Title: For Whom the Bureaucrat Tolls: Determinants of Coordination in Ghanaian Bureaucrats

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Abstract: There is a compelling argument, in comparative politics that Europe states made war and those wars made their states. In particular, wars motivated the formation of the continent's centralized bureaucracies (Tilly 1990; Ertman 1997; Hui 2005) as military campaigns ratcheted up demand for investment in matériel, such that military leaders had to then improve the efficiency with which they financed these materiel investments. This mechanism has geographical limitations as Herbst (2000) argues that the power of the modern African state suffers from a weak endowment of political geography, a structural condition that helped to constrain wars' political impact on state formation. This paper examines the impact of a different mechanism, to study how trade, instead, shapes institutional behavior. We argue that Ghana's bureaucracies coordinate their collection rates more effectively across their national network of road checkpoints in response to even slight increases in trade flows. This variation in a bureaucratic institution holds important policy and theoretical ramifications for the study of African states more broadly.

Key words: Africa, state capacity, bureaucratic coordination

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Introduction

Even though better institutions result in improved economic performance (Acemoglu, Johnson and Robinson 2005, 2012; Kaufmann et al., 1999) little is known about why African states remain notoriously weak (Engelbert, 2002). For example, Kohli (2004) classifies the Nigerian state as neopatrimonial; Frimpong-Ansah (1991) refers to Ghana as a "vampire" state; and Evans (1989) calls Zaire "predatory" while public sector reform programs across the continent frequently end in failure (Andrews and Shah, 2003). Consequently, in 2015, 18 of the poorest 20 countries were African: despite this dismal track record, scholarly research remains silent on how to reverse the trend of institutional stagnation in developing countries (Fukuyama, 2004). For context, much of this discussion of state power resorts to a theory-building treatment of capacity building that spans centuries, such as Mann's (1986; 1993) concept of infrastructural power. Although that literature focuses on the extent to which bureaucrats carry out the policies of state elites, it has not been translated into empirical research to explain determinants of institutional change or of spatial control such as that which is poorly exercised by African states (Soifer and vom Hau, 2008). This paper develops one potential answer, bureaucrats respond rapidly and favorably to weekly increases in trade volumes.

Recent research has elaborated on the behavior of lower-level bureaucrats along with the implementation abilities of state elites or "principals" (Ziblatt, 2006) to control levels of bureaucratic corruption or "agents" (Pritchett et al., 2013). Findings are not cause for optimism, however, as bureaucrats in sub-Saharan Africa do not typically

coordinate their behavior with central government policy and the resulting bribes demanded are both unpredictable and onerous on private investment (Zenger, 2011). Africa's ineffective and nonresponsive bureaucracies coincide with higher levels of corruption (Shleifer and Vishny, 1993; Zenger, 2011) which signifies an absence of "rule of law" (Foltz and Bromley, 2011). In weak states, bureaucrats do not tax effectively (Oeschslin, 2010: 631) so that the state does not then play an instrumental role in infrastructure investment or in law enforcement (Buhaug and Rød, 2006; Berman, unpubl: 1). Further, weakly institutionalized states provide few public goods (Osafo-Kwaako and Robinson 2013, 7) and suffer from poor economic performance (Robinson and Parsons, 2006: 101-2).

Motivated by this problem, the paper studies whether trade encourages Ghana's bureaucrats to coordinate and stabilize their behavior across space by making of trade (see Tilly 1990; Thakur 1996; Sundiata 1994; Gluckman 1972 for a discussion)[2]. In other words, this research studies the extent to which Ghana's bureaucrats appear to cooperate with each other in response to levels of international trade when collecting informal payments along a key trade route through Ghana to Burkina Faso. It starts from the null hypothesis that holds that checkpoint bribes are a random outcome of a stand-alone interaction between bureaucrat and trader. Consequently, international trade has no impact on such coordination levels of Ghana's bureaucrats. Against this hypothesis, we test collection strategies played by bureaucratic checkpoints dotting this trade route to see

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[2] We define commercialism as the trade-related avenue to state formation.

whether they resemble a precursor to a more formalized system of revenue extraction or if outcomes are merely random.[3]

Ghana has more than 50 checkpoints lining this main highway[4] which reaches from the southern coastal port of Tema (near Accra) to the northern land border with Burkina Faso. At any of these checkpoints, a bureaucrat may collect an informal fee from a passing truck and there are officials based at national headquarters in Accra tasked with overseeing these interactions. The collection-transactions[5] provide a unique opportunity to study determinants of the bureaucrats' behavior and to shed new light on why a particular amount is levied at a given time and checkpoint. Through this case study, the paper targets that knowledge gap of determinants of bureaucratic institution formation by framing the analysis as a game in which principals in Accra try to assert agency over the agents stationed in the periphery. In short, we ask whether and why Ghana's bureaucrats have managed to coordinate their behavior with other bureaucrats across the trade route.[6]

This paper draws from two literatures to develop its core hypothesis. First, although the state formation literature focuses largely on the effects of war (Tilly, 1992; Ertmann, 1997), which is less applicable to present-day Africa (Herbst, 2000), the

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[3] Kornai (1995; 45) defines this as "certain types of controlling and coordinating activities. The main characteristics of this mechanism include the multi-level hierarchical organization of control, the dependence of the subordinate on the superior, and the mandatory or even coercive character of the instructions of the superior." In a talk, Brian Levy pointed to the importance of leaders playing by informal rules in Cote d'Ivoire as high economic growth under President Félix Houphouët-Boigny persisted until his successor stopped playing by those rules.

[4] This trade route accounts for 70 percent of all transit trade in Ghana (source: Ghana Customs data).

[5] http://www.borderlesswa.com/fr/ressources/publications

[6] As this coordination is the result of an institutional outcome it is helpful to think of the outcome as relational rather than absolute. Economic analysis measures how high is corruption but this paper looks at how a bribe relates to other's in the network as measure of approaching a stable institutional equilibrium—the closer bribes are to each other the more institutionalized is the network.

literature also argues that trade promotes state formation. For example, when the Roman Empire collapsed, it left behind a European continent, "connected by roads, trade, religion, and collective memory," (Tilly, 1990: 38) and those transportation networks lowered the marginal costs of a state's consolidation of territorial power. Second, the bureaucratic institutions literature illustrates how African trade can consolidate institutional equilibrium as the related revenue from expanded commerce motivates both the political leadership (Acemoglu et al., 2005; Greif, 1993; 2006; Chan, 2002; 736) and her bureaucratic agents (Rose-Ackerman, 1975; 1978; Mauro, 1995; Bardhan, 1997) towards more effective coordination. Consequently, we then assume that coordination improves when bribe-observations converge toward a national average as an institutional equilibrium, which can be a non-zero level of bribe.[7]

This is the first attempt to model institution-strengthening using individual bribe observations in the context of a network of African bureaucrats. To present such an argument, the paper combines two datasets to test the determinants of bureaucratic strategies -- whether or not bureaucrats coordinate. The first dataset measures the levels of bribes collected from truck drivers in the course of 30,000 individual transactions, between 2006 and 2011, at checkpoints along Ghana's main trade route. We merge this with a second dataset, compiled by Ghana Customs (CEPS), which employs GPS tracking chips to record the daily number of trade vehicles that transit along this route. This combined dataset provides information about levels of bureaucratic coordination, calculated as the number of standard deviations of an individual payment from the national average. Through a series of regressions, the paper primarily tests the resulting

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[7] Such coordination resembles a centralizing effect of bureaucratic institutions and that is touted by Vu (2010) as potentially one of the most important political institutions of the modern state.

core hypothesis that an increase in trade motivates greater bureaucratic coordination along Ghana's main north-south trade route. Finally, an alternative hypothesis posits that distance is determinative and that those checkpoints further from the seaport in Accra coordinate less with the rest of the bureaucratic network.

As a result of this analysis, the paper presents two key findings. First, it argues that trade does influence Ghana's bureaucrats to coordinate in a way that mitigates the dampening impact of distance, as a constraint to its state power. Even when controlling for various spatial factors, trade volumes have a positive impact on national coordination across Customs and Police checkpoints. This evidence supports the argument that there is a more effective state still in a nascent stage in Ghana, as a result of the recent, growing volumes of trade. This outcome is not necessarily constrained by Ghana's geographic endowment which ties into the second finding that, in an African state enjoying rising trade flows, distance from the urban center does not have a significant impact on bureaucratic behavior, although checkpoint-specific factors still need to be better-understood. In sum, Ghana's bureaucracies do coordinate collection rates effectively across their national network in response to even slight improvements in trade flows and this can have important policy and theoretical ramifications for the study of African states.

Economics v Politics of Bribes

From a transaction basis, depending on the perspective of a study, bribes can resemble tolls and this similarity holds important value for the economic benefit as well

as the political insights. To develop this analysis, this paper focuses on how each bribe compares to amounts charged elsewhere, throughout the network. This approach represents a departure from the growing literature on transaction-level petty corruption that focuses on specific levels of bribe amounts. The underlying assumption in the existing analysis is that bribes are an occurrence of theft in which a bureaucrat does not divert funds to the public account whereas tolls do get spent on public goods although, it is not always clear that tolls do not also result in theft. To motivate this distinction between tolls and bribes, consider the case of the Garden State Parkway (GSP) in New Jersey—in the 1980s each toll cost 25¢ but the fee has risen to $1.50 per tollbooth. Even though the feel has increased 6-fold, tolls are regarded as an efficient way to finance road assets—one that is encouraged by the World Bank, for example.[8] However, unofficial bribes are treated as a total cost to traders, rather than a source of government revenue[9] even though both GSP toll revenue[10] and Ghana highway checkpoint collections may be diverted to private ends. We argue that, on the extractive end, traders prefer tolls because they are consistent and predictable—every tollbooth along the GSP charges them the same amount and there's no room for negotiation to get a lower amount or over-reach to pay a higher amount. Such consistency, alone, would be preferable for traders so that they can reliably predict how long and how much it will cost to transport their goods (MCC 2014).

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[8] https://ppp.worldbank.org/public-private-partnership/sector/transportation/roads-tolls-bridges/road-concessions

[9] For example, see Beekman et al (2013); Foltz and Bromley (2010); and Olken and Barron (2009)

[10] The New Jersey Turnpike Authority reportedly wasted $43 million of toll money, including unjustified bonuses for its employees, even while increasing tolls on the Garden State Parkway Frassinelli, Mike "Audit of N.J. Turnpike Authority finds $43 M in waste during tough economy" in http://www.nj.com/news/index.ssf/2010/10/audit_of_nj_turnpike_authority.html.

Tollbooths on the GSP differ from checkpoints in a number of ways but a key distinction identified by economists is that degree of certainty about the payment. The former advertises the toll for each car, bus, or truck while the latter results in a case-by-case negotiation between bureaucrat and truck driver. This is problematic because Hallward-Driemeier et al (2010) summarize that African firms point to "regulatory and economic policy uncertainty" as their top constraint to economic growth, adding that they are concerned by unpredictability associated with any unstable application of policy. Consequently, there is reason to study network-variation across the sample of bribe-transactions, for their detrimental economic impact. In fact, it is the variation in policy, rather than average policy outcome level that correlates with poor employment growth. Pritchett (2009) adds that firms invest based on future expectations of profitability so that policy uncertainty is an important concern, especially in countries with low levels of state capacity. The second motivation for determinants of bribe volatility or uncertainty, in the context of corruption at road checkpoints in Africa is to reveal a potential role of a principal who attempts to coordinate the network. Sequiera and Djankov (2010, 21) explains in their study of corruption in southern Africa, they focus on the interaction, solely, between bureaucrat and trader as "bribe levels at each port appear to be determined primarily by the extractive capacity of the different bureaucrats who are to engage in corruption at each port. Each of these groups of bureaucrats act as independent monopolists when setting bribes, maximizing their own individual bribe revenue as opposed to that of the bureaucracy they belong to." In sum, the authors conceive of the transaction as simply between agent and trader. We propose that this would be an important omission of the role of a principal in Ghana, who endeavors to orchestrate

network-wide uniformity or stability in bribe-collections. Specifically, political elites (the principal) in Ghana stake a claim to informal revenue collected at checkpoints, but have limits to the infrastructural power which may decline for checkpoints further from the capital (Bates 1983, Herbst 2001, Asher et al 2016). Consequently, we assume such a principal works to formulate network-wide policy certainty and coordination, an important component of bureaucratic institutional development.

This principal assumption draws from Chalfin (2010: 9) who summarizes that "Customs was the state agency most deeply embedded in the history of Ghanaian state formation" adding that it was (23) "at once territorially expansive in its reach, centralized in authority and penetrating the social fabric of the nation overall." Furthermore, she makes the principal's role explicit as headquarters issue explicit orders which "take immediate effect and must be implemented without deliberation or delay." In addition, this principal seeks to coordinate the network, as Foltz[11] observes that bureaucrats along the highway checkpoints in Ghana report to political leaders in Accra and "it appears that the profits [from bribe-taking] are shared all the way up the chain of command, it's immune to quick policy fixes."

Where effective bureaucracies have materialized they have routinized extraction (Spruyt, 2002: 139; Vu, 2010: 151) and such coordinated bureaucracies also resulted in improved income, infant mortality, and literacy levels (Kaufman, Kraay, and Zoido-Lobaton, 2000). It is cause for concern, therefore, when Africa's bureaucratic behavior is unpredictable and corrupt (Freund and Rocha, 2010; Foltz and Bromley, 2011). Although the process of building up desired coordination is still not easily understood or

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[11] http://grow.cals.wisc.edu/departments/field-notes/highway-robbery-has-far-reaching-costs

achieved (Fukuyama 2004; Pritchett et al., 2013) we look to Acemoglu et al. (2011) for guidance. They gauge the organization of the state through the efficiency with which a central authority monitors its bureaucrats and Enloe (1978: 336) emphasizes that coordinated, centralized bureaucracies are effective bureaucracies. Coser (1977: 230-33) elaborates that the centralization of state power occurs only through bureaucratic coordination.

Although we test levels of bureaucratic coordination in Ghana and apply that to inferences of an underlying principal-agent relationship, we lack the data to complete the relationship in order to assess the extent to which checkpoint revenue results in better-maintained roads. Despite this gap, it remains a novel finding that a principal can oversee and coordinate a bureaucrat under certain conditions—a conclusion that is absent from other articles which assume these transactions are random and without principal involvement. In short, we test whether principals in Ghana control their own network of bureaucrats into operating like formal toll booths--in which fees are consistent throughout rather than being randomly determined by individual bureaucrats—as this has important implications for traders as well as the Ghanaian state.

A case for commercialist Ghana?

Rodrik (2002) makes a macro-level case for trade reforms as a driver of institutional change through the relationship it encourages between the private and the public sector. Similarly, others have focused on trade's impact on levels of bureaucratic corruption (Baksi et al., 2009; Bardhan, 1997) and Woo-Cumings (1999) incorporated

international competition as a binding agent of the state into her neo-mercantilist model. Further, Greif (2006) recounts how trade competition motivated tariff reform in 11th century Sicily and Spruyt (1994: 63) details a similar relationship in medieval Europe and Treisman (2000: 401) clarifies that trade "has to be extensive" in order to decrease bureaucratic corruption levels by much. In sum, the commercialist effect is not novel but this paper makes two adjustments to the literature to address the weak bureaucratic institutions. First, we conduct a micro or bureaucrat-level analysis of commercialism to study impacts at weekly intervals and second, we apply it to modern Africa.

In spite of the commercialist analysis elsewhere that shows trade matters for state behavior, the African politics literature does not currently look for similar relationships. It also does not study how Africa's bureaucratic networks respond to international trade at the transaction level.[12] Recent data warrants such an application where trade barriers have diminished[13] and as a handful of African economies have begun to increase their international economic success , making it notable that eight of the 20 countries with the fastest trade growth, over the last three decades, are in Africa. Further, Ghana's growth rate topped this global list, doubling that of Chad, in second place. Commercialist theory would lead us to expect bureaucratic coordination as a result and this we test that expectation empirically.

To formalize the core hypothesis we start with levels of trade ("*Trucks*") and the formal tariff revenue stream ("*Tariff*") from trade. Trucks also pay an informal revenue

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[12] We have data for Ghana and Benin but further data can test the broader generalizability across Africa.
[13] World Development Indicators: http://data.worldbank.org/indicator/TG.VAL.TOTL.GD.ZS.

stream through checkpoint fees ("*Bribe*") which revert, in some proportion, to the bureaucrat as well as to political elites at headquarters (Foltz and Bromley, 2011). From the traders' perspective, both the formal and informal charges combine to impose a total cost of trading in Ghana but the latter can vary, which affects the relationship between bureaucratic agents and their principal. To see this outcome, consider that the trader's expectation of the total cost per truck relates to the standard deviation(*Bribe*), as traders' uncertainty increases they will supply fewer *Trucks* in future (Pritchett 2009). As future *Trucks* decline, so too does *Total Trade Revenue*, the combined income for political elites and bureaucrats.

To explore this argument from the baseline scenario, consider if there are no *Bribes* charged at checkpoints, then *Bribe * Trucks = 0* and the formal *Tariff* is fixed and is the sole cost to traders. At this rate, the principal maximizes its formal revenue while informal revenue is 0. By relaxing this assumption and bringing rural bureaucrats into the equation, *Bribe* variation increases *as* standard deviation(*Bribe*). Consequently, *Trucks* must pay a less predictable price to enter the Ghanaian market and so will limit their future demand for trade there especially if that total cost is more certain in neighboring ports of Abidjan or Lomé. Of course, when *Trucks* leave the country, bureaucrats collect fewer *Bribes* and political elites collect less in *Tariffs* over repeated iterations, so that the net present value of *Total Trade Revenue* is lower.

This model frames information and agency as a collective action problem in which, political leaders have three strategies they can play, each with a separate cost-benefit consideration. First, in a low cost but low revenue option, leaders can exert no effort or agency to control bureaucratic behavior so that *Bribes* become increasingly

random. This will cause *Trucks* to decrease in volume, in the short to medium term as traders exit the less predictable market. As a result, formal revenue (*Tariff * Trucks*) declines. This is a common strategy pursued in West Africa according to Foltz and Bromley (2011) where bureaucrats discount uncertain future payoffs, revealing their preference to maximize income from immediate opportunities, leading to random petty corruption outcomes.

Second, in the medium cost and medium benefit option, political leaders exert some effort to coordinate bureaucrats to charge a uniform *Bribe* rate (as suggested by Shleifer and Vishny 1993). This would maintain the level of *Trucks* at an equilibrium level in which the cost of that effort, by leaders, results in the benefit of a higher volume of *Trucks* than the first option. In this way, each bureaucrat coordinates to earn an equal share of the total informal revenue while free-riding is discouraged. As with any cartel, bureaucrats have a financial incentive to defect and charge a one-time windfall bribe but the threat of punishment and the ensuing promise of greater future returns from coordination weighs against rising trade volumes. However, if trade declines, bureaucrats may discount future payoffs and collect as much bribe revenue as they can, today.[14] Evidence shows that this second strategy is preferred in Ghana as checkpoint bureaucrats revealed, in interviews, that they hold a long-term horizon for keeping their position and that they coordinate with leaders in Accra through regular phone calls and

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[14] This resembles the thesis of Bates (2008) in that instability begets grabbing by the state as leaders discount future payouts.

weekly meetings.[15] Due to information costs of monitoring the network from Accra, there is also the possibility that checkpoints monitor each other to prevent defection, but that is not directly expressed in this paper's data.

Third, the highest cost and highest potential benefit to political leaders is that they assert their infrastructural reach to punish any collection of informal revenue. *Bribes* would then approach 0 and *Trucks* will be at the baseline rate (e.g. leaders are the only ones to tax the commons so this maximizes trade volumes). This is an expensive strategy for leaders to play when their capacity is low, as any checkpoint in the network sees a high reward for defecting to charge a maximum *Bribe*. Consequently, the strategy requires the principal to catch and punish each instance of defection or else the resulting variability in trade costs will deter trade.   However, checkpoint bribe-collection persists across all checkpoints, with the apparent approval of political elites, it does not appear that there are efforts to play this strategy. Even a recent police reform (Foltz 2014) focused on incentivizing lower bribes by rewarding higher salaries rather than punishing all acts of corruption. Consequently, I study convergence on scenario 2 such that any observation of a bribe charged by a checkpoint that deviates from the national average fee signals theft at that checkpoint. This does not just refer to higher-than-average bribes as lower amounts also suggest that a checkpoint is pursuing a private gain, also to pocket the fee (Shleifer and Vishny 1993).   Ultimately, traders avoid random behavior from bureaucrats in favor of predictability and consistency (Pritchett et al. 2009; MCC 2014).

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[15] In interviews with current checkpoint officers, they put down roots in their current location, even buying goats and chickens in the village they are stationed to supplement their salaries. At a meeting of CEPS retirees, many said they had spent most of their careers at just one checkpoint.

The effects of geographic distance on the reach of leaders in Accra provide a second testable implication. It forms the basis of an alternative hypothesis that Africa also tends to have few rural bureaucrats with which to govern and its bureaucrats closer to the urban center are more inclined to coordinate than those bureaucrats located further away as agency costs are lower. On the first point, Olowu and Wunsch (2004) relate this to bureaucratic institutions reporting that, at two percent of total government personnel, Africa has the lowest level of any region for government employees who work outside of the capital. This second point marks a relevant consideration because Herbst (2000: 11) cautions that power varies across space; in fact "the fundamental problem facing state builders in Africa has been to project authority over inhospitable territories that contain relatively low densities of people." Specifically, political institutions may vary within and across countries; after all, African bureaucracies reach mainly into areas of cash crop and mineral production, where incumbents seek out rents for governing (Boone, 2003; Reno, 1995).

There are a number of other potential explanations for variation in bureaucratic coordination. In a non-exhaustive list, the paper indirectly controls for domestic reform initiatives that may coincide with an expansion of trade. For example, Crook (1989) ascribes Cote d'Ivoire's bureaucratic capacity to an education system that emphasizes skill development, and that the slow increase in the number of bureaucrats has maintained qualification standards and organizational loyalty. Ethnic diversity may also explain levels of corruption: Alesina et al. (1999) argue that preferences vary by ethnic group for types of public goods such that ethnic conflict helps to shape fiscal decision making. Alesina and La Ferrara (2000; 2005) concur that ethnic diversity explains public goods

outcomes as localities that are highly diverse ethnically or religiously see markedly lower levels of social activity. Although these factors are difficult to model in this paper, we assume that these are also relatively sluggish forces that should not vary at weekly intervals.

Application: Data and Methods

The majority of the data in the regressions comes from the West African Trade Hub (WATH), which tracks individual bribes collected along a series of main trade routes in West Africa (see **Figure 1** for a map of the route). The route that is the focus in this paper is the 997 km highway segment that connects the port of Tema, Ghana to Ouagadougou, Burkina Faso.[16] The survey data are compiled by truck drivers, who are approached by enumerators at ports or inland depots before they start their journey. Trucking experts evaluate whether the drivers have all the required documents and that their cargo complies with regulations; only those drivers who will make the entire journey are asked to participate. These drivers then track the location, amount of time, and bribe paid at each checkpoint. Checkpoints along the route consist of 7 different government bureaucracies: customs, forestry, health, and, police who may collect bribes by stopping passing trucks. Foltz and Bromley (2011) report that customs and police checkpoints are likely to have at least one armed officer at their respective checkpoints and when they stop a truck, they ask to see the driver's papers and driver's license before

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[16] Ghana is a good first case study to test these theories because the data are available on the informal fees and delays imposes as well as good quality truck count data. The study can be extended to other countries as data come available.

negotiating for a bribe. In addition, delays for bribe negotiations are considerable on this route. For example, WATH (2010) reports that a truck takes 41 days to get from Tema or Lomé to Bamako (amounting to 1.6 km per hour journey time) but only 9 of those days is spent driving. There are a total of 52 checkpoints on the Ghanaian leg, compared to 62 in Burkina Faso, 54 in Mali, and 52 in Togo checkpoints spread over 997, 997, 699, and 745 kilometers respectively that help to explain the remainder of the travel time in the region.

Figure 1: Map of Tema-Paga Highway in Ghana
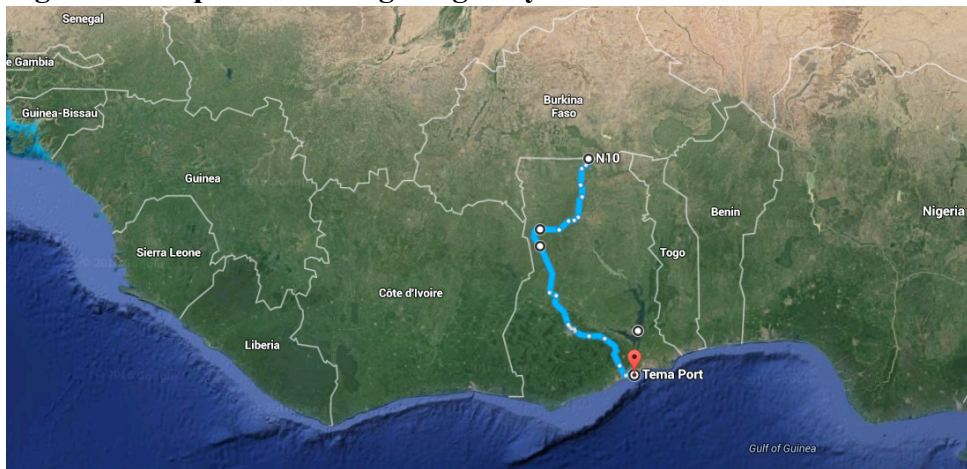
Source: Google Maps 2016.

Dependent Variable: Bureaucratic Coordination of Bribes

To understand what happens and why at those checkpoints, we look for coordination in bribes as corruption measures are strongly linked to the wider

performance of political institutions[17]. These WATH data form the dependent variable to inform how well bribes are coordinated by a principal across checkpoints log(**Coordination of bribes**). Specifically, we calculate the absolute value of the number of standard deviations of a bribe from the country-wide weekly average level and take the logged form. For example, if the mean national bribe value for week 1, in Ghana, is $3 and the standard deviation is $1 and the checkpoint bribe for a particular observation is $2 or $4, then the log(**Coordination of bribes)** will equal $\log_{10}(1)$. This is because both $2 and $4 are one standard deviation from the mean. We take the absolute value because we are interested in how far a bribe-observation, for any one checkpoint-interaction, deviates from (coordinates with) the weekly nationally established average. [18]

Coordination requires incentives and credible threats from political elites as there is a high incentive to defect. As such, whether or not bribes converge at a national mean provides a signal about the degree of institutionalization of the bureaucracy. A high standard deviation from the mean indicates that a particular payment was not well-coordinated across the network of bureaucrats (Weber 1947; Shleifer and Vishny 1993) but was rather the outcome of a one-off or stochastic interaction between bureaucrat and driver. In other words, lower values of the dependent variable[19] indicate that a payment has institutionalized closer to a national mean at that checkpoint for that particular week, thereby representing more of a formal toll (Hage 1965: 300) rather than an informal

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[17] For example, the control of corruption measure is one of six World Governance Indicators and corruption is an important component of the Fragile State Index (http://www.eldis.org/vfile/upload/1/document/1112/Myths.pdf). Furthermore, Goldstone et al. (2005) include corruption as predictor variable in their political stability forecasting model

[18] The author used to drive on the Garden State Parkway when tolls were 25 cents at each toll booth. It provided predictability and the GSP even sold tokens that represented the certainty of this toll. Were a toll booth operator to let me pass for 20 cents or try to charge 30 cents, it would have signaled corruption on their part. Such fees in Ghana do fit, to some extent, around a normal distribution and we study why that is the case.

[19] Here I modify Freeman's general formula for centralization, as it applies to social network analysis.

(stochastic) bribe. To summarize, if Ghana is in scenario 2 then political elites permit a low national average bribe to be distributed evenly across the network in order to efficiently disincentivize defection. Checkpoint fees imposed at rates below the national average indicate that there is theft by bureaucrats and fees above that amount suggest that some proportion is diverted to Accra while the rest is kept for private gain (Shleifer and Vishny 1993). Although there is no conclusive evidence that a checkpoint would charge the national average fee as a signal of its intent to coordinate, if it could defect from that level without punishment, it would have a financial incentive to do so.

In sum, log(**Coordination of Bribes**) indicates how coordinated any checkpoint is with any nationally established price[20] - lower values of the dependent variable signifies greater coordination or a higher probability that a bureaucrat is following orders to set its rate at that of the national price. Consequently, a negative sign in the regression tables means that the particular independent variable has a reducing effect on the standard deviation, or that it accounts for greater coordination while a positive sign means that the independent variable is undoing coordination or creating dis-coordination.

Independent Variables

CEPS collects daily truck-count data for transit vehicles and we incorporate these data with the WATH bribe dataset to measure the impact of trade volumes on

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[20] Based upon field observations in Ghana, there are weekly conference calls with headquarters in the capital, by taking the weekly average account for any such weekly coordination efforts to reset a national bribe level.

bureaucratic behavior. Volatility of weekly trade flows have fluctuated between the end of 2006 and 2011 but the average is approximately 1,300 trucks per week with close to a normal distribution. These data are in logged form and appear in the regression as the one-week lagged amount $log(\textbf{\textit{Truck Count}}_{-1})$, as checkpoints hold weekly conference calls with headquarters to discuss strategy for the coming week.

This paper also assesses whether distance affects bureaucratic coordination. Whether by design or by structural constraints, the strength of governance institutions is not evenly distributed spatially across a network and spatial variation offers important insights into the root cause (Fukuyama, 2004: 21). The spatial reach of an African state's bureaucracy is an important component to gain leverage on understanding power within its network. Consequently, we include the impact of distance on the bureaucrat's level of bribes, using a measure of the respective distance of any checkpoint from the capital or main port city, measured in thousands of kilometers, by road (***KM (000s))***.

The model also tests the extent to which bureaucrats can impose delays on the potential bribe payer in order to extract greater rents. Higher delays could indicate either that the truck driver is testing the limits of the bureaucratic authority or that the bureaucrat is testing the authority of the incumbent.[21] In either case, it indicates an initiative to lower levels of coordination as Bose (2004) describes, in developing countries, low-ranking bureaucrats may use delays of a routine service as a practice known as "speed-money". Foltz and Bromley (2011) describes this same process along a

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[21] In the first case, the truck driver may be holding out for a lower than average bribe and in the second case the bureaucrat may be holding out for a larger than average bribe.

West African trade route where a bureaucrat can threaten to delay a passing truck unless a bribe is paid. The driver may then attempt to negotiate down the bribe amount, using the delay as a threat point because she can also delay bribe collection from other trucks by blocking the route during that negotiation. In turn, checkpoint officials must collect a certain amount of money to send back to headquarters or risk getting reassigned to less lucrative checkpoints. To track the extent of delays or the instance of "speed-money" we include, in logged form, the delays in hours at a checkpoint (**log(Duration)**) and this variable can also help to account for one alternative explanation that higher truck volumes could result in less volatility of bribe prices. For example, with the passage of more trucks checkpoint officers may just want to spend less time negotiating each bribe and so will be more inclined to charge a standard price.

Foltz and Opoku-Agyemang (draft) find that trucks headed south, towards the port of Tema are more likely to contain illicit or smuggled goods, thereby potentially facing different treatment from a checkpoint. Accordingly, the dummy variable (*North*) accounts for the direction of travel of the truck.

In addition to trade levels, the model considers whether the type of bureaucratic agency shapes its level of coordination. Chalfin (2001) focuses on other branches of the state apparatus such as the police, border guards, and the army, who similarly seek to regulate trade along the northern trade route. To accommodate this variation, some of the regressions include dummy variables for *Customs* and *Police* to distinguish whether

these agencies' extraction rates are more or less coordinated than another. Checkpoints across the region are staffed by many different agencies, and the baseline is grouped together as "Other" in the dataset because they are not disaggregated in the raw data. These other agencies may include water and forestry services, sanitary and phytosanitary standards, Unions, health services, and immigration.

Ghana is subject to observed and unobserved attempts to reform corruption levels (typically defined as lower bribe levels rather than more coordination across them) that may provide alternative explanations than trade. Foltz and Opoku-Agyemang (draft) catalog the police reform process in Ghana so the regressions include a dummy variable (*Reform*) for the observation-years that a bribe was collected by a police checkpoint, subsequent to that reform program. In addition, the logged value of the bribe collected at that checkpoint (*log(Bribe, USD)*) helps to control for other reforms that may have lowered bribe levels (the typical focus of anti-corruption campaigns) other than through trade volumes. These US dollar values are converted from local currency and adjusted to 2012 constant dollars to be consistent over the timeframe of this study.

Finally, the models include dummy variables to capture potential fixed effects from weeks of the year. For example, checkpoints may play different strategies during a rainy season or near a holiday which is accounted for by (*Week (Dummy)*). The datasets do not capture checkpoint-specific characteristics (there is ethnic variation and different numbers of staff across checkpoints and these data are not measured by the

WATH dataset) and so some of the regressions also create fixed effects to control for these, with (***Checkpoint (Dummy)***).

Methodology and Results

This paper leans on quantitative analysis, using a series of linear regressions, to analyze the combined dataset. Although heteroskedasticity does not affect bias, consistency, or R^2 it helps to take steps to mitigate its potential effect on the model. First, this is done by taking the log of the dependent variable and, second, we use clustered robust standard errors to correct for heteroskedasticity's impact on the standard error terms to account for intraclass correlation by checkpoint[22]. In addition, qualitative accounts and observations from visiting checkpoints are used to provide further substantiation of the regression results as much of the relationship between bureaucrats and their leadership was unobserved.

This section first observes that truck volumes have a significant and negative impact upon the dependent variable in each of the 6 regressions in Table 1. Although this trade correlates positively with bureaucratic coordination the question remains, by how much. For example, log of Truck Count$_{-1}$ has a negative and significant coefficient in each of the 6 regressions, with the impact tripling from the bivariate version, in [1] to multivariate variations in [4] and [6] with the significance also increases. In sum, a 1

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[22] If we cluster standard errors generating a unique variable by week and checkpoint, the results are mostly the same except that the dummy for Customs and for Police is significant and trade is not significant in the bivariate model (this two-way clustered approach follows Cameron (2011)).

percent increase in truck volumes improves coordination by a range of 0.06 and 0.17 percent. Graph 1 illustrates this close correlation between trade and bureaucratic coordination, while keeping the controls from [4][23], in which increasing truck volumes track to decreasing bribe volatility. To develop this relationship, the rest of the section assesses each of the control variables and then considers which model selection criteria.

Graph 1. Lagged Truck Count vs. Coordination of Bribes

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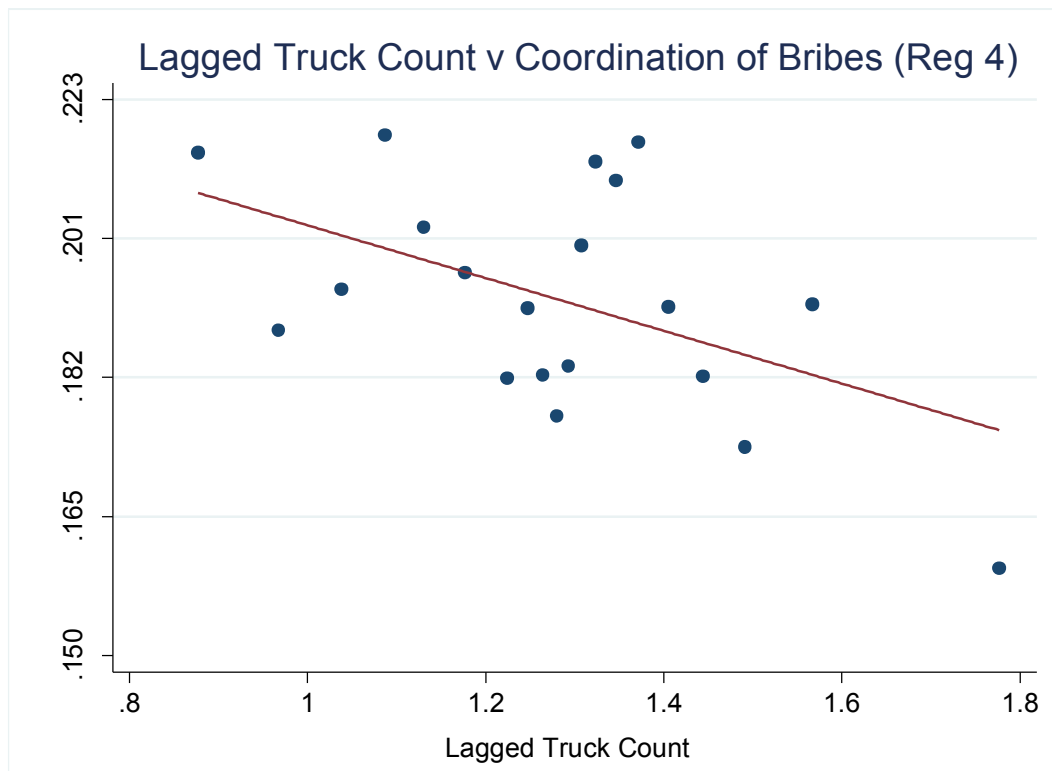
[23] Each dot in Graph 3 shows the average "Log of Bribe Coordination" for a given level of "Lagged Truck Count", holding the controls constant. The trendline shows that an increase by 600 trucks, from 1000 to 1600 trucks in the previous week, corresponds to a 0.02 improvement in bureaucratic coordination the following week. Note that the total range, from the highest to the lowest level of coordination is about 0.04.

Whether or not the model accounts for checkpoint fixed effects, space does not matter in each of these regressions. In other words, a checkpoint's distance from Accra has no measurable impact on bureaucratic coordination. Although, including distance interacted with Checkpoint dummies deliberately introduces collinearity into the model in [6], it too has little or no impact on the coefficients and their significance in the rest of the model. Except for [3], there is also no significant relationship for the length of a delay at a checkpoint, such that longer waiting times do not correlate with levels of coordination. Even in [3], a 1 percent longer delay corresponds to just 0.05 percent longer wait for a truck, suggesting that congestion by itself does not explain coordination.

In each regression that includes *North*, this dummy is not significant, such that bureaucrats coordinate just as well when collecting bribes from trucks traveling north-bound as those in the opposite direction. Agency type also does not matter, Customs officers coordinate just as well as do Police and other checkpoint officials. Furthermore, when controlling for time periods in which police salaries have doubled, through civil service reforms (***Police * Reform***), there is no significant effect on coordination compared to other periods. As another measure of reform efforts in Ghana, bribe levels at a checkpoint have a highly significant relationship with the dependent variable such that a 1 percent increase in the bribe corresponds to 0.66 percent lower levels of coordination. This could mean that higher bribes are reserved for checkpoints that are defecting from the national average and that the preference is to coordinate low, stable levels of corruption.

Finally, adding dummy variables for Checkpoint fixed effects augments the impact of Truck Count, especially when combined with the week fixed effects and adds 0.12 to the R^2 (suggesting that the fixed effects improve the model specification). However, it is beyond the scope of these datasets to unpack what may be influencing those week and checkpoint-specific factors. In sum, truck volumes have a positive effect on bureaucratic coordination in each regression and with greater specification, trade takes on a larger explanatory role on the dependent variable as [4] is tied for the highest R^2 but also addresses the multicollinearity concerns from [6].