49.00	44.65	51.15

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.14: Post-reform treated: Reduced form

	(1)	(2)	(3)	(4)	(5)
	Probability of experiencing instances of corruption				
Night-time ligt intensity (nl_r)	-0.057***	0.110***	0.033	-0.214***	0.155***
		(0.029)			(0.047)
		-0.043***			-0.028***
40-65 ×nl_r		(0.010)			(0.010)
		-0.082***			-0.044**
65+ ×nl_r	(0.018)	(0.019)	(0.037)	(0.022)	(0.020)
Yes ×nl_r		0.011			0.013

		(0.013)			(0.013)
		0.093***			0.092***
		(0.023)			(0.023)
Medium skilled × nl_r		0.087***			0.082***
High skilled × nl_r		(0.023)			(0.024)
Revival ×nl_r		-0.022*			-0.015
					(0.012)
		(0.012)			0.056**
Other × nl_r		0.075***			(0.026)
access_relation=1 ×nl_r		(0.026)	-0.029**		-0.025**
			(0.012)		(0.012)
			-0.098***		-0.115***
matricule=1 × nl_r			(0.032)		(0.032)
collaborator × nl_r			0.020*		0.005
			(0.012)		(0.013)
executor ×nl_r			0.026		0.013
					(0.018)
Cluster 2 ×nl_r			(0.016)	0.118***	0.114***
				(0.016)	(0.016)
				0.340***	0.332***
				(0.023)	(0.023)
Cluster 3 × nl_r				0.185***	0.178***
Cluster 4 ×nl_r				(0.016)	(0.016)
Individual FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	18,180	18,171	18,180	18,180	18,171
R-sq	0.730	0.731	0.730	0.734	0.735

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.15: Post-reform treated: IV

	(1)	(2)	(3)	(4)	(5)
Probability to experience instances of corruption					
treat		-0.441***	-0.515***	-0.379**	-
0.571***		-0.521***			
	(0.132)	(0.143)	(0.149)	(0.125)	(0.147)

40-65 ×treated		-0.043***			-0.033**
		(0.016)			(0.015)
65+ ×treated		-0.088***			-0.050**
		(0.023)			(0.023)
Yes ×treated		0.015			0.017
		(0.013)			(0.013)
Medium skilled ×treated		0.105***			0.100***
		(0.025)			(0.025)
High skilled ×treated		0.110***			0.089***
		(0.025)			(0.025)
Revival ×treated		-0.006			0.000
		(0.014)			(0.013)
Other × treated		0.084***			0.064**
		(0.029)			(0.028)
access_relation=1 × treated			-0.033***		-0.029**
			(0.013)		(0.012)
matricule=1 ×treated			-0.070*		-0.099**
			(0.042)		(0.041)
collaborator ×treated			0.016		-0.001
			(0.013)		(0.013)
executor ×treated			-0.001		-0.018
			(0.020)		(0.021)
Cluster 2 ×treated				0.090***	0.090***
				(0.019)	(0.019)
Cluster 3 ×treated				0.360***	0.354***
				(0.027)	(0.027)
Cluster 4 ×treated				0.191***	0.188***
				(0.016)	(0.016)
Id FE	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Obs.	18,180	18,171	18,180	18,180	18171
R-sq	0.085	0.093	0.085	0.123	0.132

F-Stat (First stage)	44.77	46.23	49.00	44.65	51.15

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.16: Effect of survey-rounds gaps

	(1)	(2)	(3)	(4)
	Any type of corruption	**Withholding from salary**	**Mandatory bribe**	**Salary diversion**
Treatment	-0.329***	-0.269***	-0.100***	-0.117***
	(0.006)	(0.006)	(0.004)	(0.004)
Treated ×2020 round	0.132***	0.073***	0.022**	0.038***
	(0.014)	(0.014)	(0.010)	(0.010)
Treated ×2021 round	0.138***	0.123***	-0.006	-0.001
	(0.013)	(0.013)	(0.011)	(0.011)
Constant	0.388***	0.319***	0.115***	0.127***
	(0.003)	(0.003)	(0.002)	(0.002)
Individual FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Observations	20,097	20,097	20,097	20,097
R-squared	0.766	0.735	0.691	0.675

Reference group: 2016-2018 round.

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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