DO HIGHER SALARIES LOWER PETTY CORRUPTION?

A POLICY EXPERIMENT ON WEST AFRICA'S HIGHWAYS[1]

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Abstract

In one of the most ambitious public sector reform experiments in Africa, the Ghana government doubled its police officer salaries in 2010 in part to mitigate petty corruption on its roads. Neighboring countries in the West African region left their police salaries unchanged. Using unique data on bribes paid from over 2,100 truck trips in West Africa and representing over 45,000 bribe opportunities, we evaluate the reform impacts on petty corruption using a difference-in-difference method that exploits the exogenous policy experiment. By following bribes paid by the same trucks in different countries as well as to different civil servants in Ghanaian bribe taking we can identify whether salaries affect both the number of bribes and the amount given by truckers. Rather than decrease petty corruption, the salary policy significantly increased the value of bribes and the amounts given by truck drivers to policemen in total. Robustness checks show the higher bribe amount is robust to alternative specifications. Moreover, we do not find that Ghana policemen collected significantly fewer bribes than other officials in the same country. *(JEL K42, R40)*

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Introduction

How can we lower the incidence of petty corruption? Given the weaknesses of institutions in developing countries, mitigating leakages has long been a concern to economists and policymakers, and understanding this question is important for improving economic efficiency and outcomes. A recent survey of the emerging literature on corruption and economic incentives (Olken and Pande, 2012) succinctly presents the need for research to tackle the fundamental question confronting policy makers: how to promulgate policies to reduce corruption. Indeed the authors of that review note that in providing policy guidance for an anti-corruption agency they "had more questions to pose than concrete answers." (Olken and Pande (2012: 481)).

A key economic insight from the corruption literature in Lambsdorf (2006) shows that if one distinguishes between small-scale (petty) corruption and large-scale government corruption, it is the petty corruption that has the largest effect on foreign investment. The logic is that paying off a high-ranking government official a single time, while costly, buys peace of mind and potentially a lower risk outcome, once the officials are bribed. In contrast petty corruption as studied in this proposal is stochastic, unpredictable, suggests a lack of the rule of law, likely increases the risk of investment and has a potentially large negative effect on growth. It is therefore the type of corruption that is most difficult to root out as well as most pernicious in its effects.

This paper exploits one of the most ambitious policy reforms in Africa to ask whether raising salaries for corrupt officials improve or worsen petty corruption outcomes in developing countries. One reason why this is interesting from a policy perspective is because officials' salaries in poor countries are low, creating an identification problem on the origins of petty

corruption. On the one hand, petty corruption outcomes such as bribery may be only manifestations of low incomes and corruption would reduce significantly if incomes were raised substantially. On the other, corrupt outcomes might occur independently of income levels and be worsened by a higher "appetite" that higher incomes would bring. These effects are further complicated by the reality that corrupt officials' incomes, persist in broader environments, so that other agents (e.g. those who must pay bribes to officials) may be aware that certain officials have higher salaries and potentially alter their strategies to reflect changes.

Collectively, these questions underlie the issue on whether raising salaries create externalities or affect incentive structures beyond the relative welfare of officials. Classic economic models show that individuals care about both their absolute and relative incomes. More recently, Peter Kuhn, Peter Kooreman, Adriaan Soetevent and Arie Kapteyn, (2011) find that happiness is not negatively affected when neighbors win the lottery. Although there is currently little work on how peer salaries can affect job satisfaction (e.g. David Card, Alexandre Mas, Enrico Moretti, and Emmanuel Saez. (2012)), there is even less on the impacts of pay differentials on the incentives driving agents toward petty corruption.

In this paper, we use detailed survey data and experimental evidence to study this question in one particular context: bribery and corruption on highways in West Africa. In July 2010, the Ghana Government implemented a "single-spine" salary structure for all police officials (unilaterally doubling their incomes) in an effort to improve officials' living standards and curb highway bribery by said officials. On the other hand, neighboring countries in the West African region left their police salaries unchanged throughout the period, as did other officials within Ghana. Between 2006 and 2012 the United States Agency for International Development (USAID) West African Trade Hub has collected unique data from over 2,100 long-haul truck

trips in the sub-region, representing over 45,000 bribe opportunities on the road between Tema, Ghana and Ouagadougou, Burkina Faso. By following bribes paid by the same trucks in different countries as well as aggregate trends in Ghanaian bribe taking using a difference-in-difference methodology, we can identify whether salaries affect both demand for bribes and the amount given by truckers.

We find that due to raised salary impacts for Ghanaian police officers relative to customs agents causes the police to increase the value of bribes taken at each individual stop by between 20-40 percent (~$0.20 - $0.40), increase the total amount taken on the road, even while they reduce the number times they receive a bribe. In other words, the higher salary translates into petty corruption becoming more intense even while its frequency is reduced. The experimental results regarding the short and medium term effects of the initiative suggest that relative to policemen in Burkina Faso, the corruption impacts of higher salaries in Ghana become stronger with time. We also find evidence that the single spine salary policy for Ghanaian police officials coincided with lowered corruption levels of Ghanaian customs officials who did not receive the salary package.

The question of incentive-compatible anti-corruption policy is a growing concern for political and development economists as shown by an increasing number of studies focusing on countries such as Indonesia (e.g. Benjamin Olken (2007); Benjamin Olken and Patrick Barron, (2009)), India (Marianne Bertrand, Simeon Djankov, Rema Hanna and Sendhil Mullanaithan (2007)), and Uganda (e.g. Raymond Fisman and Jakob Svensson (2007). One study based in Italy highlights the need to disentangle inefficiency from corruption (Oriana Bandiera, Andrea Prat, and Tomasso Valletti (2009). Such approaches are nested in the need to improve state capacity as outlined in Rose-Ackerman (2010).

Little research has studied the cross-border aspects of corruption. An exception is Zitzewitz, (2011) in which the International Skating Union found that an anti-corruption transparency reform led to more nationalistic bias from within-country judges. No study (to the best of our knowledge) has been able to evaluate polices aimed at lowering petty corruption on highways on an international scale. This gap in the literature persists although Freund and Rocha (2009) show that delays in the time it takes to get goods in and out of ports represents a major deterrent to the level of trade within and among African countries, but especially so for those that are landlocked.

This paper addresses a need to study and evaluate evidence on corruption that occurs across national boundaries. Although, high levels of corruption on the truck routes of West Africa are most certainly detrimental to the viability of both exports and imports, international highways are becoming more dominant across the countries of Latin America, Asia and the Middle East. Policy on petty corruption at the international level in these areas may similarly benefit from understanding how petty corruption might transpire even in the context of international trade.

The remainder of the article proceeds as follows. The second section discusses the single spine salary policy implemented in Ghana. The third section presents some descriptive statistics of the data. The fourth section discusses the empirical strategy and results. Section 5 provides a discussion of our findings, and the sixth section concludes.

The Single Spine Salary Structure (SSSS) in Ghana

Following independence in 1957, corruption in the Ghanaian public service led to economic then political instability in the 1960s and 1970s and a series of coups into the early 1980s. Public pay

review interim commissions mandated with harmonizing salary standards in the Ghana Universal Salary Structure (GUSS) post-independence public pay system had difficulties implementing reforms in the context of political unrest.

After returning to democracy in 1992, the Gyampoh Commission met during the rule of President Jerry Rawlings to plan and implement the public sector reforms but disbanded only a year later (Atafor 2012). In 2000, President Kufour's Ministry of Public Sector Reforms constructed a pay policy to correct existing disparities within the public sector, renamed the Single Spine Salary Structure (SSSS) and announced in 2007. Although the President Kufuor's Government had intended to implement these public sector pay reforms, it lost general elections to the NDC in 2008.

The NDC Government issued an announcement in November 2009, pledging to mitigate pay disparities in the public service; implement numerous pay negotiations; and improve productivity through payment channels (Atafor 2012). To facilitate SSSS implementation, public sector workers were categorized by job similarities. Factors influencing categorization include education; skills; training; and career roles. Parliament passed the Fair Wages and Salaries Commission (FWSC) to administer the SSSS in 25 levels. Following negotiations with public sector unions in 2009, the SSSS was implemented in July 2010.

Ghana Police Salary Increases

> Everyone is hoping to see the end of corruption, inefficiency and bribery by the police, now that their salaries have gone up.

--Stephen Owusu (2011) *Can Single-Spine Salary For Police Stop Bribery and Corruption?*

The Fair Wages and Salaries Commission migrated the Ghana Police Service to the single spine structure on July 1, 2010, leading to a doubling of police salaries. Although having other public sectors on the same structure helped harmonize pay standards across sub-sectors, this might have influenced the impression that the SSSS was meant to add more funds to all salaries. When the Ghana Prison Services, Ghana National Association of Teachers, National Association of Graduate Teachers, Civil and Local Government Staff Association Ghana; Ghana Medical Association and others received their pay without significant increases, they either picketed, demonstrated, threatened strike action or actually took such actions.

Two reasons seem to account for Ghana giving a disproportionate rise in salaries to the police as the first civil servants to get such a raise. Historically, the police service has been the least paid of all public sector workers in Ghana. Second, it was thought that this measure could curb corruption, as noted in the above media report. Thus, one might consider it both fair and the investment with the highest expected return in terms of lowered corruption to give disproportionate raises to the police.

Data

This investigation draws on unique data collected by the USAID-West Africa Trade Hub (WATH) project since 2006 from over 2,500 trucks plying the roads in West Africa. Since 2006 they have been giving surveys to long-haul trucks plying the major truck routes of West Africa. The dataset for this work includes trucks traveling back and forth from Ouagadougou to the port town of Tema, Ghana. Drivers of trucks on these routes wrote down the delay, amount paid and

the official type each time they paid an average of 27 bribes per trip to seven different types of officials spread out along these corridors.

In the dataset each checkpoint stop for an individual driver represents a data point, which produces some 40,000 useable stops for more than 2,400 drivers on trips in Ghana and Burkina Faso. There are seven different types of stops recorded: Customs, Forestry, Gendarmerie, Health, Other, Police, and Unions on the road from Tema in Ghana to Ouagadougou in Burkina Faso. The data also include information on driver and truck characteristics including country of origin of the driver & truck; truck type (tanker, container, general purpose); truck value; and driver education level. Since in Ghana over 90% of the stops are either customs or police, we use only the data on customs and police stops in both Ghana and Burkina Faso.

The surveys were given to truck drivers at the beginning of their trips. When the drivers are approached with a survey, an expert in trucking checks their papers and assesses if the papers for the truck and cargo are in order. If they are and the truck driver agrees to take the survey, they are given a survey to fill out which is then collected at the end of the trip. Only trucks scheduled to drive the whole trip are given surveys to fill out. It is estimated by those that hand out the survey that the trucks with their papers in order represent about one-third of the long-haul trucks on the road. The data therefore represent a selected sample that represents the minimum levels of bribes paid, since the trucks without appropriate papers will be likely to pay higher bribes.

Our data suggest that the total cost of bribes is between $0.03 and $0.17 per kilometer, implying that bribes are a non-negligible 1-5% of total costs, and between 2% and 10% of variable costs. In addition the data show delays due to petty corruption that can add up to an

extra day in transit. The average bribe paid in Ghana is just under $1 on average, with the most frequent bribe amount being paid at 1 Ghanaian Cedi.

A Theory of Bribe Taking

We present below a simple theoretical model that captures multiple potential outcomes from increasing police salaries. Because there are multiple possible outcomes, below we call the testable hypotheses "conjectures" rather than propositions. A first possibility, as envisioned by the policy, is that increased salaries will reduce police bribe taking because the higher salary will substitute for the earnings from bribes. This first idea we will model as a career concerns issue in which a policeman reduces his bribe taking in order to preserve his future, now higher income. Another possibility is that an increased salary for policemen will increase the amount of money that it takes to bribe a policeman.[2] In this case the logic is with their higher salaries a policeman will require higher amounts of money to engage in illegal behavior.

Assume a potentially corrupt official has a utility function A_t in period t which takes the following form: $A_t = B_t + g(e_t) - c(e_t)$, where B_t is the salary, e_t is the effort chosen by the official to solicit a bribe, while $g(e_t)$ is an increasing concave function representing the bribe value received from effort e_t while $c(e_t)$ is an increasing concave function representing the utility cost to an official from asking for and taking a bribe. For an official to take a bribe it must be that for some low levels of effort $g(e_t) > c(e_t)$, which, given the ubiquity of bribe taking, we assume to hold in all cases. In a one period model as set forth, the optimal bribe effort e^* will equate $\partial g/\partial e = \partial c/\partial e$ and changes in B_t will not affect the effort to solicit bribes.

[2] An Accra taxi driver named Kofi outlined the ideas behind this model for us during fieldwork.

Conjecture 1: Salary levels have no effect on the level (and amount) bribe taking.

We analyze the second possibility first. In this case let the disutility of bribe effort function *c(.)* be an increasing multiplicative function of the salary level, B_t , $c(e_t, B_t)$, such that $\partial c/\partial B > 0$. Intuitively the disutility of asking for a bribe now goes up with the salary of the official. This could be motivated by social norms such as suggested by Acemoglu and Jackson (2014) in which you need a higher amount to get over the social norms. Now the optimal level of effort e^* will be an increasing function of the salary level B_t: $\partial e/\partial B > 0$.

Conjecture 2: Increased salaries will increase the level (and amount) of bribe taking

Next we consider the potential effects of a salary increase on an official's career concerns using a two period version of the same utility function: $A_t = B_t + g(e_t) - c(e_t)$. Let the two period utility function be given by $V = A_t + E[\theta_{t+1}(e_t)]\,\delta\, A_{t+1}$, where δ is a discount rate and $E[\theta_{t+1}(e_t)]$ is the expected probability that an official will lose his or her employment in period $t+1$ because of bribe taking in period t, e_t . Since salary increases will increase future income A_{t+1} it will increase the incentive for officials to keep their jobs, which will reduce the incentives to ask for bribes $\partial e/\partial B > 0$.

Conjecture 3: Increased salaries will decrease the level (and amount) of bribe taking.

As should be obvious, these three conjectures are mutually exclusive in levels and in amounts respectively, but it is possible that one could have a significant effect on levels in one direction and a significant effect in a different direction in amount of bribe taking.

Policy Experimental Design

In our policy experiment set up we have civil servants (Ghanaian policemen) who have received a treatment (higher salaries) and other civil servants (e.g., Ghanaian customs agents or Burkinabé policemen) who did not receive such a treatment. We observe these treated and control populations in multiple interactions (~45,000 bribe "opportunities") with truck drivers across 6 years: 4 years before the experiment (2006 – June 30, 2010) and two years afterwards (July 2010 – 2012).

This unique experimental set up allows us to use a difference-in-difference and triple difference approach making use of the variation across civil service type, country and year (Wooldridge, 2002) to test the effects of raises in police salaries on bribes. We can test the effect of the treatment (salary increase) on the amount and levels of bribe taking at both individual stop and national levels, while controlling for truck, truck driver, road, time, and country characteristics.

The key outcome (dependent) variables we will be testing are: the amount paid at each stop, the number of stops where no bribe is paid, and the total amounts paid on a road. Specific hypotheses to be tested with this methodology are that the rise in police salaries has: 1) Reduced the amount paid in bribes to policemen in Ghana compared to other countries and other civil servant types. 2) Reduced the number of times a truck is stopped and asked to pay a bribe by policemen in Ghana compared to other countries and other civil servant types. 3) That #1 and #2 combined have reduced the overall cost and delays associated with bribery on the roads of Ghana.

Econometric Model

Our econometric strategy uses a difference-in-difference method to test the effects of the salary policy change for policemen relative to other civil servants. Let Y_{ijt} be a bribe paid by truck *i* at checkpoint *j* at time *t*, and let X_{ijt} be the characteristics of a truck, *i*, stopping at checkpoint *j* at time *t*. Our basic equation of interest will then be:

$$Y_{ijt} = \alpha + \beta_1 Police_{jt} + \beta_2 Salary\_Policy_{jt} + \beta_3 Police_{jt} X Salary\_Policy_{jt} + \gamma X_{ijt} + \lambda T + \varepsilon_{ijt}, \quad (1)$$

where β_3 is our difference-in-difference parameter of interest, *T* is a time trend or series of time dummies and ε_{ijt} is a standard error term which we cluster at the truck level in the estimations. The equation (1) is estimated with data from Ghana and provides the difference between bribes to policemen and customs officers. We also estimate (1) as a probit model in which the dependent variable is the number of times a truck is stopped at a roadside checkpoint and leaves without paying a bribe. Versions of (1) are also estimated with the bribe amounts aggregated across *j* so that Y_{it} represents the average bribe a truck pays on the road. Similar estimates are done with the number of stops with no bribe and the total number of stops. All of the aggregated estimates have robust standard errors, rather than clustered errors at the truck level as in the baseline equation.

We then expand the dataset to include the bribes that the trucks paid Burkina Faso, which allows us to estimate (1) as a panel data fixed effects model. Our equation will now be:

$$Y_{ijt} = \alpha + \beta_1 Police_{jt} + \beta_2 Salary\_Policy_{jt} + \beta_3 Police_{jt} X Salary\_Policy_{jt} + \lambda T + \eta_i + \varepsilon_{ijt}, \quad (2)$$

where η_i is a truck specific fixed effect that controls for differences between trucks. Here the results we obtain will be driven by differences of the bribes paid within a single truck trip, although the difference-in-difference will be driven by the checkpoint civil servant and policy changes. This fixed effect regression will control for any changes in truck "quality" between

before and after the policy change as might happen if the policy change induced truckers to improve the quality or compliance of their trucks with police checkpoints. We also estimate a random effects probit version of (2) with the probability of zero bribes as a dependent variable.

Results

Table 1 shows descriptive statistics for the variables used in the main regressions for the Ghana part of the dataset. As shown across all years the average bribe was the equivalent of 473 CFA, just under $1 at the exchange rates of the period. The average truck had 16 stops in the Ghana portion of the trip, with 6.5 stops in Burkina Faso. About 13% of the stops involved no bribe paid and 53% of the stops are with police while the other ones are with customs officers. More than 90% of the drivers are Ghanaian, with half of the trucks having Ghanaian registry, and 15% are oil tanker or container trucks, which are less likely to be carrying illegal cargo than general-purpose trucks.

The baseline difference-in-difference regressions measuring the amount paid of each bribe (including non-payment at a stop) are presented in table 2, with standard errors clustered at the level of the 2,147 drivers. They show that the interaction of police and salary policy dummy variables produces about a 100 CFA increase in bribes at each stop across the whole time period. No major changes in the parameter estimates come from including year and quarter effects. If one reduces the sample to just 2010, the year of the change, or to June and July of that year, the month before and after the policy change, one finds even larger effects of 168 CFA for 2010 and 583 for just July 2010. These latter two estimates may suffer from an anticipation bias since the salary change was anticipated by spring 2010 and certainly known in June 2010. But the higher

magnitude is consistent with the baseline that the higher salaries caused higher bribe levels. Thus we find evidence in the baseline for conjecture 2.

We extend the baseline in table 3 to include variables describing the truck and driver, whether the particular day the bribe is paid was a holiday, and whether the truck was coming from the port, since many of the return trips are mostly empty trucks. The basic results shown in table 2 hold up with these additional controls and our point estimate of the effect goes up to 109 CFA. Among the control variables, only trucks coming from the port has a significant effect, lower bribe values likely due to the empty trucks going to the port having higher propensities to carry illicit goods.[3] We continue to see strong evidence for conjecture 2.

We then proceed to investigate the number of times that a truck is allowed to pass through a road-stop without paying a bribe using a probit regression framework, which provides a measure of the amount of bribe taking. Table 5 shows significant positive effects of the salary policy on whether a policeman allows a truck to pass without paying a bribe. In opposition to our results on the level of payment, these results show that policemen took fewer bribes overall than before the change. The raw data show that before the salary change policemen allowed 10% of the trucks to pass without taking a bribe and that this level increased to 19% of the trucks after the salary policy change. In general trucks were less likely to pay a bribe on a holiday, if their vehicle was registered in Ghana, although they paid higher bribes if the driver was Ghanaian. Thus our difference-in-difference results provide evidence for conjecture 3 in the amount of bribes.

[3] In both Ghana and Burkina Faso, long-haul trucks such as these are not allowed to pick up goods or people along the way to either bring to another intermediate point or to the end point. Thus even normally legal goods such as charcoal or pineapples might be illicit for these trucks.

While the above estimates provide evidence for how bribe taking changes within Ghana, it is possible that there are unmeasured trends that could be confounding our data within Ghana. We therefore turn to a triple difference fixed effects estimate in which we estimate the effects of the policy in Ghana relative to the amounts paid to customs agents and policemen in the neighboring country of Burkina Faso, who were not affected by the change. In addition, with the truck fixed effects, we are able to control for potential confounding effects of truck characteristics unobservable in the data, but readily observable to a policeman (e.g., a broken headlight). This can account for any differences in the truck fleet that might have occurred after the salary policy change. If for example truck fleets changed the quality of their trucks due to the salary change, the OLS regressions would not be robust to this effect, but the fixed effects would be.

Table 5 shows the panel fixed effects results for the baseline with a year time trend, one with year dummies, other controls, for 2010 only and for June and July 2010. The three models with the full dataset show significant effects of the police salary policy relative to Burkina Faso and non-policemen on the order of 185 CFA, which represents a 39% increase in the level of bribes after controlling for truck and country effects. On the other hand this effect is not robust to only using 2010, or the months around the change as the dataset, which show negative, although not significant effects. This suggests that the biggest effects are noticeable in the longer term in the data, rather than the short-term, or that anticipation of the policy change may affect our results in 2010. Overall, the panel data results confirm the support for conjecture (2) that the salary increase will increase bribe values. For 2010 we cannot reject in the panel data our conjecture (1) that salaries have no effect.

In order to test the number of stops without a bribe in the panel dataset, we estimate a random effects probit, which is shown in table 6 with both year trends and year dummies. In the random effects probit we find corroborating evidence that the salary change increased the number of trucks that policemen stop and ask for a bribe went down after police salaries went up. Thus the evidence is that for each stop, the probability a truck did not have to pay a bribe went up for Ghanaian policemen after the salary change relative to customs officers or Burkinabé policemen. This provides evidence for conjecture (3) in the amount of bribe taking.

While the previous estimates are done at the level of each individual time a truck stops, they do not tell us about how the aggregate price to travel on the road and number of total stops might change with the Ghanaian police salary change. In order to test those effects the regressions in tables 7 and 8 use data aggregated at the level of a truck trip through Ghana. Table 7 shows the effects of the salary policy on the aggregate amount paid in bribes on the road in Ghana and the percent of stops with no bribe. Consistent with our previous findings, we see that the salary policy increased the total amount of bribes paid to policemen by a statistically significant 140 CFA. This represents a 4-5% increase in the amounts of bribes paid on the road due to the policy change. We also find that the number of stops without a bribe goes up significantly after the salary policy change.

Table 8 shows how the salary policy changes the number of stops on the road and the number of stops at which a bribe is paid. The first two columns show that the police salary change increased the number of stops on the road by 0.7 stops, which is an 8% increase over the average of 8.5 stops by policemen in Ghana. This suggests that while the salary increase encouraged policemen to be more likely to let trucks go without paying a bribe, the higher salary also increased the number of police stops. Both of these effects could be interpreted as evidence

of policemen doing their job better after the salary increase. It is just that doing the job "better" may also mean collecting higher bribes. The last two columns of table 8 show that the total number of bribes paid on the road, which equals the total number of stops minus the number of stops with zero bribes paid, is unchanged by the increase in police salaries. Thus the result seen at the individual stops in which policemen were more willing to let trucks pass without a bribe after police salaries increased, did not mean truckers paid a smaller number of bribes. The 8% increase in the number of police stops completely offset the reduction in the number of bribes paid. This gives evidence for conjecture (1) in the amount of bribes: that a salary increase will not change the number of bribes collected.

Finally to demonstrate that there has been an increase in zero bribes and a reduction of low level (1 cedi) bribes for policemen relative to customs officers in Ghana, figures 1 and 2 show kernel density estimates of the bribe amounts in Ghanaian Cedis, with values truncated at 10 to focus the analysis. Figure 1 shows an increase in mass at zero and two cedis, while a reduction in one cedi bribes after the policy change. Figure 2 shows that customs officers have a different behavior with bribes reduced after July 2010, with more of them being one cedi rather than two or three. This provides corroborating evidence that the effect of the salary policy change was to increase the value of bribes asked for by policemen, but to reduce the number of bribes they asked for.

Conclusions

This work has used a policy experiment in Ghana to show that increasing salaries of civil servants can have multiple different effects on bribe taking by those civil servants. The work

shows that policemen who received the single spine salary increase in Ghana increased the value of bribes they took, the total amount that truckers had to pay on the road, all while they decreased the number of times they asked for a bribe. Their decreasing the number of times they ask for a bribe could be related to career concerns in which the more often one asks for a bribe, the higher the probability of losing one's job. On the other hand the increased value of bribes taken is consistent with the idea that higher civil service salaries induce civil servants to demand higher bribes.

Since the Ghanaian salary increase experiment took place without a commensurate increase in enforcement of anti-corruption laws, the results here suggest that merely raising salaries without changing the context and incentives within which the civil servants operate may not have the desired or hypothesized effects on corruption. The results presented here suggest that fighting corruption cannot be done by salary policies alone.

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Table 1: Descriptive Statistics for the Ghana data

Variable |	Obs	Mean	Std. Dev.	Min	Max
Bribe value in CFA (500 ~ = $1)	34873	473.728	1311.25	0	150289
No bribe paid at a stop	34873	0.13127	0.33770	0	1
Police	34873	0.52745	0.49925	0	1
Salary Policy	34873	0.39397	0.48863	0	1
Police X Salary Policy	34873	0.21145	0.40834	0	1
Container or Tanker Truck	34873	0.14759	0.35470	0	1
Holiday	34873	0.16628	0.37234	0	1
Ghanaian Vehicle	34873	0.57804	0.49387	0	1
Ghanaian driver	34873	0.91208	0.28318	0	1
Coming from the port	34873	0.78909	0.40795	0	1

Table 2: Baseline Regressions OLS

Dependent variable is real CFA value of bribe paid at each stop

VARIABLES	(1) Baseline	(2) Year and Quarter	(3) year==2010	(4) June/July 2010
police	-95.75***	-100.3***	-83.37***	-541.7*
	(21.77)	(21.90)	(28.05)	(289.2)
salary1_policy	-171.8***	-30.70	-143.1***	-1,009***
	(27.87)	(38.82)	(33.51)	(358.6)
police_salary1	99.20***	101.8***	167.6***	583.2*
	(33.49)	(34.14)	(33.65)	(295.9)
2007.year		-56.74		
		(54.83)		
2008.year		135.0***		
		(51.88)		
2009.year		-73.46*		
		(43.48)		
2010.year		-108.5**		
		(54.18)		
2011.year		-106.6		
		(88.06)		
2012.year		-252.3***		
		(73.41)		
quarter_1		98.91**		
		(40.28)		
quarter_2		101.9***		
		(37.73)		
quarter_3		41.56		
		(31.88)		
Constant	571.0***	516.4***	498.1***	1,414***
	(13.60)	(35.68)	(32.02)	(358.4)
Observations	34,873	34,873	8,333	1,284
R-squared	0.003	0.007	0.004	0.038

Driver Cluster Robust standard errors in parentheses

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

Table 3: Extended Baseline

Dependent variable is real CFA value of bribe paid at each stop

VARIABLES	(1) Baseline	(2) year==2010	(3) June/July 2010
police	-102.1***	-54.16**	-487.3*
	(20.82)	(25.90)	(275.2)
salary1_policy	-33.99	-126.6***	-857.4***
	(40.11)	(32.26)	(305.1)
police_salary1	108.9***	149.4***	559.4**
	(34.33)	(32.04)	(281.2)
Container/tanker	59.17	-9.938	-68.25
	(50.24)	(28.22)	(140.0)
holiday	-35.20	n.a.	n.a.
	(23.62)		
Ghana vehicle	17.33	9.556	-23.07
	(19.27)	(34.29)	(36.91)
Ghanaian driver	-12.77	-100.9*	-176.0
	(27.63)	(56.17)	(179.7)
Coming from port	-110.8***	-303.9***	-477.3**
	(37.15)	(43.16)	(191.7)
Constant	640.4***	805.4***	1,814***
	(76.15)	(82.83)	(387.0)
Year & Quarter dummies	Yes	No	No
Observations	34,873	8,333	1,284
R-squared	0.009	0.033	0.065

Driver Cluster Robust standard errors in parentheses

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

Table 4: Probit Regressions on the probability of paying no bribe
Dependent variable = 1 if no bribe paid

VARIABLES	(1) zerobribe	(2) year==2010	(3) June/July 2010
police	0.0600**	-0.0824	-0.211
	(0.0295)	(0.0524)	(0.261)
salary1_policy	-0.115	-0.0508	-0.370
	(0.0798)	(0.0728)	(0.256)
police_salary1	0.181***	0.398***	0.715**
	(0.0458)	(0.0814)	(0.285)
Container/tanker	-0.0211	-0.0648	0.212
	(0.0539)	(0.0727)	(0.154)
holiday	0.132**	0.473***	n.a.
	(0.0549)	(0.0880)	
Ghana vehicle	0.282***	0.104	-0.147
	(0.0382)	(0.0733)	(0.111)
Ghanaian driver	-0.241***	0.0442	0.0696
	(0.0660)	(0.0891)	(0.169)
Coming from port	0.0352	0.275***	0.0203
	(0.0402)	(0.0635)	(0.192)
Constant	-1.251***	-1.546***	-1.275***
	(0.134)	(0.106)	(0.269)
Year & Quarter dummies?	Yes	No	No
Observations	34,866	8,333	1,284
ll	-12968	-3403	-383.2

Driver Cluster Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Panel Fixed Effects using data from Ghana and Burkina Faso

Dependent variable is real CFA value of bribe paid at each stop

VARIABLES	(1) Baseline	(2) Year dummies	(3) Other controls	(4) year==2010	(5) June/July 2010
ghana	-641.8***	-642.0***	-642.2***	-998.0***	-137.6
	(24.00)	(24.00)	(24.00)	(33.78)	(216.6)
salary1_policy	-391.8***	-391.6***	-393.1***	-144.3***	-943.7***
	(42.59)	(42.59)	(42.60)	(47.03)	(251.9)
police	-216.1***	-216.0***	-216.4***	102.7***	50.74
	(20.74)	(20.74)	(20.74)	(28.17)	(156.1)
police_salary1	185.5***	185.4***	185.3***	-45.25	-74.87
	(36.97)	(36.97)	(36.97)	(39.45)	(186.8)
Time trend	161.8				
	(164.0)				
holiday			158.2**		
			(64.55)		
Constant	-323,635	797.2	572.3	1,494***	1,535***
	(329,552)	(711.7)	(717.5)	(18.34)	(85.90)
Year dummies	No	Yes	Yes	No	No
R-squared	0.044	0.044	0.044	0.194	0.064
Observations	48,476	48,476	48,476	11,581	1,761
Number of trips	2,147	2,147	2,147	552	93

Standard errors in parentheses

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

Table 6: Random Effects Probit

Dependent variable = 1 if no bribe paid

VARIABLES	(1) zerobribe	(3) zerobribe
ghana	0.550***	0.505***
	(0.0289)	(0.0292)
salary1_policy	0.209***	0.331***
	(0.0437)	(0.0470)
police	0.0330	0.0376
	(0.0239)	(0.0239)
police_salary1	0.212***	0.207***
	(0.0367)	(0.0367)
Year (Time Trend)	0.0444***	
	(0.0138)	
Constant	-91.34***	-2.183***
	(27.73)	(0.0758)
lnsig2u	-0.808***	-0.860***
	(0.0501)	(0.0505)
Year dummies	No	Yes
Observations	48,476	48,476
Number of trips	2,147	2,147
ll	-14435	-14395

Standard errors in parentheses

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

Table 7: Aggregate per trip total bribes and number of stops with no bribe

VARIABLES	(1) Total Bribe costs on road	(2) Number of stops with no bribe
police	-126.5***	0.0878
	(29.25)	(0.0584)
salary1_policy	-287.5***	0.442***
	(52.80)	(0.124)
police_salary1	140.1***	0.600***
	(43.86)	(0.114)
Constant	566.9***	0.974***
	(57.93)	(0.144)
Year dummies?	Yes	Yes
Observations	4,236	4,236
R-squared	0.026	0.053

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Aggregate per trip number of stops and bribes paid

VARIABLES	(1) Number of stops	(2) Number of stops	(3) Number of bribes paid	(4) Number of bribes paid
Police	0.588***	0.585***	0.501***	0.497***
	(0.156)	(0.153)	(0.164)	(0.161)
salary1_policy	0.321***	0.540**	0.0313	0.0973
	(0.105)	(0.221)	(0.114)	(0.223)
police_salary1	0.705***	0.709***	0.104	0.109
	(0.226)	(0.223)	(0.239)	(0.235)
Constant	7.098***	8.435***	6.368***	7.549***
	(0.202)	(0.379)	(0.219)	(0.411)
Year dummies?	No	Yes	No	Yes
Observations	4,236	4,236	4,236	4,236
R-squared	0.022	0.055	0.005	0.038

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Graph of Police GH Cedi bribe amounts before and after the salary change

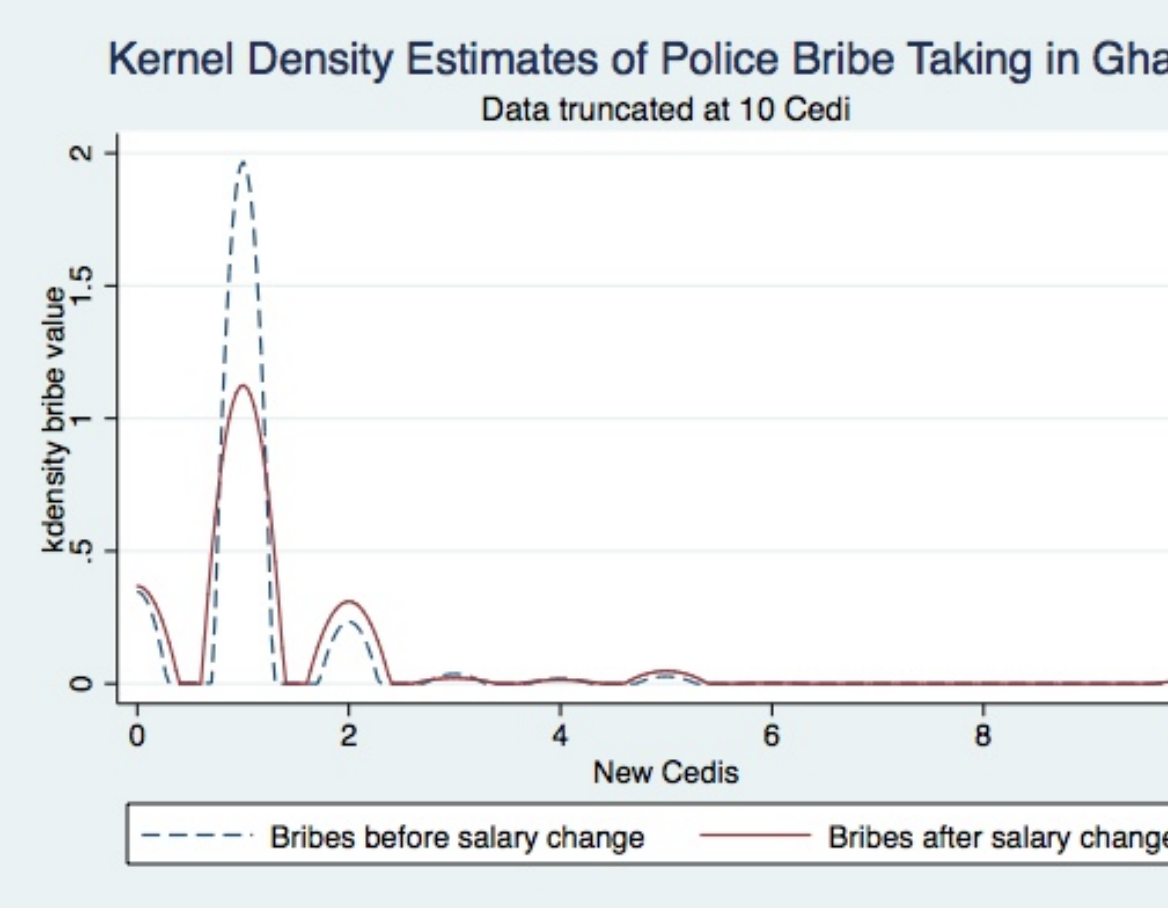

Figure 2 Graph of Custom GH Cedi bribe amounts before and after the salary change