Corruption in Indonesia[1]

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April 2006

Bribes paid by firms in Indonesia arise principally from red tape, in particular licenses, imposed by local government officials. Red tape generates direct revenues (fees) plus indirect revenues in the form of bribes. The expected value of the latter is capitalized into lower salaries needed by localities to compensate public officials. Localities in Indonesia are hampered by insufficient revenues from formal tax and transfer sources to pay competitive salaries to officials and meet public service expenditure requirements, because local tax rates are capped by the center and inter-governmental transfers are limited. Thus the direct and indirect (bribe) revenues from local red tape are critical to local finances. The paper models how inter-jurisdictional competition for firms limits the extent of locally imposed red tape and how greater sources of inter-governmental revenues reduce the need for red tape and corruption. The paper estimates a large reduction in red tape in better funded localities. For countries such as Indonesia that are in the midst of decentralizing government functions, the impact on corruption is tied to fiscal arrangements and the ability of localities to legitimately fund activities. The paper then estimates the relationships between red tape, bribes, and time devoted by firms to dealing with corrupt officials.

Key words: corruption, inter-jurisdiction competition, fiscal decentralization.
JEL codes: D2, D7, H2, H7, O1

Corruption in Indonesia is widespread and costly (Macon, 2004). Based on the detailed survey this paper utilizes, in 2001 firms report spending on average over 8% of costs on bribes and over 10% of management time in "smoothing business operations" with local officials. Corruption in Indonesia is a major on-going political issue with wide press coverage and public discussion and has been a focus of both World Bank (2003) and local academic (Kuncoro, 2003) study. But the extent of corruption varies enormously across local jurisdictions, with, for example, the average of bribes to costs ranging from .56% to 31% across localities in the survey. We view bribes as a form of compensation for local government officials, which is planned, or least anticipated by local governments. Bribes paid are based on the extent of "red tape" at the local level, where the extent of red tape is set locally. This paper focuses on two issues.

First we argue and present evidence that the extent of local red tape depends on local fiscal situations, as determined by central government policy. Localities receiving relatively fewer transfers from the central government rely more on corruption, or bribes, to help pay the salaries of their employees and hence enact

[1] This paper was written while Kuncoro was a Visiting Professor of Population Studies at Brown University, for which funding from the Mellon Foundation is gratefully acknowledged. We thank Gilles Duranton for helpful comments on an early draft of the paper.

more red tape to facilitate bribe activity. Fortunately to enable identification of such effects, in Indonesia because of oddities in the national tax-transfer system, in our data on local fiscal budgets, there is wide variation in the extent of fiscal transfers from the center as a fraction of local GDP. Second in this paper, we detail aspects of the nature and costs of corruption at the local level which support our model and assumptions, showing how money and time costs vary as the local red tape a firm faces varies.

In Indonesia, the everyday corruption most firms face involves interaction with local officials, who administer regulations and indirect taxation. These are district (kabupaten) level officials, where a district is similar in geographic scope to northeast US counties. Our survey examines corruption for the year 2001, which is at the dawn of full local democratization. In 2001, Indonesia switched away from a unitary form of governance and decentralized enormous responsibilities to district governments, under local assemblies that were democratically elected in 1999 in Indonesia's first democratic election. We view the red tape in place in 2001 as having been implemented prior to decentralization, based on local governance and fiscal situations in the late 1990's; and we present evidence to that effect. In a subsequent paper using a data set on corruption in 2004, we examine the effects of decentralization and local politics on corruption in 2004 and on the (dramatic) changes in corruption between 2001 and 2004 (Henderson and Kuncoro, 2006). But this paper is focused on how the instrument of corruption, red tape, is set in the pre-decentralization era before full local democracy, in part being driven by fiscal transfer arrangements with the central government.

To understand the potential link between corruption and fiscal arrangements, we think of the government of a district as hiring local officials to administer regulations, as well as provide services. For the moment, let the government of a district be embodied in the bupati, who is the head of the district government and in 1999 was appointed by the center (although that changes with bupatis first being elected by local assemblies and then by direct vote in later years). The district government has a local property tax base, where de facto tax rates are capped at low levels; and fiscal transfers are modest. It is widely acknowledged that revenues from tax and transfer sources both before and after decentralization are insufficient to pay for even minimal mandated public service levels, so the local government needs to seek other forms of revenue. Local red tape such as licenses and "levies" provide indirect revenues in the form of bribes, as well as direct revenues. Bribes received by local officials to ameliorate the impact of red tape mean the local government can pay lower salaries to officials; i.e., expected bribes received are capitalized into lower official salaries. [This does not say whether the freed up money is used for best purposes; below we model that explicitly. [2]] The use of red tape and corruption to provide local revenues is not without consequence. Increased red tape

[2] Note bupatis as well as central government officials are corrupt, perhaps inhibiting their ability to fight lower level corruption (Andvig and Moene, 1990).

and bribe demands make a locality unattractive to firms, driving firms to other districts and lowering the tax base of the district. Greater fiscal transfers from the center reduce the need to rely on corruption.

The results are relevant to local governance before and after decentralization, since they suggest that the propensity to tolerate corruption is based on local fiscal needs and national inter-jurisdictional transfer arrangements. Today Indonesia faces the problem that, while expenditure responsibilities have been decentralized, revenue-raising functions have not. Local governments have limited taxation ability and thus rely on corruption to help supplement the salaries of local employees.

The paper also investigates the nature and costs of corruption, asking what types of red tape invite bribes (Kaufman and Wei, 1998) and how important is each type. For red tape such as required licenses, how does the bribing process work and what determines the amounts of time spent wooing local officials? Answering these questions will help us understand the extent to which creation of red tape enhances the ability of officials to extract bribes and how much time is lost from the perspective of firms in dealing with corruption. We also examine forms of corruption, involving defraud of the state of, say, tax revenue that individual firms might favor (Shleifer and Vishny, 1993).

To examine corruption, we utilize a data set collected in late 2001 by LPEM at the University of Indonesia covering 1808 firms in 64 (out of about 300) district government areas, which is unusual in two aspects. First is the detailed micro information on forms of red tape and interactions with local officials. Second is the high response rate – in terms of willingness to report bribes, willingness to report other corruption information, and candor about the magnitude of bribes paid. For example, 75% of all firms sampled report positive bribes, and we infer that some reasonable number correctly report zero bribes. In contrast, in Uganda which is a country viewed at least as equally corrupt (Bardhan, 1997), Svensson (2003) ends up analyzing bribes reported by just 48% of original surveyed firms from a general economic survey of firms. In Svensson's survey mean bribes are only about 3% of profits (and presumably a much smaller fraction of costs), in comparison to mean bribes to costs of 10.5% (for those paying bribes) in our survey. The magnitudes reported for Uganda are similar to what Indonesian firms report as corruption costs ("gifts given") in the Indonesian Annual Survey of Medium and Large [Manufacturing] Enterprises. But the carefully crafted interviewing for our survey specifically focused on corruption, with various indirect checks on accuracy, brings out very different responses than the manufacturing survey.

The paper starts with a conceptual framework, modeling aspects of corruption, inter-jurisdictional competition, and the effect of fiscal arrangements on corruption, reviewing the relevant literature as we go along. Then we review center-local fiscal arrangements in Indonesia and estimate the effects of fiscal

arrangements on red tape. Finally we examine the nature of interaction between firms and local officials: bribe activity and time wasted with local officials in dealing with red tape.

1. How Local Governments Set Red Tape

In this section we outline a simple model of the determination of red tape in districts to motivate the empirical work to follow and to clarify our views of the process. In the framework we outline, firms pay local taxes to the central government at rates set by the center; some fixed proportion of proceeds is then rebated to districts. Districts decide on a level of red tape, with the intention of influencing the level of corruption and bribes to supplement local salaries of officials. Red tape levels in districts influence firm location decisions which in turn affects local tax bases and tax proceeds remitted by the center to districts. So in setting red tape, districts consider the loss of tax base as they raise red tape levels. Firms decide what bribes to pay based on the extent to which that will reduce harassment, given the red tape they face and the extent to which local officials spend time harassing them. Officials decide how much to harass firms based on the time and travel costs to them of harassing firms and the bribes their actions generate.

In terms of the literature, firms supply bribes, under the "efficient grease" hypothesis to reduce the impact of regulations (e.g., Liu, 1985, and Becker and Maher, 1986, as reviewed by Bardhan, 1997). But local government employees are imposing regulations to influence bribe income (e.g., Banerjee, 1994, Kaufman and Wei, 1998). Strategic competition across districts for firms limits red tape (Brennan and Buchanan, 1980; Edward and Keen (1996, and Arikan, 2000). The new consideration we introduce (Bardhan and Mookerjee, 2005) is that the decision on the extent of red tape is influenced by local fiscal situations and inter-governmental transfers. We now present our stylized model, relegating many of the mechanical details to an Appendix and presenting the model in a simple form to make the basic points.

2.1 Modeling Firm Response to Regulation

Firms face a pre-tax profit function of the form $\tilde{\pi}(N, h(l,t,b);\cdot)$. The function has district level variables perceived as exogenous by the firm (but not district government) affecting profitability, which for simplicity here are encapsulated in N, the number of firms in the district. We postulate marginal diseconomies of scale in equilibrium, so firms are spread over many districts rather than agglomerating all in one district; for example, the more firms the fewer district resources (labor or land) available to each firm and hence the higher the prices of local resources. The other argument in the profit function is "harassment," h, where profits are decreasing in harassment. Harassment is increasing in red tape, l, where the main form of red tape is licenses, and increasing in time, t, local officials spend at the firm. Bribes, b, are paid to reduce

harassment. As detailed later, more licenses provide more excuses for officials to visit and spend time at firms and firms pay bribes to facilitate the licensing process and get officials out of their plants. In defining the firm's optimization problem to conserve on notation, we write the firm's profit function as $\pi(N,l,t,b)$.

The firm's optimization problem is

$$\max_b \Pi = (1-\tau)\pi(N,l,t,b) - b; \quad \pi_l, \pi_t, \pi_N < 0; \; \pi_b > 0; \; \pi_{bb} < 0; \; \pi_{bt}, \pi_{bl} > 0. \tag{1}$$

In (1), τ is the national tax on official profits, and post-tax profits are reduced to the firm by bribes paid, b. The second derivative restrictions imposed are to ensure second order conditions for the firm and local official are satisfied. The firm chooses a level of bribes to maximize profits in (1), so that

$$(1-\tau)\pi_b - 1 = 0 \; , \tag{2}$$

with second order conditions requiring $\pi_{bb} < 0$. In the empirical work we will argue that time and bribes are "complements", meaning here that $\pi_{bt} > 0$ so that marginal effectiveness of bribes increases as the firm and local officials spend more time together. Correspondingly, as explained later, we also assume $\pi_{bl} > 0.$ The restriction $\pi_{bt} > 0$ is required for a well behaved local official's optimization problem below. Time may be needed to assess the required level of bribes so that time and bribes rise together, an idea that can be modeled explicitly, although we are imposing a "black-box" here.[3] In addition, based on common perceptions of the social forces involved in Indonesia, officials may not want to be seen as simple thieves and spend time cultivating a "gift relationship" among "friends".

Equation (1) defines an implicit function for bribes perceived by local officials where

$$b = \tilde{b}(N, l, t, (1-\tau)); \quad \tilde{b}_t = \frac{\pi_{bt}}{-\pi_{bb}} > 0; \; \tilde{b}_{tt} = \partial(\frac{\pi_{bt}}{-\pi_{bb}}) / \partial t < 0. \tag{3}$$

Derivative restrictions ensure the official's optimization problem below is well-behaved. Local officials spend time at plants in order to maximize their benefits defined as

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[3]Economic micro-foundations for the time-bribe relatrionship could involve a learning story. For any license and license grantor, there is a minimum payment, say θ, an official will accept, depending on the official's "tastes". That minimum is private information and the firm only knows the distribution. The firm gets, say, two tries (visits by the official to the factory), to bribe him. If he fails on both accounts, he gets no license that year and that imposes specific costs. Suppose θ, is uniformly distributed between 0 and 1. The firm can offer θ_1 on the first visit which has a probability θ_1 of being accepted. If θ_1 is too low, no license is granted on the first visit and the official incurs a cost c_1, with probability $(1-\theta_1)$. On the second visit the factory can offer θ_2 which has a probability $(\theta_2 - \theta_1)$ of being accepted. If it is rejected, the firm then bears a cost c_2 with probability $(1-\theta_2)$, where $c_2 > c_1$. Optimizing with respect to θ_1 and θ_2 certain regions of parameter space yield an interior solution where $\theta_1 = 2/3\, c_1 + c_2/3$ and $\theta_2 = 2/3\, c_2 + c_1/3$. Given $\theta_2 > \theta_1$ in such a solution, time spent (number of visits) with the local official rises with observed bribes; and the solution also has the feature that with greedy officials bribes may never be paid although heavy costs (c_1, c_2 and 2 visits) are incurred.

$$\tilde{b}(N,l,t,(1-\tau))-c(t);\quad c_t>0, c_{tt}>0\,, \tag{4}$$

choosing t so that

$$\tilde{b}_t - c_t = 0\,. \tag{5}$$

The restrictions in (3) and (4) ensure first and second order conditions are satisfied. In (5) the presumption is that increases in licenses result in increases in bribes, or $d\tilde{b}/dl = \pi_{bl}/(-\pi_{bb}) > 0$. Otherwise there is no efficient grease and the whole problem makes no sense.

If bribes are increasing in licenses, what limits the number of licenses set by the local government? One limit is firm exit, where in Bliss and Tella (1997), given heterogeneous firms, corruption forces less efficient firms out of business. Another limit which we take here is to emphasize inter-jurisdictional competition, and exit to other jurisdictions. Here we assume for convenience that firms are perfectly mobile across regions so that

$$\Pi_j = \Pi_i,\quad \forall i, j \tag{6}$$

where Π's are defined in (1) and i and j index districts. Equation (6) will be a constraint on the local government's optimization problem, in the district competition for firms. Increases in red tape will generate more bribe income for local officials but will also drive firms out of the district and lower its tax base. We now turn to defining this trade-off.

What is the nature of local governments? We can either assume the local government is a Leviathan (Brennan and Buchanan, 1980, which in some sense means it is infinitely corrupt) or assume its greed is tempered by a desire (or need, given social- political forces) to please residents of the district. Following Edwards and Keen 1996, Panizza, 1999, Arikan 2000 and Arzaghi and Henderson 2004) we assume a local government objective function $\Omega = (R-g)^{\sigma}V(g;\cdot)^{1-\sigma}$, where g is the level of public goods enjoyed by the representative resident and $V(\cdot)$ the utility from that. For simplicity, in the model we avoid the general equilibrium aspect of how having more or less firms may affect residents' earnings and hence income in $V(\cdot)$. R is public revenue received by the local government net of its administrative costs. $\sigma<1$ is the weight given to surplus revenue of the local government where a lower σ implies more democracy and a higher one more autocracy. Licenses are chosen to maximize this function, with a first order condition $\partial R/\partial l = 0$, the same as in a Leviathan problem (but if there are general equilibrium effects of numbers of firms on wages then the problem is more complicated in that a lose of firms becomes even more costly to a district). The key issue concerns local revenues.

From each firm the center collects $\tau\pi(\cdot)$ and a portion β of that is remitted to the district. In addition the district may receive a lump sum transfer from the center, S as the district's source of revenue. The district employs an official who administers regulations and purchases public services. The competitive total compensation of government officials we assume is fixed at $\bar{w}$ (avoiding the issue of whether that compensation depends on district wage levels which may be influenced by the number of firms). Actual wage payments by the district to this official are reduced by anticipated net bribe income, $N[\tilde{b}(\cdot) - c(t)]$, collected by the local official. In summary the net revenue of the local government is

$$R = N\beta\tau\ \pi(N,l,t,b),+S-\{\bar{w}-N[\tilde{b}(\cdot)-c(t)]\}. \tag{7}$$

Optimizing with respect to l and collecting terms we get

$$\begin{aligned} &\frac{dR}{dl}|_g = [N\beta\tau\pi_l + N\tilde{b_l}] + [\beta\tau\pi(\cdot) + N\beta\tau\pi_N + \tilde{b}(\cdot) - c(\cdot)]\frac{dN}{dl} \ +[N\beta\tau\pi_t]\frac{dt}{dl}+[N\beta\tau\pi_b]\frac{db}{dl} = 0 \\ &d(\frac{dR}{dl}|_g)/dl < 0 \end{aligned} \tag{8}$$

In the first equation in (8), the first term in square brackets is the direct effect on revenues of increasing licenses: the reduction in profits and taxes because licenses increase harassment (first term within the brackets) opposed by the increase in direct bribe income (second term within the brackets). The second term in square brackets represents the effect of licenses on numbers of firms in the district. Fewer firms mean (a) fewer entities to collect taxes from (first term within the square brackets), (b) a rise in each remaining firm's profitability (second term), and (c) less firms to collect net bribe income from (last two terms). The third term in square brackets represents the indirect effects on revenues of how license numbers affect officials time spent harassing firms which affects firm profits (note a potential term $N(b_t(\cdot) - c_t(\cdot))$ equals zero from (5)). The last term is the effect on firm profits of increased licenses affecting firm bribes through harassment.

To solve for the terms dN/dl, dt/dl, and db/dl we need to differentiate equations (2), (5) and (6) and then solve the three equations for these three unknowns. We do this exercise in the Appendix for the case where the profit function is separable in N, meaning $\pi_{bN} = \pi_{lN} = \pi_{tN} = 0$. The key idea is that these three equations represent the behavior of firms in choosing locations, of officials in choosing time harassing firms and in firms choosing bribes, which constrains the local government in optimizing. The location choice problem implicit when differentiating (6) is a little more nuanced. When the local government chooses licenses under inter-jurisdictional competition across the n districts in the country it anticipates that firms move between regions so $\Pi_i - \Pi_j = 0$, in a Nash context where our region j is choosing l_j holding the l_i of

all other districts fixed, but recognizing that increases in l_j will induce movements to other regions. Specifically if all regions are identical so there is a symmetric equilibrium, then for our region j, $dN_j / dl_j = -(n-1)dN_i / dl_j$, $i \neq j$. Then when differentiating (6) we can define a relationship (see Appendix) where

$$\pi_N (n/(n-1))\frac{dN}{dl} + \pi_l + \pi_t \frac{dt}{dl} = 0 . \tag{9}$$

For this paper the key relationship of interest concerns the effect on red tape of changing inter-governmental transfers, by raising the rate β at which local taxes collected by the center are rebated back to the local government. That is we want to know the sign of $dl / d\beta$. Imposing symmetry nationally across regions, that sign is given by differentiating (8), to get

$$\frac{dl}{d\beta} = \frac{d(dR/dl/d\beta)}{-d(dR/dl)/dl} < 0 . \tag{10}$$

From the second order condition in (8), the denominator is positive. In the Appendix, we argue $d(dR/dl/d\beta)$ will be negative under two assumptions, that define the problem as being relevant. First an additional firm to a district raises total district profits ($\tau\pi(\cdot) + N\tau\pi_N > 0$); so there are not "super diseconomies of scale", whereby a region wants to rid itself of firms. Second, an increase in licenses has the overall effect of reducing firm profits (apart from the costs of bribes) so $\pi_l + \pi_t dt/dl + \pi_b db/dl > 0$. This is simply a statement that overall licenses hurt, not help, firm productivity. If that were not the case, the whole issue of red tape and efficient grease would be irrelevant. Note however changes in lump-sum transfers, S, have no effect on red tape choices. So the issue concerns rebates of locally raised taxes, the key source of inter-governmental transfers in Indonesia. A caveat is that symmetry in critical; if regions differ then the effect would vary by district, potentially giving a more complex story (e.g., Cai and Treisman, 2004).

Based on results in the Appendix we expect fiscal transfers to also affect bribes and the time spent with local officials. Bribes and time fall as licenses do. So if licenses fall as fiscal transfers fall, then so should bribes and time.

What aspects of the model can we test with our data? We state these now to provide a road map for what we do in the rest of the paper. First we test for a causal relationship between fiscal transfers and red tape in the form of licenses. Second we will show that, as licenses rise, so do bribes and time; and we will argue the data strongly indicate that time and bribes are positively related. However due to the timing of events in Indonesia and the complexity of actual bribe situations, as explained below, we cannot really test for a direct effect of fiscal relations on bribes. We can simply show that fiscal relations affect the imposition of red tape;

and red tape in turn affects bribes and time. Second, due to lack of relevant information in the annual survey of medium and large size manufacturing firms beyond 1999 we cannot directly show the effect of corruption on firm location decisions, although there is plenty of evidence that firms in Indonesia do respond in location choices to district conditions (Henderson and Kuncoro, 1996).[4] In order to explain what we can and cannot test for, in the next section we start by discussing the timing of events and the fiscal situation in Indonesia. Then we look at the effect of fiscal transfers on red tape. The section after that examines the relationship between red tape, time officials spend with firms, and bribes paid.

2. The Effects of Inter-Governmental Fiscal Relations on Corruption.

2.1. The Context

In January 2001, Indonesia implemented extensive decentralization, following legislation enacted in 1999. Our survey gathers information on firms for their 2001 year and is conducted in late 2001 carrying over to 2002. The main form of red tape for which we have an objective measure is licenses. The array of licenses required by firms is set by local governments. There is a long history of licensing to create red tape in Indonesia with licensing requirements fluctuating over time. In the mid-1990's in part spurred by the World Bank criticism, the Suharto government worked to cut back on the number of licenses given their negative impact on business and FDI, by limiting the types of activities licenses could be granted for and limiting regulations governing licenses. However with democratization in 1999 along with the decentralization legislation, prior to actual decentralization in 2001, local governments felt empowered to add new licenses and set sharp time limits on the period to renewal of licenses, so fieldwork suggests many licenses date from the late 1990's. These are the licenses that are in place in our 2001 survey. Their imposition in the late 1990's is going to depend on fiscal conditions prior to decentralization.

[4] We spent a lot of time on this issue. We structured a firm birth model for counts of births of manufacturing firms across kabupaten from 1997 to 2000 (the last year available), using the IV approach used for counts of licenses. Unfortunately this time period (base of 1997) is well before our data on harassment in 2001-2002. Thus we can't look at whether harassment affects location decisions; that would require birth data for, say, 2001-2003. Unfortunately beyond 2000, the Annual Survey of Medium and Large Size Establishments no longer records a birth year (essential to distinguish births from firms that grow from small to medium or large size) and the ability to link records over years deteriorates. We can look at whether difference in effective property tax rates in 1997 across districts as reported in the Annual Survey of Medium and Large Size Establishments affects location decisions for 1997-2000. For firm births, apart from this tax variable (which is also measured with error), variables such as local wage rates and own industry external scale economies are endogenous. In IV estimation a one standard deviation increase in the tax rate leads to a 29% decline in the number of firms in a district, a really strong effect. However given the larger number of endogenous variables and a problem of less than very strong instruments, while the estimate of the coefficient is fairly robust, its t-statistic is 1.20.

Decentralization completely changed fiscal arrangements starting in 2001 with new formula for transfers and new fiscal responsibilities of local governments. The precise fiscal arrangements were initially uncertain, with formula applied imprecisely and changing from 2001 to 2002. The impact of new expenditure responsibilities was also uncertain, if only because there was an entirely new regime: local democracy under full decentralization. While 2001 licenses, almost all of which were imposed in the late 1990's, will depend on pre-decentralization fiscal conditions, bribes and time which are determined contemporaneously do not depend directly on historical fiscal conditions. Bribes and time in 2001 will depend on current, uncertain fiscal conditions and may be influenced by democratization per se and local political conditions. Moreover bribes paid by a firm depend not just on licenses but on a whole array of local regulatory and tax conditions as described later; in addition bribe data is fairly noisy, again as explained later. While in principle contemporaneous bribes should depend indirectly on historical fiscal conditions through their effect on licenses, too many things influencing bribes in 2001 are occurring for us to isolate a significant indirect historical effect. Instead we make the inference by first looking at the effect of historical fiscal conditions on (pre-determined) licenses and then the effect of licenses on bribes and time contemporaneously.

What are local fiscal conditions before decentralization? On expenditures, local governments had autonomy over a limited range of services such as construction, maintenance of local side streets, parks, and other more minor infrastructure, and regulation of firms. Other public services were provided centrally. Major types of construction projects were also centrally mandated and paid for out of capital construction transfer (INPRES) monies, to be spent on, say, constructing a specific school (or hospital). On the revenue side prior to decentralization, the major categories of revenues for discretionary expenditures were the portion (64.8%) of national property taxes rebated back to the district, local license and levy fees, and residual inter-governmental transfers, some of which seem arbitrary and some connected, for example, with the district's generation of natural resource related revenues (generated by the sale of oil, natural gas, mining, and forest and fishery products from the district). Our focus is on the first item: intergovernmental transfers of locally generated tax revenues, although we will incorporate the third as well. Overall for Indonesia these rebated tax revenues average 20% of local revenues, but the share can be as high as 55% and as low as 0.2%. The third category containing transfers for natural resource revenues collected by the center accounts for only 3% of local revenues, although it goes as high as 34%. We note that prior to decentralization, the local district administration also acted as a "cashier" for the national government formally paying for most operational expenditures of the national government (e.g. teachers' salaries) within the district. These cashier money transfers, or pass-through monies were called "SDO" funds. We separate these out since they are not revenues for local expenditures. However we can't properly distinguish local expenditures from central expenditures in

a locality, since the numbers are mingled on the expenditure side, making it impossible to separate out local discretionary from nationally mandated expenditures.

With decentralization, expenditure functions governing schooling, health care, public works, communications, environmental regulation and policing were decentralized to the district level. In essence the cashier for formerly nationally provided local public services became the new provider. However, while legislative functions are now decentralized, most critically revenue functions are not. Now localities get more extensive inter-governmental transfers from the center, under the DAU program, which accounts for about 50% of local revenues. Most DAU monies are based on a "hold harmless condition", relating these DAU monies to the former SDO cashier funds transferred to the district. The idea is that minimum DAU transfers should be enough so the district can afford to pay the same teachers who were on the payroll before decentralization whom they now formally employ, with a similar constraint covering historical capital expenditures, as well as pay the salaries of former central government administrative personnel whose employment has now shifted to the district. In 2001, apart from DAU transfer funds, the three main sources of local government revenues remain as before.

The common perception as noted in the introduction is that local governments in Indonesia are "under-funded". Prior to decentralization, monies from property taxes and from general transfer revenues were insufficient to fund competitive salaries of local officials and provide basic services over which the district had autonomy. Decentralization has not changed this perception.

2.2. Red Tape and Fiscal Conditions

We now turn to estimating the effect of fiscal conditions on district imposed red tape, as measured by the number of licenses. Depending on what a firm produces and where it locates, it must procure a variety of licenses to operate a business. These licenses have fixed terms and must be renewed, some from year-to-year. The mean and standard deviation of licenses are respectively 4.7 and 5.0. Without the proper license for a particular activity, a firm may be harassed by neighbors and inspectors, unable to perform certain functions, or have all operations suspended. The number of licenses will depend on firm characteristics like size and industry (affecting machinery and energy needs and associated licenses) and firm specific activities, such as exporting, making noise, creating congestion, polluting in different dimensions, etc. While some types of licenses are required in all districts, the license requirements facing identical firms vary by district, especially in terms of requirements for specific firm activities. Bribes are paid to officials from the local Ministry of Industry who come to the factory to inspect licenses to get these officials out of the factory (since they are taking up the entrepreneur's time and bothering the workers), to resolve "arguments" over whether the correct licenses are in place and properly specified, and most particularly so officials do not hold up the granting, or

renewal of a license. Firms sometimes hire middlemen ("calo") to help procure licenses and pay the requisite bribes.

We estimate two forms to the model. In both cases we control for firm characteristics, which influence licenses in all districts, given the distribution of these characteristics varies across districts. The first form is an equation based on the stripped down version, represented by equation (10), where licenses are set to maximize district revenues, given fiscal transfer rates. Second is a version where we add in more district level controls such as income per capita, population and a measure of sophistication of local village leaders. We add these controls for two reasons. Unlike in the model, in reality districts are heterogeneous such as in size and income and that will affect fiscal responses and licenses. Second in the model we assumed away within district general equilibrium effects where local incomes and political choices may respond to numbers of firms as affected by harassment. That is, the district in maximizing the objective function $(R-g)^{\sigma}V(y,g)^{1-\sigma}$ may have an effect $(dy/dN)/(dN/dl)$ in addition to dR/dl. Finally, there may be tastes concerning the use of corruption to raise revenues, where the willingness to impose red tape and generate bribes may be declining in residents' incomes or sophistication of local public officials. For the latter, we know the education level of the village head, a basic level of administrator within the district and we see if districts with a greater fraction of heads who have completed high school utilize red tape less.

For fiscal variables, we have two -- transfers back to the district from indirect tax collections by the center and residual transfers based in part on natural resources rents collected by the center. In principle, indirect tax rebates and residual transfers could have the same effect. But indirect tax revenues are long standing and "certain", and directly based on the level of business activity in the district. We note the model is for a profits tax; indirect taxes are not exactly that. Some portion are property taxes in principle are a tax on forms of capital (but assessments may vary with profitability); but some portion do seem related to firm profitability as we will discuss in the next section of the paper. The second form of transfers are much smaller and related to only more immobile forms (natural resources) of local economic activity, so their effect within the model is less clear. We enter these two fiscal magnitudes as normalized—as a fraction of local GDP. The model uses a tax transfer rate; we don't observe those rates, but assume their variation is reflected in the ratio of transfers to GDP, with the latter measuring the level of business activity. We also report results for absolute magnitudes of transfers. For these outside revenues, we use 1999 fiscal variables. Records for 2000 are messed up because of a change in the dates of the fiscal year. While we have many firms, we have only 64 districts; so we stick to simple formulations.

2.2.1 The Empirical Formulation

Data. Our survey covered 1803 firms spread across Indonesia in 64 different districts, in late 2001 and early 2002, covering data for the 2001 calendar year. The survey covers both manufacturing and service firms and was drawn as a random sample of formal sector firms based on local lists from the district chamber of commerce (an NGO), supplemented by other lists such as firms in the Annual Survey of Medium and Large [Manufacturing] Enterprises. Below we discuss more fully the longer list of corruption variables. Here we focus on the main form of red tape, the count of licenses. About 21% of firms report zero licenses. Many smaller firms do not have licenses and but we worried that some answers could be non-responses. The survey unfortunately did not distinguish clearly zeros from non-responses on certain questions. Fortunately non-responses seem to be bunched in the sense that firms either respond to essentially all questions or refuse to answer many questions, with the latter group numbering about 45. We exclude the 45 firms who refused to answers questions about the amount of time they spent with local officials and attitude questions on the problems they experienced with levies and retributions (see next section).

Formulation. Given the count nature of the data, with many zeros, we start with a Poisson count model for the absolute number of licenses per firm. In estimation an econometric issue is endogeneity. Presumably whatever unobserved variables drive district levels of harassment (e.g., unexplained needs for public services) affect also the intensity with which the district bargains for higher property tax targets and central government's willingness to adjust these targets, or to increase monies in the residual transfers category. Thus the direct (negative) effect of transfers on harassment will be biased towards zero, where unobserved "special needs" may raise both transfers and harassment. As such we want to define a set of instruments that influence the fiscal covariates but are exogenous to current district error drawings. In that case we estimate a moment condition based on a count model. If $V_j \equiv L_j - \lambda_j = L_j - \exp(\beta X_j)$, where X_j are covariates, L_j is the actual number of licenses and λ_j the expected number, the moment condition is $E\left[V_j \mid Z_j\right] = 0$ (Windmeijer and Silva, 1997 and Mullahy, 1997), where Z_j are instruments. In the moment condition, a Poisson assumption is no longer imposed and estimates account for heteroskedasticity.[5]

For instruments, we use the median property tax rate paid by manufacturing firms in the 1997 annual survey of all medium and large enterprises. While this variable may seem suspicious, we argue that, while it is correlated with tax transfers in 1999, it is divorced from the current unobservables affecting the post-Suharto bargaining between a district and the center over current targets and the district's post-Suharto license setting behavior. We will report specification test results on our assumptions (see later). We use the ratio of

[5] We use Windmeijer's EXPEND Gauss program, which he has kindly made available on the IFS website at UCL.

first sector GDP (which includes natural resources) to all GDP in 1994 as influencing residual transfers. Finally to normalize and control for district scale we use 1990 land area. Instruments are strong for tax transfers, but not for residual ones (see later).

2.3 Results

Basic results are in Table 1. We start in column (i) with the stripped down model where apart from firm characteristics, only the district tax transfer as a percent of local GDP enters as a covariate. Then in column (ii) we add in the residual (natural resource) transfer as a percent of GDP variable. In the remaining columns we add in district controls for GDP per capita, population and % of village heads with a high school degree. Columns (iii) and (iv) contain the basic results: in column (iii) results are for transfers as a percent of GDP, while in column (iv) the transfer variables are entered in (logs of) total transfers. Finally column (v) presents ordinary Poisson results. Not the key impact of IV estimation is on transfer variables coefficients—taking coefficients biased towards zero and making them much more negative and significant.

We start with firm characteristics. Firm size is measured by sales in four categories. Not surprisingly, larger firms tend to have more licenses. But numbers of licenses don't vary with industry, export status or FDI. However government shareholding means a firm has fewer licenses, which could reflect the differential nature of government owned activities. Or it could imply that having central government ownership means a firm is less hassled by locals and faces less enforcement of local license requirements.

Turning to the variables of interest, everywhere tax transfers has negative, significant coefficients, indicating that districts with greater transfers are less likely to impose red tape, as predicted. The residual transfer variables also has a negative and significant (in 2 of the 3 relevant columns) impact; but its coefficient is less stable. Its first stage F-statistic is an abysmal 2.84, compared to 53.8 for the tax transfer variable. The key issue is that column (i) fails the Sargan specification test and column (ii) barely passes. This seems to be a problem with specification of the model not instruments: in the 2SLS estimation of the same model, in a regression of residuals on all instruments none are close to being significant. Indeed once we move to columns (iii) and (iv) adding in other district controls, then Sargan test results improve dramatically.

In column (iii), where transfer variables are a percent of local GDP, reflecting a rate of transfer as in the model, the district GDP per capita and population control variables are insignificant, although the theory as developed is silent on the issue of the expected sign. In column (iv) we enter the transfer variables in their total magnitudes. As one might expect, by removing GDP from the denominator of the (negative effect) transfer rate variables, the coefficients of GDP per capita and population controls become positive and significant. The Sargan test suggests column (iv) is a better specification; although in columns (i) and (ii)

without the district controls, conceptually one must use normalized measures of transfers, or rates. And the column (iii) specification is conceptually the preferred one.

In both columns (iii) and (iv), as sophistication of local officials increases, that reduces the use of licenses, perhaps reflecting a greater aversion to encouraging corruption. This result is of interest in itself, with the idea that with human capital accumulation and perhaps the resulting improvement in local institutions, corruption declines.

What are the magnitudes of effects for column (iii) and (iv) policy variables? In column (iii), a one standard deviation (.00238, for a mean of .00335) increase in the tax transfer variable decreases the number of licenses by 88%, a huge effect. A similar size increase in the residual transfer variable decreases the number of licenses by 47%. A one standard deviation (21) increase in the education variable reduces the number of licenses by 13%, still a substantial effect. In column (iv), coefficients are now elasticities, so a 1% increase in tax transfers reduces licenses by 1.2%, with a much smaller effect for natural resources transfers. And a doubling of tax transfer reduces licenses by 85%. These magnitudes suggest a strong, causal link between red tape and fiscal arrangements.

Robustness We tried various robustness checks. We treated the population, GDP per capita and village head education 1999 variables as endogenous, instrumenting with population from 1990, GDP per capita from 1996 and percent of the population with high school in 1960. That changes the tax transfer rate coefficient in column (iii) to -233 and the residual tax transfer to -88; but the specification fails the Sargan test. For various specifications (with and without the population, GDP per capita and village head education 1999 variables being treated as endogenous), we estimated the model by simple 2SLS (including zero dependent variable observations); the coefficient on the tax transfer variable is in the neighborhood of -225, but the coefficient on residual transfer variable bounces around and is insignificant. We conclude the tax transfer effects are solid but we have weak instruments for residual transfers.

3. Red Tape and the Costs of Corruption

From our survey, the dominant form of red tape is licenses. Licenses affect bribes paid (a transfer from firms to officials) and affect time spent by both firms and local officials with each other. The latter is a resource cost—lost time by management and presumably associated lost production by the firm and time wasted by local officials at the opportunity cost of providing real services. We focus first on a formulation where licenses affect bribes and try to establish a quantitative link between bribes paid and licenses, which will give us a sense of the indirect effect of fiscal arrangements on bribes. From the model there are two forms

to the bribe equation. First is a "structural" form equation where, from inverting equation (2), bribes paid by a firm depend both on red tape and time spent by local officials harassing the firm, so $b = \tilde{b}(l, t; \cdot)$. We have only an indirect measure of (endogenous) time spent by local officials; however we can solve out time spent by local officials, where, based on equation (5), time is a function of red tape the firm faces, or $t = t(l; \cdot)$. Substituting this into the bribe equation gives a reduced form equation for bribes $b = b(l; \cdot)$.

In the first part of section 3, we discuss the data on bribes, our implementation of the equation $b = b(l; \cdot)$ and econometric problems in estimation, and then results. In the next sub-section, we turn to other red tape and local tax policy factors that may affect bribes. We detail these are suggestive results, although econometric issues of endogeneity will limit conclusions we can draw. Then we turn to the interaction between bribes and our proxy for time spent with local officials, trying to look at a more structural version of the bribe relationship to show bribes and time are complements. In the last sub-section we turn to the effect of red tape on time wasted.

3.1. Red Tape and Bribing in Indonesia

In a corruption survey, as noted earlier, the big issue is how to elicit accurate bribe responses. Pre-survey testing suggested that, in Indonesia, firms balk if asked absolute monetary figures on bribes, taxes and the like. So, respondents were asked about the ratio of bribes to total costs. Given this ratio question, the intent was to gauge firm size by asking about sales, as well as a three-sector industry breakdown, employment in three size categories and information on whether the firm exported, had FDI investment, or had the government as a partial shareholder. The interviewees turned out to be cagey; and it became clear that absolute continuous numbers on sales were not going to be forthcoming from a large enough set of respondents. So the questionnaire was adjusted and firms slotted themselves into four size categories by sales. For researchers, that leaves imprecise controls on firm size and costs.

The information on bribing was elicited carefully, with many examples of what constituted bribes (shopping trips to Singapore, gifts, under-the-table payments, etc.) and with return visits to initial non-respondents. Giving of gifts per se is not illegal in Indonesia, although bribing is, so the issue of what might be illegal was carefully avoided. Besides the interviewers, a representative from the local Chamber of Commerce (non-governmental) was often present at interviews especially in more remote areas outside Java, with the tested idea that this would facilitate "a conversation among friends". Out of 1,808 firms, over 70% gave positive responses on bribes; the distribution of these responses is in Figure 1. There is some tendency for responses to bunch at numbers like 5%, 10%, and 15%, but many responses are much more nuanced. Of the 25-30% respondents reporting no bribes, it wasn't completely clear that these were true zero bribe responses, as opposed to non-responses. Originally we thought that more than half just wouldn't reveal bribe

information; but now after much more time spent studying corruption in Indonesia, it seems that firms are quite candid and there are many firms which do pay no bribes, especially smaller firms in more traditional villages or those run by devout Muslims who are known to refuse to pay bribes. We treat zero bribe responses as true zeros, with one caveat. We exclude about 100 firms who either do not respond to non-controversial questions, concerning time spent with local officials and attitudes towards problems with levies (discussed later) or give off the wall bribe ratio answers (implausibly high bribe to cost ratios of over 80). We estimate the model, treating zero bribes as a simple censoring problem. We use both a Tobit formulation, as well as linear least squares including zero bribe observations.[6]

Given the data where the bribe information is total bribes/costs and we don't know total costs or sales, for firm k in district j, the form we have for $b = b(l;\cdot)$ is

$$\left(\frac{\text{bribes}}{\text{costs}}\right)_{kj} = C_1(Z_{kj}) + \beta_1 \ln(\text{no. of licenses}_{kj}) + \varepsilon_{kj}. \qquad (11)$$

In the second term the β_1 coefficient on number of licenses captures how bribes rise as red tape increases. The first term $C(Z_{kj})$ in (11) represents a set of qualitative controls for firm costs which will include size measures and FDI and government ownership status (see below). We will also control for access of the firm to major metro areas. This has two aspects. First in more remote areas it may be more costly for officials to travel to in order to collect bribes. Second, starting in the 2-3 years before 2001, firms face official octroi taxation (taxes on movements of good across district boundaries). For timely movement of goods, bribes must be paid in addition to the tax and the access measure is a control for this form of harassment; the further a firm is from major shipping points the more district borders it may need to ship goods across. The control is distance from the center of the district to the nearest of six major urban centers, given transport routes run out from major cities.

In equation (11) the major econometric issue is that there are unobserved district characteristics (greed of current local officials, unobserved fiscal needs) affecting both bribes demanded and the degree of red tape. We use district fixed effects to control for this. However apart from greed of officials, on the other side there are unobserved characteristics of firms related to the "slickness" of the entrepreneur in handling bribes, which affect not just the bribe payment but might affect the red tape recorded as facing the firm. The

[6] Moving beyond a simple censoring specification, we did try a Heckman-type selection specification. To help identify any selection effect, we added in the selection equation controls on whether a firm says it faced recent labor problems, thinks the recent general election was good for them, or believes the police currently protect them and their property. Those who answer ("breezily") that everything is fine are significantly less likely to report bribes. The selection formulation did not work well. Both Mills' ratios in the 2-step formulation and correlation coefficients in the ML formulation are insignificant; and selection has no discernible pattern of effects. Therefore we do not report selection results.

identifying assumption under fixed effects is that licensing is a straightforward application of district regulations and all firms with the same characteristics face the same number of licenses in a district. Slickness affects what you pay in bribes but not your license requirements. While this is consistent with fieldwork information, it is a strong assumption. The alternative would be to instrument for licenses, using for example variables from the prior section. Unfortunately, despite the results in that section, these are weak instruments in 2SLS work; using tax transfers per capita, residual transfers per capita, land area and percent of village head with high school as instruments gives a partial R^2 of .007 and partial F of 3.1 in first stage OLS regressions. We experimented with many instrument combinations including various historical controls on district industrial structure; these are also weak instruments. We instrumented for slickness (but not district greed) by using the average license requirements in the district apart from the own firm. IV results are simply unstable (sometimes implausibly large) and coefficients always insignificant. So we rely on ordinary and fixed effect results.

3.1.1. Results for Licenses

Results on bribes paid are reported in Table 2, based on the OLS and Tobit formulations with and without fixed effects. For OLS standard errors are clustered robust ones, while for the Tobit they are clustered. The key issue concerns the effect of licenses on bribes paid. Fixed effect coefficients are larger than OLS ones, which may seem puzzling, since local government greed could lead to both more licenses and bribes. On the other hand, if a local government approaching the era of democracy is saddled with historically appointed and entrenched particularly greedy local officials, it may try to limit the number of licenses imposed in order to curtail bribery.

In column (ii) of Table 2, for fixed effect results, a doubling of the number of licenses (ln 2) raises the bribe ratio by 1.0. The mean and standard deviation of the bribe/cost ratio (in percent terms) are 8.0 and 10.3 respectively. An increase in the absolute number of licenses from 1 to 18, or to 1 standard deviation above the mean, raises the bribe ratio by 4.2, a substantial effect. Turning to the indirect effect of fiscal arrangements on bribes, in the previous section a 1 standard deviation increase in tax transfers reduces licenses by 88%, which in turn in this section reduces the bribe ratio by 1. So the effect is certainly noticeable. Moreover while Tobit results as expected are larger than the linear ones, for licenses in fact they are larger than usual—more than inflated by just the probability of paying a bribe. In column (iv), the overall effect of doubling the number of licenses is raise the bribe ratio by 1.51, and the approximate marginal effect is 76% of that, or 1.15.

In terms of firm characteristics, bribes ratios seem to decline with firm size, indicating a ‘fixed cost” component to bribes, with bigger firms devoting lower ratios of bribes to costs. Service firms appeared to pay more than manufacturing ones, perhaps getting less support from local governments eager to expand

manufacturing capability. Firms with international exposure—having FDI or exporting-- pay substantially more. They may be more profitable and stronger targets of corruption, or they may be more constrained by appearances (will face more neighborhood protests if their licenses are not up-to-date). Having government ownership didn't seem to matter per se. Finally distance to the nearest large metro area increases bribes; a one-standard deviation increase raises the bribe ratio by .72 in OLS results. Note fixed effect results don't apply here since the variable is defined at the district level.

3.1.2 Other Bribe Inducing Activity.

In 2001 there is another significant form of harassment that may generate bribes. Firms face "local levies and retributions" for having an escalator, operating a water pump, operating a generator, etc. Bribes are paid to spread levy payments over a period of time, perhaps a rather minor item. But for local levies and retributions, the application of specific levies may be subject to some negotiation. The survey has qualitative information on "problems with" levies and retributions, which we experiment with controlling for. One question asks about the obstacles for a firm created by levies and redistributions with a response grade 1-6, from "very small" to "very big". A second asks with the same response range whether the recent regional autonomy law in moving localities to decentralized democracy resulted in the creation of new levies. It is a little difficult to interpret attitudinal variables, since responses may be conditioned on what is the norm for the specific district.

Apart from red tape, bribes may be generated which involve defraud of the state, rather than efficient grease. One major source of this is defraud of the state of tax revenues connected with property taxation. While the official national property tax rate is .5% on market value of tangible assets, effective local tax rates derive from the target for total district collections given the local tax collector's office, which is typically based on historical collections and numbers of firms. That target is a subject of negotiation based on changing economic conditions in the district and the local government can push for collections above the target, but collectors who are appointed by the center have little incentive to respond to that pushing. The target is universally considerably less than what is hypothetically legally owed for the district, which introduces opportunities for graft. As shown later, the Annual Survey of Medium and Large [Manufacturing] Enterprises suggests the de facto rate averages about .25%. With targets universally set considerably less than what is hypothetically legally owed by the district, assessors and tax collectors may collect in bribes some portion of the gap between the legal tax liability of a firm and the on-average much lower target. Given potential legal liabilities, firms can lower their assessed payments by bribing assessors not inspect a building and to accept their statement of what the capital contents are. Collectors can be bribed on an annual basis, to lower the tax bill below legal assessed taxes for businesses claiming "special" circumstances such as cash-flow problems,

poor sales, etc. Collectors and assessors often work out of the same building and how they split the "surplus" we don't know.

To incorporate this aspect of corruption empirically requires an adaptation of the model in Section 1, so firms have property. Suppose a firm's full tax liabilities are tK, where t is the official tax rate and K the full value of property. Given tK, a firm pays $tK\ (1-\alpha)$, where α is the forgiveness rate. For the typical firm in a district, α represents the gap between full tax liabilities and target tax collections, both of which are set by the center. While α is the overall forgiveness rate for the district, officials will negotiate with each firm as a bribe, a portion γ of αtK, since the firm's official tax liabilities remain tK. This bribe $\gamma\alpha tK$ is determined by bargaining, where bargaining power depends on the firm's influence with other government officials, the security of the official's position, the local attitude towards corruption, and the like. In a Nash bargaining context threat points could be to shut down, or seize the business unless γ=1, versus to offer the official close to nothing. We can't observe any of this process, but we estimate for the typical firm α and γ. If actual taxes paid are $tK\ (1-\alpha)$ and bribes $\alpha\gamma tK$, then for later reference

$$\text{bribes in } i \ = \ \frac{\alpha\gamma}{1-\alpha} \cdot [\text{actual taxes paid in } i] \qquad (12)$$

While we could incorporate defraud of the state into the analysis in Section 1 of strategic interactions across district, it is both complicated and in the end involves the same issues. While firms might seem to want lower γ, collectively that would increase salaries needed to pay local officials, forcing them to look for other sources of revenue (e.g., red tape).

Based on this discussion, we amend the bribe equation in (11) to add on $\alpha\gamma/(1-\alpha)\ (taxes/\cos ts)_{ij}$, as well as responses to attitudinal questions on levies. α is the forgiveness rate on assessments and γ is the bribe rate on forgiven taxes; below we will present evidence from the Annual Survey of Medium and Large [Manufacturing] Enterprises on α, allowing us to recover γ. Any estimates with the tax variable included are biased, because unobserved slickness of the firm affects both negotiated amounts--bribes and taxes paid. Again we do not have sufficiently strong instruments for this variable; even including the 1997 median tax rate leave first stage regressions with first stage F's under 10 and partial R^2's of about .03. The exception is to instrument with the average tax/cost ratio of other firms in the district, which deals with slickness but assumes there are no district unobservables affecting this negotiated ratio, which is implausible.

Results. To the basic bribe model in Table 2, in Table 3, we add the tax/cost ratio variable and responses on attitudes concerning levies and retributions. OLS and fixed effect results on this are in columns (i) and (ii) respectively. Apart from controlling for district specific greed of officials, the case for fixed effects involves

district level attitudes and culture that affect attitudinal responses. We note that the introduction of these new variables substantially reduces the license effect, making the OLS result insignificant. However the fixed effect result is significant and still sizeable. We tend to rely on the Table 2 estimates for license effects since the formulation is cleaner: fixed effects may deal with the basic endogeneity issue in Table 2, but they can't in Table 3 for the tax variable. Moreover adding in attitudinal responses may introduce variables which reflect a general feeling of harassment, including licenses, thus capturing part of the license effect.

In Table 3 column (ii), we examine the effects of the new variables. The attitudinal response variables are very important but hard to interpret. For "levies are obstacles", a one-standard deviation increase in this rating (1.55) raises the bribe ratio by 1.4. For "new levies since autonomy law" a one-standard deviation increase raises the bribe ratio by .54. Turning to the tax-fraud variable, the coefficient identifies $\gamma\ (1-\alpha)/\alpha,$ where α is the forgiveness rate on taxes and γ is the bribe rate on forgiven taxes. The coefficient is .337. From the Annual Survey of Medium and Large Enterprises for manufacturing firms, for a sample size of 9784, we regress indirect taxes paid $((1-\alpha)\ tK)$ on the market value of all land, buildings and capital machinery $(K).$ From Table 4, the coefficient gives an overall estimate for $(1-\alpha)t$ of .00263. (The coefficient is .00248 if zeros are included in LHS observations and a sample is 14,289.) The estimate is "tight" but the R^2 is low; there is enormous cross-district and cross firm variation in taxes paid. While in theory, indirect taxes are property taxes, in practice they also include special assessments on profits, such as for firms with government links. Given an official tax rate t of .005, the Table 4 coefficient implies an α of .47. From Table 3 that, in turn, implies a γ of .30. So, if we had unbiased estimates, the point estimate would suggest local officials collect under the table about 30% of forgiven taxes, on average across Indonesia.

3.1.3 Bribes and Time as Complements.

The bribe equation we estimated is a "reduced form" equation, with no control over the effort devoted by local officials to collect bribes. While we don't know time spent by local officials per se, we have an estimate of management "time spent smoothing local officials", which falls into six categories of percent time spent smoothing: 0-5%, 5-15%, 15-25%, 25-50%, 50-75%, over 75%. In the raw data, bribes and time are positively correlated: the mean percent of bribes in production costs changes across firms in each category, taking average values respectively of 7.8%, 9.3%, 12.5% 16.8%, 14.4% and 19.4%, so the average rises by 2.5 fold moving from the lowest to highest category. This is supportive of the idea that as time devoted to public officials rises, so do bribes, as assumed in the model in Section 1. Bribing doesn't eliminate hassle; rather hassle and bribes go together. To explore this further we look at partial correlations.

We add this variable scaled from 1-6 to our basic equation. While this doesn't recover the structural equation per se since we have only a time proxy and no strong instruments for this endogenous time proxy[7], it shows the partial correlation between time and bribes. In terms of these interactions with local officials, we also add other aspects of the interaction. If firms can better predict bribes (on a scale of 1-6), or "know the prices", we ask whether they pay more. We anticipated a positive correlation: firms would pay a premium to operate in an environment where prices are known. But as it will turn out, it seems that, in any locality, some firms know the prices and others don't: those who don't spend more. This would be consistent with the micro-foundations for bribing outlined in footnote 3, where those who know prices don't need to experiment with time and money. Finally in terms of the bribe ratio, we see if perceptions about whether promised "services" are delivered affect the bribe ratio.

OLS and fixed effect results are in columns (iii) and (iv) of Table 3. Time spent smoothing and bribes are indeed positively correlated. A rise from 1 to 6 in the smoothing time reported is associated a rise in the bribe ratio of 7, suggesting very high complementarity between bribes and time. Firms which feel they know bribe prices pay less in bribes, consistent with the idea that if you don't know the prices, you waste time and money discovering them. Reported attitudes on receiving promised services have no effect on bribes.

3.2 Red Tape and Time Wasted

As a last piece to the puzzle, we turn to equation (5) and look at time spent by local officials in harassing firms, as indicated by the smoothing time variable. We estimate an equation based on (5) in the form noted earlier of $t = t(l;\cdot)$. Having a sense of the determinants of time is important per se, since this is the real resource cost of corruption. Bribes are a transfer but time spent with local officials means time diverted from production.

As noted, in our data we will have six categories of the fraction of time spent by management with local officials smoothing operations. The mid-point values of time are 2.5%, 10%, 20%, 37.5%, 62.5% and 87.5%. We use our category variable as the dependent variable. We estimate the equation for time by OLS using mid-point values for the categories, but estimates are imprecise given the limited nature of the dependent variable. So we turn to ordered Probit, estimating both regular ordered Probit and then a version with district fixed effects added. We focus on a version with just licenses as the red tape variable, but report results when all harassment variables are added.

[7] The first stage F-statistic on plausible instruments for time (such as education of local officials and district wealth variables representing sophistication of local officials) is 2.3 and the partial R^2 is .011.

Basic Results.

In Table 5, column (i) gives the OLS results as a reference: standard errors on coefficients are large and most variables are insignificant. The regular ordered Probit in column (ii) gives more precision, although effects are a pain to interpret. Column (iii) reports a Probit with fixed effects added to the column (ii) specification; generally all effects weaken with fixed effects. Finally column (iv) present results with all harassment variables added to column (ii); a fixed effect version of this leaves all but one coefficient ("levies are obstacles" insignificant (with the license coefficient dropping to .043). As before, attitudinal questions pose a problem in interpretation of results.

We focus on the interpretation of column (ii) and (iii) results on licenses. For a large, non-export, non-FDI, non-government, manufacturing firm at an average distance, we examine the effect on the probability of being in the six smoothing time orders, of a change in the licenses. In column (ii), for the license variables at its mean, the probabilities of being in the lowest to highest order are .30, .36, .23, .092, .015, and .0036 respectively. If the license variable (in logs) rises by one-standard deviation (the equivalent of 6.5 licenses), the probabilities become .27, .36, .24, .10, .018, and .0047. Then, for example, the probability of being in the lowest group falls 10%, while the probability of being in the top group rises 28%. If we assign mid-point values for time in the 6 categories, the *expected* amount of time with average licenses is 13.57, while with the one standard deviation increase in the license variable, it is 14.53. This is an increase in expected time of 1 percentage point (and compares with the OLS result where a standard deviation increase in the license variable increases expected time by .79). This is not an enormous effect, but it is noticeable. For column 3 results, for the corresponding experiment, the probability of being in the lowest category falls by 6%, while that for being in the top rises by 15%; and overall the expected amount of time increases by .58, a more muted effect than ordinary ordered Probit. Ordered Probit results on licenses in column (iv) are similar to column (ii), although a little more muted. For other variables, as with bribes, service firms seem more hassled and government owned ones less so.

4. Summary

Bribes for firms in Indonesia in part arise from the imposition of red tape, principally licenses, administered by local government officials. Licenses generate direct revenues (fees) plus indirect revenues in the form of bribes, where we argue that the latter are capitalized into lower salaries needed by localities to compensate public officials. Localities in Indonesia are hampered by insufficient revenues from non-harassment sources to pay competitive salaries plus fund "required" levels of public services. Effective local

tax rates are capped at different levels across localities by the center and inter-governmental transfers are limited. Thus the direct and indirect revenues from red tape are a central part of local finances.

The paper models how inter-jurisdictional competition for firms limits the degree of red tape and how greater sources of tax or inter-governmental revenues reduce the need for harassment, and help limit corruption. The paper estimates the effect of differential revenue sources on the variation in red tape across localities, finding a large reduction in the number of licenses in better funded localities. It also finds that, ceteris paribus, red tape declines with increased education of local officials. That would suggest that economic development per se will retard corruption. The findings are directly relevant to Indonesia where corruption is high and the country is in the throes of major decentralization and local democratization processes. A key to limiting local corruption, apart from appointing better educated officials, may be to either relax caps on local property tax rates or to increase inter-governmental transfers, so localities have sufficient revenue sources and don't need to rely on "red tape" and corruption to effectively compensate local officials and raise local revenues.

The paper also models and estimates the relationships between bribes, time spent with local officials, and different forms of regulation. The paper finds that both bribes and time rise with red tape and that bribes and time are positively correlated. Bribing is a time intensive activity. The effect of licenses on bribes and on time gives an indirect estimate of the effect of fiscal reforms on bribes and wasted time, through their effect on red tape decisions.

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Table 1. Harassment (Licenses) and Fiscal Transfers

	(i)	(ii)	(iii)	(iv)	(v)
	Number of licenses	**Number of licenses**	**Number of licenses**	**Number of licenses**	**Number of licenses**
	IV	**IV**	**IV**	**IV**	**Poisson**
dummy: small-	.139**	.131*	.145**	.185**	.178**
medium firm	(.0687)	(.0804)	(.0690)	(.113)	(.0648)
dummy: medium-	.155**	.0737	.163**	.109	.229**
large firm	(.0705)	(.0851)	(.0709)	(.110)	(.0633)
dummy: large firm	.223**	.329**	.320**	.532**	.322**
	(.0985)	(.0120)	(.101)	(.187)	(.0906)
dummy: service	-.0717	.0455	-.0474	.112	-.0678
sector	(.0560)	(.0765)	(.0558)	(.104)	(.0498)
dummy: FDI or not	-.0668	.0933	-.0530	-.290	-.166
	(.109)	(.134)	(.124)	(.218)	(.106)
dummy: export or	.0276	.0480	.0144	.0311	.0369
not	(.0718)	(.0867)	(.0722)	(.147)	(.0638)
dummy: govt.	-.154*	-.289**	-.267**	-.194	-.152**
shareholding	(.0794)	(.0983)	(.0857)	(.134)	(.0757)
prop. tax trans/GDP	-198**	-495**	-372**	[-1.24**	-24.5**
[ln(prop. taxes)]	(49.3)	(72.8)	(84.0)	(.402)]	(10.5)
residual trans./GDP		-2507**	-196	[-.298**	1.42
[ln(res. trans.)]		(1015)	(125)	(.103)]	(4.69)
ln (GDP pc)			-.0527	1.43**	-.0279
			(.0526)	(.472)	(.0364)
ln (population)			-.0710	2.08**	.0850**
			(.0452)	(.748)	(.0418)
% village heads			-.0060**	-.0059**	-.00508**
with high school			(.0020)	(.0030)	(.00134)
constant	2.01**	3.25**	4.21**	-16.4**	.739
	(.149)	(.233)	(.0740)	(7.01)	(.590)
Sargan p-value	.000	.0898	.229	.770	
pseudo R^2					.0266
N	1757	1757	1757	1757	1757

Table 2. Bribes and licenses

	(i)	(ii)	(iii)	(iv)
	OLS	**Fixed effects**	**Tobit**	**Tobit, with district fixed effects**
ln (no. of licenses)	1.17**	1.44**	2.02**	2.18**
	(.442)	(.311)	(.638)	(.386)
distance to nearest	1.07**	n.a.	1.52**	n.a.
major metro area	(.297)		(.393)	
dummy: small-	.674	1.21*	.370	1.20
medium firm	(.992)	(.664)	(1.41)	(.815)
dummy: medium-	-1.47**	-1.22*	-2.13**	-1.58*
large firm	(.705)	(.688)	(1.03)	(.850)
dummy: large firm	-3.55**	-3.50**	-4.83**	-4.57**
	(.972)	(.863)	(1.29)	(1.07)
dummy: service	1.94**	1.64**	2.08*	1.93**
sector	(.803)	(.600)	(1.12)	(.740)
dummy: FDI or not	2.99**	1.90**	3.28**	1.99*
	(1.26)	(.869)	(1.42)	(1.07)
dummy: export or	1.60**	1.70**	2.41**	2.40**
not	(.793)	(.693)	(1.03)	(.850)
dummy: govt.	-1.16	-.469	-.851	-.359
shareholding	(.932)	(.974)	(1.14)	(1.20)
constant	4.81**	n.a.	1.55	n.a.
	(.867)		(1.38)	
R^2	.050	.152		
Sigma			12.3**	11.5**
			(.819)	(.234)
N [zeros]	1702	1702	1702 [398]	1702 [398]

Table3. Other Bribe Inducing Activities

	(i) OLS	(ii) Fixed effects	(iii) OLS	(iv) Fixed effects
ln (no. of licenses)	.329	.659**	.230	.533*
	(.360)	(.294)	(.370)	(.290)
taxes/costs	.368**	.337**	.361**	.325**
	(.0304)	(.0253)	(.0311)	(.0250)
distance to nearest	.654**	n.a.	.526**	n.a.
major metro area	(.232)		(.244)	
"levies are	.884**	.895**	.680**	.727**
obstacles"	(.174)	(.190)	(.196)	(.189)
"new levies	.444**	.397**	.397**	.357*
problem"	(.195)	(.209)	(.189)	(.206)
dummy: small-	.445	.921	.246	.842
medium firm	(.771)	(.619)	(.812)	(.606)
dummy: medium-	-2.08**	-1.57**	-2.16	-1.61**
large firm	(.652)	(.645)	(.663)	(.632)
dummy: large firm	-4.25**	-3.99**	-4.77**	-4.31**
	(.881)	(.806)	(.798)	(.794)
dummy: service	1.19**	1.15**	.670	.774
sector	(.641)	(.561)	(.654)	(.551)
dummy: FDI or not	2.36**	1.89**	2.17*	1.71**
	(1.09)	(.811)	(1.11)	(.801)
dummy: export or	1.81**	1.86**	2.00**	1.84**
not	(.799)	(.643)	(.799)	(.634)
dummy: govt.	-1.29	-.800	-.771	-.459
shareholding	(.792)	(.911)	(.816)	(.889)
time spent			1.10**	1.37**
smoothing			(.311)	(.235)
firms predict bribes			-.542**	-.572**
			(.183)	(.187)
firms will receive				
promised favors			-.138	-.0680
			(.226)	(.192)
R^2	.204	.265	.226	.287
N	1677	1677	1640	1640

Table 4. Taxes in Annual Survey of Medium and Large Enterprises

Value Capital Stock	.002631**
	(.000172)
controls for ownership[a]	yes
N	9784
R^2	.0447

a) Only government ownership is significant with a large positive coefficient. This is the "cash-cow" problem facing firms with government ownership – extra "taxes" assessed.

Table 5. Time Spent Smoothing

	(i)	(ii)	(iii)	(iv)
	OLS	**Ordered probit[a]**	**Ordered probit[b]**	**Ordered probit[c]**
			district effects	
ln (no. of licenses)	1.01	.109**	.0735**	.0809**
	(.641)	(.0524)	(.0340)	(.0324)
distance to nearest	.768**	.0731**	n..a.	.0653**
major metro area	(.372)	(.0330)		(.0230)
taxes/costs				.00211
				(.00288)
“levies are obstacles”				.147**
				(.0218)
“new levies problem				.0221
since auto. law”				(.0245)
dummy: small	2.03	.231*	.129*	.232**
medium firm	(1.47)	(.120)	(.0730)	(.0690)
dummy: medium-	.561	.0942	.0252	.0321
large firm	(1.22)	(.105)	(.0758)	(.0713)
dummy: large firm	1.53	.170	.0193	.118
	(1.18)	(.114)	(.0953)	(.0899)
dummy: service	2.81**	.270**	.0681	.228**
sector	(1.02)	(.0886)	(.0666)	(.0595)
dummy: FDI or not	1.51	.121	.0774	.0902
	(1.02)	(.0851)	(.0940)	(.0876)
dummy: export or not	-.772	-.0308	.0129	-.0152
	(.758)	(.0696)	(.0765)	(.0722)
dummy: govt. share-	-2.08	-.267**	-.116	-.176*
holding	(1.39)	(.122)	(.109)	(.102)
R^2	.026			
N	1732	1732	1732	1732

(a) Cut-off points (on 1-6 scale) with standard errors in parentheses are .-.155 (.148), .788 (.142), 1.59 (.140), 2.45 (.168), and 3.05 (.175).

(b) Cut-off points (on 1-6 scale) with standard errors in parentheses are .-.652 (.166), .406 (.166), 1.30 (.168), 2.24 (.179), and 2.86 (.208).

(c) Cut-off points (on 1-6 scale) with standard errors in parentheses are . .445 (.111), 1.42 (.115), 2.24 (.119), 3.13 (.133), and 3.74 (.171).

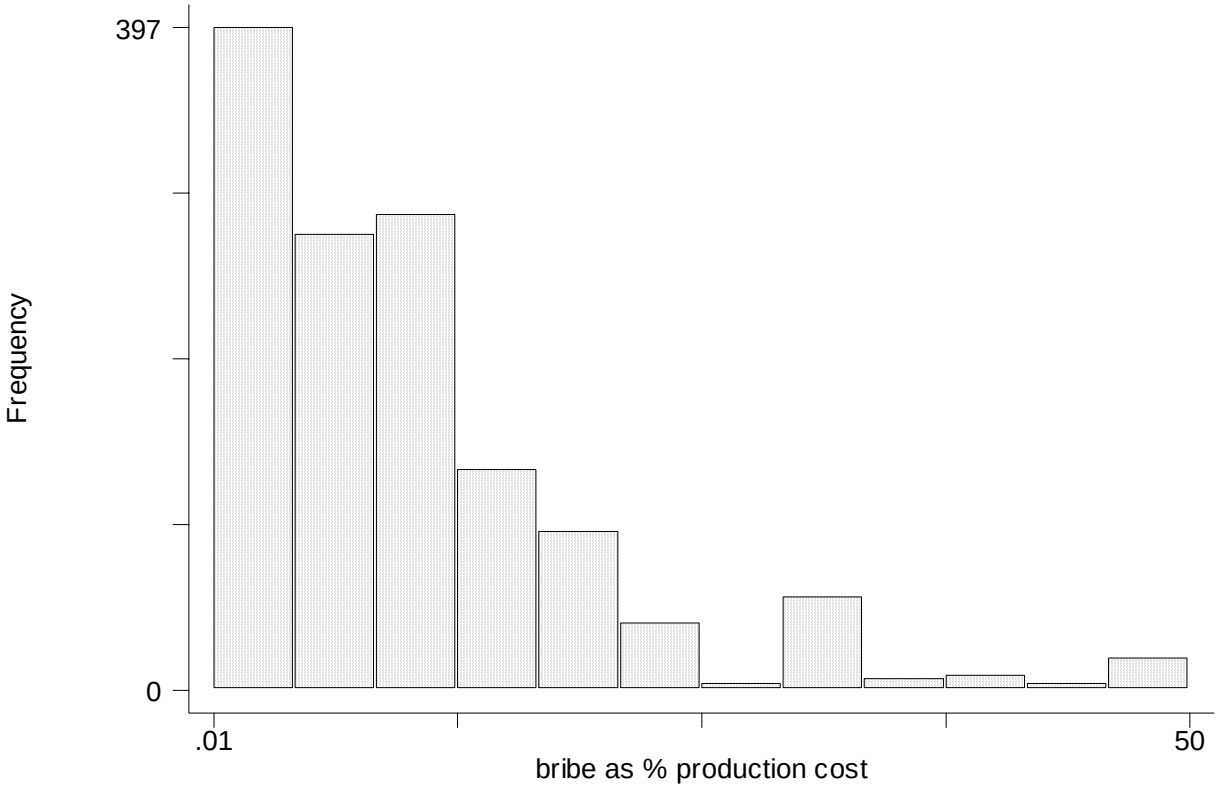

Figure 1. Distribution of Bribe to Cost Percents (12 equal length cells)

Appendix. Derivation of the response of red tape to fiscal transfers.

In this Appendix, first we solve for the expression in equation (8) in the text. Equation (8) contains the terms $dN/dl, dt/dl,$ and db/dl. To solve these we differentiate equations (2) and (5) and solve for (9). We do so assuming $\pi(\cdot)$ is separable in N. Differentiating (2) we get

$$\frac{db}{dl} = \frac{\pi_{bl}}{-\pi_{bb}} + \frac{\pi_{bt}}{-\pi_{bb}}\frac{dt}{dl} > 0. \tag{i}$$

Differentiating (5) we get with rearrangement

$$\frac{dt}{dl} = \frac{\tilde{b}_{tl}}{-(\tilde{b}_{tt} - c_{tt})} > 0. \tag{ii}$$

In (ii), it seems reasonable to assume $\tilde{b}_{tl} > 0$, so that the return on time in getting bribes raises as red tape does. Then $dt/dl > 0$ given the denominator must be positive for the official's maximization problem to be well behaved. Then in (i), given from the text $\pi_{bl}, \pi_{bt} > 0$ and $\pi_{bb} < 0$, $db/dl > 0$.

Differentiating (6) in order to get (9), we have

$$(1-\tau)\pi_N \frac{dN_j}{dl_j} + (1-\tau)\pi_l + (1-\tau)\pi_t \frac{dt_j}{dl_j} = (1-\tau)\frac{dN_i}{dl_j} \tag{iii}$$

where we note that $[(1-\tau)\pi_b - 1]\, db/dl = 0$ from (2). We impose national full employment across our n identical regions, so $dN_i = -dN_j/(n-1)$. Substituting (ii) into (iii) and solving we get

$$\frac{dN}{dl} = \frac{\pi_l}{-\pi_N \dfrac{n}{n-1}} + \frac{\pi_t \dfrac{\tilde{b}_{tl}}{-(\tilde{b}_{tt} - c_{tt})}}{-\pi_N \dfrac{n}{n-1}} < 0. \tag{iv}$$

The sign pattern in (iv) is given by prior assumptions. Equations (i), (ii) and (iv) give us our three equations in three unknowns, $dN/dl, dt/dl,$ and db/dl. These are to be substituted into

$$\frac{dR}{dl}\Big|_g = [N\beta\tau\pi_l + N\tilde{b}_l] + [\beta\tau\pi(\cdot) + N\beta\tau\pi_N + \tilde{b}(\cdot) - c(\cdot)]\frac{dN}{dl} + [N\beta\tau\pi_t]\frac{dt}{dl} + [N\beta\tau\pi_b]\frac{db}{dl} = 0. \tag{8}$$

For the record we note doing so yields

$$[N\beta\tau\pi_l + N\tilde{b}_l] + [\beta\tau\pi(\cdot) + N\beta\tau\pi_N + \tilde{b}(\cdot) - c(\cdot)]\left[\frac{\pi_l}{-\pi_N \dfrac{n}{n-1}} + \frac{\pi_t \dfrac{\tilde{b}_{tl}}{-(\tilde{b}_{tt} - c_{tt})}}{-\pi_N \dfrac{n}{n-1}}\right] \tag{v}$$

$$+ [N\beta\tau\pi_t]\left[\frac{\tilde{b}_{tl}}{-(\tilde{b}_{tt} - c_{tt})}\right] + N\beta\tau\pi_t\left[\frac{\pi_{bl}}{-\pi_{bb}} + \frac{\pi_{bt}}{-\pi_{bb}}\frac{\tilde{b}_{tl}}{-(\tilde{b}_{tt} - c_{tt})}\right] = 0.$$

The entire model is solved for t, l, and b using equations (2), (5) and (v).

Fortunately all we want to show here is that, assuming an equilibrium exists,

$$\frac{dl}{d\beta} = \frac{d(dR/dl/d\beta)}{-d(dR/dl)/dl} < 0 . \qquad (10)$$

The second order condition on the local government's optimization problem signs the denominator as positive. That leaves the numerator. From (8),

$$d(\frac{dR}{dl})/d\beta = [\tau\pi(\cdot) + N\tau\pi_N]\frac{dN}{dl} + N\tau[\pi_l + \pi_t\frac{dt}{dl} + \pi_b\frac{db}{dl}] . \qquad (vi)$$

This term is negative under two conditions, given $dN/dl < 0$. First an additional firm to a district raises total district profits ($\tau\pi(\cdot) + N\tau\pi_N > 0$); so there are not "super diseconomies of scale", whereby a region wants to rid itself of firms. Second, an increase in licenses has the overall effect of reducing firm profits (apart from the costs of bribes) so $\pi_l + \pi_t\frac{dt}{dl} + \pi_b\frac{db}{dl} > 0$. This is simply a statement that overall licenses hurt not help firm productivity. If that were not the case, the whole issue of red tape and efficient grease would be irrelevant.